USDA-FOREST SERVICE FS-2500-8 (6/06)

Date of Report: August 31, 2011

BURNED-AREA REPORT
(Reference FSH 2509.13)

PART I - TYPE OF REQUEST

A. Type of Report

[X] 1. Funding request for estimated emergency stabilization funds
[ ] 2. Accomplishment Report
[ ] 3. No Treatment Recommendation

B. Type of Action

[X] 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: Ken Fire

B. Fire Number: CA-BDF-12349

C. State: CA

D. County: San Bernardino

E. Region: 05

F. Forest: San Bernardino National Forest

G. District: Front Country (53)

H. Fire Incident Job Code: P5GBX4

I. Date Fire Started: 08/22/2011

J. Date Fire Contained: 08/24/2011

K. Suppression Cost: Approximately $500,000 as of August 29, 2011, **NOT** including air support cost (per Mike Hill).

L. Fire Suppression Damages Repaired with Suppression Funds
1. Fireline waterbarred (miles): 1.5 miles
2. Fireline seeded (miles): 0
3. Other (identify): n/a

M. Watershed Number:
Huc 6 watershed: Lower Cajon Wash (180702030303);

N. Total Acres Burned: 322 ac
NFS Acres (210 ac) Other Federal (0 ac) State (0 ac) Private (112 ac)

O. Vegetation Types:
Dominant vegetation types in the burned area consist primarily of lower montane mixed chaparral and ceanothus mixed chapparal. Other vegetative types are contained in the following GIS based table.

Sum of Ken Burn Severity x Veg	Column Labels			
Row Labels	H	L	M	Grand Total
Buckwheat		0.7	9.2	9.9
Canyon Live Oak		2.3	0.4	2.7
Ceanothus Mixed Chaparral	3.3	7.8	41.8	53.0
Lower Montane Mixed Chaparral	0.2	115.2	111.8	227.1
Riparian Mixed Hardwood		14.9	3.9	18.9
Scrub Oak		8.4	1.4	9.8
Urban/Developed (General)		0.0	0.7	0.7
Grand Total	**3.5**	**140.9**	**169.3**	**322.1**

P. Dominant Soils:

Soil Map Units within the Ken Burned Area (from BDF Soil Survey)

Map Unit	Map Unit Name	Acres	% Area
AbD	Soboba-Hanford families association, 2 to 15 percent slopes	115	35.7
DnG	Trigo family-Lithic Xerorthents, warm complex, 50 to 75 percent slopes	14	4.3
CmF	Osito-Modesto families association, 30 to 50 percent slopes	193	60

Q. Geologic Types:
The East San Gabriel Mountains geologic units within the Ken Fire are predominantly Mesozoic metamorphic rocks; mostly muscovite- albite-quartz Schist, muscovite-plagioclase Schist and gneissic rock and marble. These rocks are heavily influenced by major and minor fault zones, often highly fractured, weathered and landslide prone.

R. Miles of Stream Channels by Order or Class:
Perrenial = 0 mi; Intermittent = 1.6 mi; Ephemeral = 0 mi

S. Transportation System (all private): Trails: 0.22 miles Roads: 1.11 miles

PART III - WATERSHED CONDITION

A. Burn Severity by total and FS (acres derived from GIS):

Row Labels	Sum of Acres
NON FOREST SERVICE	**112**
High	0
Low	69
Moderate	43
USDA FOREST SERVICE	**210**
High	4
Low	80
Moderate	126
Grand Total	**322**

B. Water-Repellent Soil (acres):
Increase in area of water repellent soils is estimated to be 4 acres for the entire burned area

C. Soil Erosion Hazard Rating (acres):
0 (low) 115 (moderate) 207 (high)

D. Erosion Potential:

ERMIT Erosion Model Outputs for the First Year Following the Ken Fire (assumes 20% probability, for 5-year storm; 800 foot long hillslope length; 35% rock, in chaparral)

	Erosion in tons/acre by Burn Severity			
Slopes	**Unburned**	**Low**	**Moderate**	**High**
Slopes 0-10%	0-1	0-10	0-11	0-13
Slopes 11-30%	1-2	12-22	16-27	20-32

The ERMiT model is storm event based; outputs represent a single event rather than over-winter.
Model accuracy assumes +/- 50%.

Disturbed WEPP Mean annual averages for 30 years: Upland erosion rate range: 0.4 – 1.3 tons/acre

E. Sediment Potential (cubic yards / square mile):

Sediment yield (cubic yards per square mile) comparison for first and second years after Ken Fire for areas of concern. Average annual results (using Rowe, Countryman, and Storey; Tables 62 & 63).

		Sediment yield 1-year following Ken Fire		**Sediment yield 2-years following Ken Fire**	
Watershed area of concern	**Normal**	**Post-fire**	**multiplier from pre-fire**	**Post-fire**	**multiplier from pre-fire**
Ken Fire (4 sq. mi. contributing to Cajon Wash)	640-2690	1890-8590	3.0-3.2	1040-4620	1.6-1.7
Pitman Canyon contributing to Caltrans culvert	150-610	1080-5000	7.4-8.2	450-2050	3.1-3.4
Above Matthews Ranch home	11-45	165-770	15.2-16.8	60-280	5.6-6.2

This modeling indicates that the overall watershed may see the effects of increased discharge for rain events following the fire in the localized area of the fire. Peak flows will increase in the area, more sediment will be entrained by the flows, and more deposition of sediment will occur.

F. Debris Flow Potential:
As a result of the removal of vegetation by the fire, excessive sediment and available transported material in channels and potential high runoff as a result of moderate to high rainstorms, debris-flow probabilities are high along and above the I-15 corridor.

Peak flow was estimated at various points in the watershed using the Rational Equation and Curve Numbers from the FS Peak Flow Calculator. A small 7 acre watershed above the Matthews property modeled a flow of 20 cfs. A pair of side-by-side culverts at the bend of the Matthews Ranch entry road modeled a peak flow of

430 cfs. The Caltrans culvert under Interstate-15 at the base of Pitman Canyon modeled a peak flow of about 1500 cfs.

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period, (years): 3-5

B. Design Chance of Success, (percent): 64

C. Equivalent Design Recurrence Interval, (years): 5

D. Design Storm Duration, (hours): 5.74

E. Design Storm Magnitude, (inches): 3.11

F. Design Flow, (cubic feet / second/ square mile):

Peak discharge (cfs/sq.mi.) increases to the watersheds for the 2-year (Q2 – 2 inches in 2.5 hours), 5-year (Q5 – 3.1 inches in 5.75 hours), 10-year (Q10 – 3.7 inches in 7.1 hours), and 25-year (Q25 – 5 inches in 8.5 hours) storm events for the year following the Ken Fire (using Rowe, Countryman, and Storey (1949)) - on an average annual basis (Note: The modeled peak flow values should only be used as an indicator of the relative increase in peak flows after the fire.)

	Normal watershed peak discharge per storm type (cfs/sq.mi.)			
Watershed area of concern	**Q2**	**Q5**	**Q10**	**Q25**
Ken Fire (4 sq. mi. contributing to Cajon Wash)	15-45	25-75	30-100	45-140
Pitman Canyon contributing to Caltrans culvert	3-10	6-17	8-23	10-32
Above Matthews Ranch home	0.24-0.77	0.4-1.3	0.55-1.7	0.75-2.4

G. Estimated Reduction in Infiltration, (percent): 25%

H. Adjusted Design Flow, (cfs per square mile):

Peak discharge (cfs/sq.mi.) increases to the watersheds for the 2-year (Q2 – 2 inches in 2.5 hours), 5-year (Q5 – 3.1 inches in 5.75 hours), 10-year (Q10 – 3.7 inches in 7.1 hours), and 25-year (Q25 – 5 inches in 8.5 hours) storm events for the year following the Ken Fire (using Rowe, Countryman, and Storey (1949)) - on an average annual basis (Note: The modeled peak flow values should only be used as an indicator of the relative increase in peak flows after the fire.) The equivalent storm interval is provided (e.g. a Q5 result with Q10 indicates that the watershed is likely to respond as if there was a Q10 event occurring).

	1-year post burn peak discharge per storm type (cfs/sq.mi.) with approximate equivalent recurring storm rank			
Watershed area of concern	**Q2**	**Q5**	**Q10**	**Q25**
Ken Fire (4 sq. mi. contributing to Cajon Wash)	16-52 (Q2)	27-85 (Q7)	35-110 (Q14)	48-150 (Q37)
Pitman Canyon contributing to Caltrans culvert	4.6-15 (Q4)	7.4-24 (Q10)	9.5-30 (Q25)	13-40 (Q65)

Above Matthews Ranch home	0.5-1.5 (Q7)	0.7-2.3 (Q22)	0.9-2.9 (Q50)	1.2-3.8 (Q100+)

PART V - SUMMARY OF ANALYSIS

A. Describe Critical Values/Resources and Threats:

Summary of fire burned area characteristics and watershed response:

The Ken Fire burned approximately 322 acres with 210 acres on the San Bernardino National Forest, and 112 acres on non-Forest Service lands within the San Gabriel Mountains in San Bernardino County. The fire was within the Lower Cajon Wash sixth field watershed.

US Forest Firefighters traveling along Interstate 15 spotted a vegetation fire along the northbound side of the freeway just north of the Kenwood exit shortly after 1pm on Monday, August 22, 2011. The Ken fire did force closure of Interstate 15 in both directions for a brief period and a closure of several northbound lanes into the evening, and the far right lane on the northbound side was re-opened at 1pm on August 23, 2011. The Ken fire spread rapidly up a drainage towards the Mathews Ranch, located east of Interstate 15, destroying one home, two shipping containers and three small outbuildings. Firefighters were able to prevent the fire from damaging the two remaining homes and numerous outbuildings at the ranch.

There are several private in-holdings and Caltrans has an easement/right-of-way in association with Interstate-15 within the fire perimeter totaling 112 acres. A Forest BAER assessment team was mobilized because the District Ranger indicated that multiple values at risk should be assessed, including private residences and access roads into residences, Interstate 15, a Kinder-Morgan petroleum line, Southern California Edison power lines, and threatened, endangered and sensitive species habitat. The BAER team has been coordinating with Caltrans and the NRCS with regard to the initial BAER assessment, findings, and recommendations. Portions of the Ken fire reburned areas associated with the Grand Prix-Old complex of 2003.

The BAER Team Leader and Team Hydrologist found the overall soil burn severity to be 3% unburned and very low, 44% low, 52% moderate, and 1% high. In addition, the rock content had an average value of 35 to 40%. Many areas rated as moderate for soil burn severity will have increased coverage due to rock content. Accelerated hill slope erosion and watershed response is expected on slopes with moderate and high burn severity. Soils with low burn severity still have good surface structure, contain intact fine roots and organic matter, and should recover in the short-term once revegetation begins and the soil surface regains cover. The moderate to high classes have evidence of severe soil heating in isolated patches; these areas have long-term soil damage and high to very high erosion hazard. The most severely burned slopes occur where pre-fire vegetation density and fuels accumulations were higher. Water repellency is present throughout the fire area, including unburned areas, and was only moderately exacerbated by the fire. While a proportion of eroded soil will remain on the hill-slope, delivery of eroded soil, by dry ravel or water erosion, to stream channels is expected to occur. These eroded sediments are a primary source of material for debris flows and sediment laden stream flows.

Watershed and Geology and Soils

The Ken Fire occurred in the Cajon Pass area which bridges the Southern California basin to the south and the high desert environment to the north. The area is dominated by older slides, a broad alluvial wash, and numerous springs. A majority of the drainages only flow when rainfall is present, typically in the winter months.

The San Gabriel Mountains are some of the most tectonically active and rapidly uplifting mountains in the United States. The forces lifting the mountains to great heights are being counteracted by erosive forces tearing them down, such as gravity, moving water, wind, earthquakes and human activities. When the Ken Fire removed vegetative cover and burned surface soil structure, slopes and channels became even more unstable than normal. Rocks which have lost their supporting vegetation on steep slopes have already started to roll down to roadways or canyon bottoms, or to places where they are stopped by obstructions or gentler

slopes. Groundwater which previously fed vegetation may now surface as seeps and springs on some slopes and in canyon bottoms, and may initiate slope movements in some areas, even before the arrival of winter rains.

Deep seated rotational landslides and earth flows are relatively few in these mountains, but could occur in deep saturated slopes, especially if shaken by an earthquake. Many earthquake faults crisscross and border these mountains, and quakes could significantly increase all types of slope movements when slopes are saturated. Thin surficial slides and deeper translational debris slides will increase due to the destruction of soil structure and loss of root support.

Potentially the most dramatic geologic hazard response to the fire could be the increase in destructive debris flows. Debris flows tend to bring side slope and channel deposits racing down channel bottoms in a slurry similar to the consistency of concrete, in masses from a few hundred cubic yards to hundreds of thousands of cubic yards of saturated material, destroying everything in their path until they finally lose their momentum or are caught in a debris catchment basin. Peak flow modeling using the Rational Equation indicates that the culverts near the base of the fire could experience flows that could be problematic.

Soils are dominantly coarse textured, rocky, and occur on steep to very steep slopes, rendering them naturally erodible. Relatively recent tectonic uplifting and high geomorphic erosion rates are responsible for relatively low amounts of soil development. Pulse erosion following fire is a natural, long-term process in this region. Cover is critical for soil stabilization, and is lacking throughout most of the fire area.

Threats to Life, and Property

Threats to life, safety, and property exist from the increased potential for flooding along roads that provide the only access to two residences within the fire area. Hall Ranch Rd. and Mathews Ranch Road merge together and pass under Interstate 15 through a tunnel. The tunnel and junction of these two roads is on non-Forest Service land based on review of San Bernardino County ownership data. There are two small culverts associated with Mathews Ranch Road that allow flow to one main culvert associated with Interstate 15. From conversations with Mr. Mathews and Mr. Hall when the two small culverts plug, flows are directed into the tunnel road, preventing access into or out of their properties. This occurred during winter storm event following the 2003 Grand Prix/Old Fires. There is also potential for damage to parts of Mr. Mathew's property as a result of increased flooding and sedimentation if channels associated with his property top or fail as a result of increased flows from the fire.

There are culverts along Interstate 15 that will have increased flows as a result of the Ken fire. These increased flows are not expected to cause damage to Interstate 15 and associated infrastructure, as long as the entrances, outlets and associated infrastructure are maintained.

With a possible sediment yield of over 15-20 times the average natural condition, it is important to make those responsible for road and residential protection aware of potential issues.

Threats to water quality and quantity

Given that the Ken Fire only burned in an area of intermittent and ephemeral streams, the increase in sediment and ash from the burned area should not noticeably affect water quality. Cajon Creek is about 0.4 miles from the edge of the fire below Interstate 15. During storm events, increased sedimentation and flow could reach Cajon Wash. However, the 322 acre Ken Fire will not significantly affect water quality due to the dilution of the size of the watershed.

Burned buildings and vehicles on private land pose a threat to water quality from the release and mobilization of associated toxic chemicals such as gas, oil, and building materials. While the threat is currently thought to be low, further coordination with the NRCS and San Bernardino County is needed.

Threats to Soil Productivity

The greatest threat to long-term soil productivity comes from the threat of increased potential for establishment of noxious weeds. Despite high rates of post-fire soil erosion (dry ravel, increased overland flow, and wind), burned area soils will support recovery of fire adapted vegetation in the burned area. Slope stability is likely to recover to pre-fire conditions within 3-5 years.

Threats to wildlife and botanical resources

An emergency exists with respect to the recovery and ecological sustainability of the native vegetation within the entire burned area as a result of invasive weed introduction and expansion and unauthorized off-road vehicle (OHV) use. While the burned area did not have a history of unauthorized OHV use, there is now potential for increased use to occur as a result of the loss of vegetative barriers. Additionally, areas of ground disturbance (i.e. dozer lines) and regular equipment or crew presence (i.e. staging areas, safety zones, drop points) during suppression operations created a risk of invasive weed introduction, establishment and proliferation. Loss of vegetative cover which has acted as a natural barrier substantially increases this threat. Invasive weed populations known prior to the Ken Fire event will increase in the burn area due to naturally accelerated growth rates, high reproduction capabilities, and release from competition with native species. These weed populations could affect the structure and function of native plant communities within the burn area, weaken watershed integrity and soil stability, and threaten native wildlife habitat. The open vegetation structure of the post-fire landscape is extremely vulnerable to unauthorized OHV use. Impacts associated with this activity, including soil disturbance, compaction, and weed introduction/spread further exacerbate the recovery of multiple resources already at risk post-fire. These resources at risk include general vegetation, rare plants, wildlife, heritage resources, and watershed values. It is expected that most native vegetation would recover over time if noxious weed competition and OHV use are minimized.

Speckled dace (Forest Service Sensitive fish), Arroyo Toad (Federally Endangered), Willow Flycatcher (Federally Endangered), Least Bell's Vireo (Federally Endangered), and San Bernardino Kangaroo Rat (Federally Endangered) are all known to occur downstream of the burn area in Cajon Wash. Due to the small size of the fire and dilution of sediment and ash as a result of the size of Cajon Wash, impacts to these species are not expected as result of increased watershed response.

Threats to Heritage Sites

No known concerns per acting District Archaeologist.

Summary of Values at Risk and Emergency Determination

Value Category	Hazard	At Risk	Emergency Yes/No
Life/Health/Safety	Debris Flows, flooding, rockfall, sediment deposition	Private Residence Roads and Matthews Ranch properties	Yes
Property/Infrastructure	Debris flows, flooding, rockfall, sediment deposition	Private Residence Roads and Matthews Ranch properties	Yes
	Debris flows, stream channel scouring	Kinder-Morgan petroleum pipeline	Yes
Water Quality	Increased sedimentation and turbidity	Water quality	No
	Hazardous material runoff from burned vehicles, structures	Water quality; public health	Unknown
Wildlife and rare plant habitat	Noxious Weed Invasion, Increased unauthorized OHV use	Vegetative recovery; wildlife and rare plant habitat	Yes
Soil Productivity	Increased runoff and debris flows, rock and debris fall,	There is no emergency to soil productivity due to fire-adapted ecosystems.	No

	erosion and sedimentation, and landslides.		

B. Emergency Treatment Objectives:

The primary treatment objectives are to reduce threats to life, safety, and natural resources.

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

Land **90** % Channel **N/A** % Roads/Trails **N/A** % Protection/Safety **N/A** %

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Land	80	90	90
Channel	N/A	N/A	N/A
Roads/Trails	N/A	N/A	N/A
Protection/Safety	N/A	N/A	N/A

E. Cost of No-Action (Including Loss): $44,500,000 (Cost risk worksheet is in project file.)

F. Cost of Selected Alternative (Including Loss): $28,500 Cost risk worksheet is in project file.)

G. Skills Represented on Burned-Area Survey Team:

[x] Hydrology [ ] Soils [ ] Geology [ ] Range [ ] Recreation/Trails
[ ] Forestry [ ] Wildlife [ ] Fire Mgmt. [ ] Engineering [ ]
[ ] Contracting [ ] Ecology [ ] Botany [ ] Archaeology [ ]
[ ] Fisheries [ ] Research [ ] Landscape Arch [X] GIS

Team Leader: Marc Stamer

Email: mstamer@fs.fed.us Phone: 909-382-xxxx FAX: 909-383-xxxx

Core Team Members:

- Robert G. Taylor – Hydrologist
- Tracy Tennant – GIS

H. Treatment Narrative:

The proposed treatments on National Forest System lands can help to reduce the impacts of the fire from storm events, but treatments cannot fully mitigate the effects of the fire on the watershed. Detailed information of the treatments summarized below can be found in the specialist reports prepared in support of this funding request. Hill slope treatments (such as hydromulching, aerial seeding, and straw application) were not proposed because they are infeasible and/or would not reduce the probability of damage to assets. For more information, see the Hydrology Specialist Report. The treatments listed below are those that are considered to be the most effective on National Forest System lands for the identified threats.

Land Treatments:

Noxious Weed Detection Surveys:
Surveys will begin in 2012 during the resprouting and flowering periods of weed species. Completion of surveys in roads, dozer lines, staging areas, safety zones, downstream from the weed washing station, known invasive and sensitive plant populations, and habitat for the southwestern willow flycatcher will be the first priority. The second survey priorities would be along riparian areas, hand lines, drop points, and prohibited plant plantations. Detailed weed detection survey guidelines are in the Noxious Weed Detection Survey Plan.

Item	Unit	Unit Cost	# of Units	Cost
GS-11 Botanist	Days	$390	2	$780
Supplies	Each	$100	1	$100
Vehicle Mileage	Miles	$0.37	200	$74
			Total Cost	**$954**

Channel Treatments: N/A

Road Treatments: N/A

Protection/Safety Treatments:

BAER Implementation and Interagency Coordination:
This treatment ensures continued communication and coordination with NRCS and California Depratment of Transportation both of which have jurisdiction over adjacent lands and in holdings where life and property are at risk from post-fire conditions. Actions include working and coordinating with other agencies on the post-fire effects within and downstream of the fire such as potential road closures, Kinder-Morgan Pipeline operation and maintenance plan with regard to the fire, the County of San Bernardino regarding road closures, and the NRCS regarding private property in holdings.

Item	Unit	Unit Cost	# of Units	Cost
GS-11 Lands specialist	Days	$355	2	$710
Total Cost				**$710**

I. Monitoring Narrative:

Part VI – Emergency Stabilization Treatments and Source of Funds **Interim #**

			NFS Lands				Other Lands			All
		Unit	# of		Other	# of	Fed	# of	Non Fed	Total
Line Items	Units	Cost	Units	BAER $	$	units	$	Units	$	$
A. Land Treatments										
Noxious Weed Detecti	ea	$954	1	$954	$0		$0		$0	$954
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Land Treatments				$954	$0		$0		$0	$954
B. Channel Treatments										
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Channel Treat.				$0	$0		$0		$0	$0
C. Road and Trails										
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Road & Trails				$0	$0		$0		$0	$0
D. Protection/Safety										
Interagency Coord.	ea	$710	1	$710	$0		$0		$0	$710
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Structures				$710	$0		$0		$0	$710
E. BAER Evaluation										
Assessment Team	ea	$1,000	5	$5,000			$0		$0	$0
Insert new items above this line!				---	$0		$0		$0	$0
Subtotal Evaluation				---	$0		$0		$0	$0
F. Monitoring										
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Monitoring				$0	$0		$0		$0	$0
G. Totals				$1,664	$0		**$0**		**$0**	**$1,664**
Previously approved										
Total for this request				**$1,664**						

PART VII - APPROVALS

1. */s/ Jody Noiron* — *8/31/11*
   Forest Supervisor (signature) — Date

2. /s/ Jeanne Wade Evans — 9/8/11
   Regional Forester (signature) — Date