2006 Day Fire BAER Assessment
Executive Summary

An initial Burn Area Emergency Response (BAER) assessment was completed for the 2006 Day Fire Los Padres portion. The fire burned an area that was 163,908 acres in size. Approximately, 152,908 acres was evaluated in this assessment. Burn severity in the fire area includes 1,171 acres (1%) of high burn severity, 83,345 acres (54%) of moderate burn severity, 30,678 acres (20%) of low burn severity, and 38,130 acres (25%) of unburned to very low burn severity.

Several values at risk were identified on private lands below the fire area, on the south side of the fire, including private property and road structures in the lower reaches of Santa Paula Creek, Sespe Creek and Lower Piru Creek, in the communities of Santa Paula and Fillmore. Potential damage could occur to agricultural lands and some structures that were observed in the flood plains of the aforementioned water courses. Increased sediment and water discharge into Lake Piru and Pyramid Lake is also a threat that could reduce the storage capacity of the reservoirs. Values at risk were identified on National Forest System lands that include forest system roads and trails, heritage sites and the potential for the establishment of noxious weeds exists.

Several analyzes were completed for this assessment including a water discharge analysis, erosion and sediment analysis and a qualitative slope stability analysis. A quantitative slope stability analysis, specifically a debris flow probability analysis and an estimation of maximum discharge in cooperation with the United States Geological Survey is being considered. Watersheds with the most increases in water yield include Piru Creek/Mutau Creek. Piru Creek/Snowy Creek and Piru Creek/South Fork Piru Creek watersheds will have increases of water yield of 69, 43, and 50 percent, respectively. The predicted water discharge into Santa Paula Creek will increase 16% and the predicted water discharge into Sespe Creek/Hot Springs and Sespe Creek/West Fork Sespe Creek will increase 32% and 57%, respectively. The predicted water discharge into Agua Blanca Creek and Fish Creek will increase 38% and 39%, respectively. The estimate of the average post-fire erosion rate for the fire was 14 tons/acre in 24 months after the fire. This is comparable to the sediment estimates for the post-fire year of 9897 cubic yards per square mile (15 cubic yards per acre). Estimates of post-fire erosion rates range from 5 to 15 tons/acre, with the Santa Paula, Upper Sespe and Lower Sespe having the highest rates at 15 tns/ac, 13 ton/ac, and 11 ton/ac, respectively. Watersheds with the most increases in sediment potential are Agua Blanca Creek watershed, 599%, Santa Paula Creek, 648%, Sespe Creek/Hot Springs Canyon Watershed, 1849%, Piru Creek/Snowy Creek Watershed, 1999%, Piru Creek/South Fork Piru Creek Watershed, 2003%, Piru Creek/Mutau Creek, 2692%, Piru Creek/Fish Creek, 3274% and Sespe Creek/West Fork Sespe Creek, 6750%. The potential for creating an emergency for debris flow, slope movement, and sediment generation is found in the following watersheds: Aqua Blanca Creek, Santa Paula Creek, Sespe Creek-Hot Springs Canyon and Sespe Creek-West Fork of Sespe Creek. This analysis process indicates that increased debris flows, slope movements, and greater sediment generation are likely in these four watersheds.

There is a high likelihood that loss of control of water (flooding) and increased sedimentation could be a threat to life and property and could cause damage to downstream properties. Emergency treatments for downstream values include notifying other government agencies that have jurisdiction in the area, of the Day Fire BAER assessment. Coordination

with other government agencies has been started by direct contact with the Natural Resource Conservation Service to identify those private properties that were observed to be at risk by the BAER Team. In addition, two interagency meetings were held to notify those other government agencies including Ventura County Watershed Protection District and the Sheriffs Office of Emergency Service of the BAER Team's efforts and to provide a briefing of the BAER Team's findings and recommendations. This BAER assessment was not able to completely evaluate the possibility of a BAER treatment for a floating boom in Lake Piru to contain large floating debris in the lake and minimize damage.

There is a high likelihood that forest roads, trails and heritage sites could become damaged from loss of control of water and erosion. The public is also at risk from using roads and trails for at least the upcoming winter. Forest personnel could be at risk from hazard trees on roads and trails during implementation of road and trail treatments. Damage could be substantial if emergency treatments are not implemented. This BAER assessment has identified 31.5 miles of road and 56.85 miles of hiking trails and Off-Highway Vehicle (OHV) trails that need treatment to control increases in runoff and erosion. In addition, treatment to control the movement of noxious weeds into the fire area is proposed. One hundred and sixteen heritage resource sites have been identified, as being at risk of damage, and these sites are currently being assessed. An interim 2500-8 will be submitted requesting approval to treat these sites.

Recommended treatments for values at risk on National Forest System lands include closing roads and trails to the public through the spring of 2007 or until re-evaluation occurs. In addition, $1,370,467 is being requested to treat roads, trails, conduct a delayed detection survey for noxious weeds and prevent damage to heritage resource sites.

USDA-FORESTSERVICE FS-2500-8
(6/06)

Date of Report: 10/26/06
version 11-15-06

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: Day Fire Los Padres NF

B. Fire Number: CA LPF 2023

C. State: CA

D. County: Ventura

E. Region: 5

F. Forest: Los Padres

G. District: Ojai and Mt. Pinos

H. Fire Incident Job Code: P5C50E

I. Date Fire Started: 09/04/2006

J. Date Fire Contained: 10/02/2006

K. Suppression Cost: $70,304,735 as of October 2, 2006

L. Fire Suppression Damages Repaired with Suppression Funds
1. Fire line water barred (miles): Dozer line 164 + hand line 172 = 336 miles
2. Fire line seeded (miles): 0
3. Other (identify):

M. Watershed Number: Described by 5th field Hydrologic Unit Code (HUC).

1806000701	Upper Cuyama River
1807010205	Upper Piru Creek
1807010206	Lower Piru Creek
1807010207	Sespe Creek
1807010209	Lower Santa Clara River

N. Total Acres Burned: 152,908. This figure includes an unburned island in the Mutau Flat area and does not include the portion assessed in the Day Fire (Eastern) – Angeles NF.
NFS Acres (149,467) Other Federal (0) State (0) Private (3,441)

O. Vegetation Types: The Day Fire impacted an enormous variety of different plant communities and environments. It burned from Costal Sage Scrub to Great Basin Sagebrush and from Big-Cone Douglas-fir Forest to Pinyon Pine Woodland.

P. Dominant Soils: Haploxerolls, Argixerolls, Haploxeralfs

Q. Geologic Types: Sedimentary, granitic and metamorphosed granitic rocks. The sedimentary rocks are varied in both type and origin. Sandstone, shale, and conglomerate are present from sediment deposited in both deep marine and terrestrial environments. There are also more recent landform units consisting of alluvial gravel of varying age, colluvium and landslide deposits.

R. Miles of Stream Channels by Order or Class: There are approximately 749 miles of seasonal stream channels and 108 miles of perennial stream channels.

S. Transportation System

Trails: 48 miles Roads: 40 miles within the fire perimeter and 55 miles total.

PART III - WATERSHED CONDITION

A. Burn Severity (acres): Unburned to Very Low 38,130 (25%) (Low) 30,678 (20%) (Moderate) 82,929 (54%) (High) 1171 (1%)

B. Water-Repellent Soil (acres): 107402 (Low), 53700 (Moderate), 1600 (High)

C. Soil Erosion Hazard Rating (acres):
55,115 (Low) 35,500 (Moderate) 71,000 (High)

D. Erosion Potential: 14 tons/acre Erosion rates are average estimate for 24 months using USLE.

E. Sediment Potential: 9,897 cubic yards / square mile. Pre-fire sediment yield is 1,466 yds^3/mile. Post-fire and pre-fire estimates include conditions and sediment contribution from 2002 Wolf Fire and 2003 Piru Fire.

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period, (years):	33% 1st year; 48% 2nd year
B. Design Chance of Success, (percent):	80%
C. Equivalent Design Recurrence Interval, (years):	5
D. Design Storm Duration, (hours):	24
E. Design Storm Magnitude, (inches):	4
F. Design Flow, (cubic feet / second/ square mile):	10-13
G. Estimated Reduction in Infiltration, (percent):	25
H. Adjusted Design Flow, ($cfs/mile^2$):	11-18

PART V - SUMMARY OF ANALYSIS

A. Describe Critical Values/Resources and Threats:

Introduction

The Day Fire burned a total of 163,908 acres of National Forest System (NFS) lands and private lands. This BAER assessment covers the portion of the fire on the Los Padres National Forest, which is approximately 152,908 acres. The Day Fire is bounded on the east by Federal Interstate Highway 5, on the north by Lockwood Creek and Piru Creek, on the west by the headwaters of Piru Creek and Sespe Creek and on the south, along the Sespe Wilderness boundary.

Burn severity in the fire area includes 1,171 acres (1%) of high burn severity, 83,345 acres (54%) of moderate burn severity, 30,678 acres (20%) of low burn severity, and 38,130 acres (25%) of unburned to very low burn severity. Slopes are generally steep within in the fire perimeter, averaging 43 percent. The steepest slopes are concentrated in the southern half of the fire. Theses areas are in the watersheds of Piru Creek/Fish Creek, Agua Blanca Creek, and in Sespe Creek/Hot Springs Canyon.

The Day Fire burned within five HUC 5 watersheds. The Upper Cuyama River watershed had little burn area (0.69 mi^2 burned out of 297.4 mi^2). Downstream effects from the wildfire in the Upper Cuyama River watershed are expected to be minor and further analysis is not needed.

The other four watersheds include Upper Piru Creek (91.37 mi2 burned out of 291.1 mi2), Lower Piru Creek (31.37 mi2 burned out of 143.5 mi2), the Sespe Creek (56.92 mi2 burned out of 268.7 mi2), and the Lower Santa Clara River (5.78 mi2 burned out of 134.0 mi2). Two recent fires burned in the area and add to the cumulative effects of the Day Fire. The 2002 Wolf Fire burned on the western side of the Day Fire and the 2003 Piru Fire burned in the southeastern area of the Day Fire. Table 1 shows burn severity in square miles for the affected HUC 5 watersheds of the Day Fire with percentage of high and moderate burn severity per watershed.

Table 1 – Burn Severity (miles^2) In Affected 5th Field HUC Watersheds

Watershed	*High severity*	*Moderate severity*	*Low severity*	*Unburned in & out of fire*	*Watershed Area*	*% High & Mod Burn*
Lower Piru Creek	0.1	21.4	9.8	112.1	143.5	15%
Lower Santa Clara River	0.3	4.9	0.6	128.1	134.0	4%
Sespe Creek	0.1	40.4	16.4	211.8	268.7	15%
Upper Cuyama River	0.1	0.6	0.1	296.6	297.4	0.2%
Upper Piru Creek	1.3	67.1	23.0	199.7	291.1	23%
Total Affected Watersheds	**1.8**	**134.4**	**50.0**	**948.4**	**1134.6**	**12%**

Fourteen HUC 6 sub-watersheds are located within the five HUC 5 watersheds. One of those HUC 6 sub-watersheds is located in the Cuyama River watershed and is not a concern for post fire emergency. All fourteen sub-watersheds have been analyzed for increased water discharge and sediment (see hydrology report). Five of the HUC 6 sub-watersheds are a concern for post fire emergencies and will be discussed in more detail. Those five HUC 6 sub-watersheds include Santa Paula Creek, Sespe Creek/Hot Springs Canyon, Sespe Creek/West Fork Sespe Creek, Agua Blanca Creek and Piru Creek/Fish Creek. The HUC 6, Upper Piru Creek watershed was affected by the Day Fire and this area was also analyzed and will be discussed.

1. Santa Paula Creek HUC 6 watershed is the only sub-watershed that burned within the Lower Santa Clara River HUC 5 watershed. Approximately, 17% of the 47.3 mi^2 Santa Paula Creek watershed is located within the perimeter of the Day Fire. Approximately 0.25 mi^2 (0.53%) burned with high burn severity and 4.93 mi^2 (10.42%) burned with moderate burn severity. The remaining area within the fire's perimeter burned with low to no burn severity. The upper section of Santa Paula Creek is a highly efficient bed load transport reach, evident by the existence of a well scoured, narrow, moderately steep-graded, polished bedrock gorge with small amounts of stored sediment and debris. It appears that the majority of sediment and debris generated by floods in the upper watershed deposits in the lower canyon. The characteristics of the lower reaches of Santa Paula Canyon show that this section is subject to heavy debris and sediment deposition. Recent severe flood events during the winter of 2004-2005 introduced increased amounts of sediment and woody debris that is currently stored along the channel banks on terraces that could be mobilized and moved downstream with the next severe flood event. The lower channel is highly unstable and prone to stream flow re-

direction as flood events move the on-site stored sediment and debris to different locations that can cause sudden changes in channel geometry.

Considering the potential for mobilization of stored debris and sediment, flood flows will be forced toward unstable and highly erosive terrace slopes and banks, barren of stabilizing vegetation, resulting in increases of bed materials downstream and terrace slope erosion. The upper watershed of Santa Paula Creek can usually have at least one event of rainfall that can have a magnitude of 6-8 inches of rain in a 24 hour period (estimated from National Weather Service Data). This potential effect, compounded with the expected increases of sediment and debris transport and water yield from the burned area in the headwaters of Santa Paula Canyon from anticipated heavy winter storms, could result in debris constrictions of the channel and sudden channel shifts in the lower response areas, threatening downstream values at risk. These values include the trail system and campsites on Los Padres National Forest, an avocado farm upstream of Thomas Aquinas College, 5 bridges and a stream gauge.

Above the East Fork Santa Paula Creek and Santa Paula Creek, along the Santa Paula Canyon Trail, the creek is a stable channel. The creek contains minimal amounts of sediment and is an efficient transport reach due to the channel being steep and bedrock controlled. The area between the Big Cone Campsite and Cross Campsite is actively used by the public for swimming, hiking, and camping. The trail is located along the stream for most of the reach and has been eroded and/or destroyed in certain spots. Upstream of where the East Fork Santa Paula Creek meets Santa Paula Creek, a Forest Service sign states that the trail is “No longer maintained beyond this point”. The Big Cone Campsite is located on a terrace approximately 70 vertical feet above the floodplain and is not at risk from flooding. The Cross Campsite shows evidence of sediment deposition from previous flood events. Campers should be cautioned not to be camping in the area when the possibility of a storm is in the area.

The avocado farm upstream of the Thomas Aquinas College is at risk. The avocados trees are approximately 5 to 15 feet above the channel on an old terrace. The past floods have eroded away the banks and created a vertical wall. Two channel tributaries located through the property have down cut and eroded the banks leading into Santa Paula Creek. There is potential for the owner to lose some of the avocado trees due to the high banks and the two channels located through the property. The water pump on the upper end of the property is also at risk of being damaged and/or covered with sediment.

The Thomas Aquinas College campus borders the top of the steep, eroding terrace bank of Santa Paula Creek. The channel thalweg (middle or deepest path) has shifted towards the campus as a result of channel migration from recent flood events. With post-fire flood conditions, there will likely be an increase of the terrace bank erosion, as the channel will continue to migrate towards the campus property. The channel may clog with debris at the point where the channel narrows and cause a back water eddy effect that may enhance the terrace erosion. The primary threat is loss of the existing fence line and vegetation on the property, such as mature oak and sycamore trees that line the property boundary along the terrace edge. In addition, an area of landscaped property and topsoil on the top of the terrace could be affected. The college president’s residence is located on the top of the terrace next to the creek and is far enough away from the terrace bank edge (approximately 100 yards and higher in elevation) that there is no emergency hazard to life and property. It was suggested to the caretaker of the

college to remind college staff to monitor the stream terrace during floods and to advise students and staff to avoid getting near the terrace edge during floods, as slope failure could occur and cause potential accidents. The upstream portion of the property boundary is elevated enough and located far enough from the channel that there is very a low chance of flood flows to enter the campus from that area.

The lowest reach of Santa Paula Creek within the community of Santa Paula is contained in a concrete lined channel that is filled with large amounts of sediment. The recent 2005 storm resulted in significant deposition of sediment in this concrete lined portion of the channel. This channel flows under at least 5 bridges, including a railroad trestle. The channel maintains its entrenched state until it reaches the site of destroyed fish ladder and gauge station. The remnants of the fish ladder and gauge station create a change in elevation and gradient along the creek. Santa Paula Creek carries such large sediment load, the change in elevation caused by the old structure results in deposition of large amounts of sediment upstream of this site. If the structure fails there is the potential for a large debris flow to impact the concrete lined channel downstream. The gauge station in Santa Paula Creek has been moved at least 3 times and is a value at risk.

2. Sespe Creek is subdivided into two HUC 6 sub-watersheds that include the Hot Springs Canyon sub-watershed and the West Fork Sespe Creek sub-watershed. Approximately, 63% of the 70.3 mi^2 Sespe Creek/Hot Springs Canyon watershed is located within the perimeter of the Day Fire. Approximately 0.1 mi^2 (0.14%) burned with high burn severity and 19.8 mi^2 (28.15%) burned with moderate burn severity. The remaining area within the fire's perimeter burned with low to no burn severity. Most of the north facing slopes on the south side of Sespe Creek burned with moderate burn severity, whereas the south facing slopes, north of Sespe Creek burned with low to no burn severity. Approximately, 90% of the 44.6 mi^2 Sespe Creek/West Fork Sespe Creek watershed is located within the perimeter of the Day Fire. Approximately 0.1 mi^2 (0.13%) burned with high burn severity and 20.5 mi^2 (45.96%) burned with moderate burn severity. The remaining area within the fire's perimeter burned with low to no burn severity. Sespe Creek flows through the town of Fillmore where several values at risk were identified. These values at risk include life and property along Grand Avenue and Good Enough Road on both sides of Sespe Creek. There are several parcels of private property with agricultural land and structures along the river. Several sites were reviewed by the BAER Team and are described below. There may be other sites that need to be evaluated along the Sespe River.

   Numerous sites in the Sespe Creek floodplain are at risk of flooding and debris flows could occur as a result of the Day fire. Sespe Creek currently contains a large amount of stored sediment resulting from the 2003 Piru fire. Some of this sediment is in the form of large channel bars which under average flows divert water into croplands farms and have the potential to cause future damage to adjacent lands. Evidence of this can be seen where a large mid-channel bar appears to have diverted flows into an adjacent farm. It appears as if flood waters have been responsible for crop damage as there is an age variation in crops at about the location of an expected floodplain elevation. Based on this evidence it is reasonable to consider that all of the buildings in the lower vicinity of this area is at risk.

   Another value in this area includes a home, trailer, vehicles and other private property items. This property appears low in the floodplain and is more at risk than the

downstream homes as the levee appears to terminate just before it reaches the home upstream.

A horse ranch located at the mouth of Sespe Canyon, upstream of the aforementioned property is another area of concern. This ranch has a main house and numerous "out" buildings that appear to be at risk of flooding and potential debris or mudflows could occur at this site. See the hydrology report for photos of these sites.

Sespe Creek flows under numerous road bridges and a rail road trestle and they have the potential to be affected by debris flows and flooding.

Ventura County Watershed Protection District maintains a system of stream gauges and rain gauges to monitor storm flood events. One of their stream gauges is located in an area of Sespe Creek, where the channel bottom can change significantly during moderate and large flood events. The gauge is also susceptible to damage, rendering the site inoperable during flood events. This happened during 1998 and 2005. The orifice line at the current site tends to be destroyed when moderate flows occur in Sespe Creek. A site upstream, located on private land has a natural control that prevents large changes in the channel bottom. A gauge structure is located at this former site and is intact and built to withstand large flows in Sespe Creek. This would provide a better knowledge of moderate and high flows along Sespe Creek and provide a reliable site during flood events. Steps should be taken to acquire the previous gauging site.

3. Lower Piru Creek is subdivided into two HUC 6 sub-watersheds that include the Piru Creek/Fish Creek sub-watershed and the Agua Blanca Creek sub-watershed. Approximately, 74% of the 40.6 mi2 Piru Creek/Fish Creek watershed is located within the perimeter of the Day Fire. Approximately, .09 mi2 (.22%) burned with high burn severity and 11.66 mi2 (28.76%) burned with moderate burn severity. The remaining area within the fire's perimeter burned with low to no burn severity. Lower Piru Creek flows into Lake Piru above the Santa Felicia Dam. The dam is the first structural value at risk below the lake. Immediately below the dam is an equestrian center that sits on what was once an old point bar somewhat above the elevation of the current floodplain. At this location the river valley is very wide and could probably withstand a large flood. The equestrian center is probably safe however the road systems associated with this complex is located further down in the floodplain and is probably at risk. There are numerous roads and other transportation features (railroad trestle, footbridge, etc) between the dam and the terminus of Piru Creek which is the Santa Clara River. These bridge crossings are also at risk. There are roughly five bridges between the dam and the Santa Clara River. After the 2003 Piru Fire, significant amounts of floating large woody debris moved into Lake Piru. It is expected that at least the same amount, which was estimated to be approximately 60 acres in floating debris, will come into the lake.

4. Upper Piru Creek is subdivided into 4 HUC 6 sub-watersheds that include Upper Lockwood Creek, South Fork Piru Creek, Mutau Creek and Snowy Creek. Upper Piru Creek drains into Pyramid Lake on the northeast corner of the fire area. Approximately, 38% of the 291.1 mi^2 Upper Piru Creek watershed is located within the perimeter of the Day Fire. Approximately 1.29 mi^2 (.44%) burned with high burn severity and 67.08 mi^2 (23.04%) burned with moderate burn severity. The remaining area within the fire's perimeter burned with low to no burn severity.

An analysis of expected changes in watershed discharge, sediment rates, soil erosion and slope

stability were conducted during the BAER assessment. The results of those analyses are included in the following discussion.

Loss of Control of Water

Discharge Analysis

Wildfires result in increased runoff commensurate with burn severity. Burn severity was used to estimate runoff increases resulting from fires. These increases are calculated as adjusted design flow. Adjusted design flow is the flow increase expected to occur as a result of decreased infiltration and interception following a wildfire. Together these values are utilized to evaluate the need to increase capacity for flow or drainage structures such as culverts and bridges. Values also provide an estimate of flooding potential to near-by communities.

Before an adjusted design flow can be determined, pre-fire design flow must be calculated. This is the flow expected to occur prior to the fire. This is the flow responsible for forming present day channel conditions and flows used to estimate proper performance of culverts and other drainage structures. Design flow estimates have been based on existing gauge station information and streams surveyed within or adjacent to the immediate fire area. These estimates assume pre-fire ground infiltration and ground cover conditions.

Adjusted design flow is calculated using the same relationships as design flow; however runoff response is estimated by assuming an increased runoff commensurate with burn severity in terms of recurrence interval. This recurrence interval estimates the response of the newly burnt landscape to an average annual storm. The Day fire is expected to respond to an average rainfall event, an event usually associated with the 1.5-year storm, differently for the low, moderate, and high severity burned areas. It is expected the landscape would respond as if the discharge were associated with a 1.75, 2, and 5-year event, respectively. The unburned lands within the fire would respond as the unburned lands outside the fire and would have a discharge associated with the 1.5-year return interval. Increases in discharge associated with predicted recurrence intervals are prorated across watersheds by burn severity to yield post-fire discharge or the adjusted design flow. The hydrologic design factors used were for a 5-year, 24-hour storm that precipitates an average of four (4) inches. The fire has been analyzed at either the 5th and 6th field watersheds or 5th and 6th Hydrologic Unit Code (HUC). Runoff and water discharge has been analyzed at both the HUC 5 and HUC 6 watershed levels.

The 5th field watershed analysis takes into account the entire watershed size and due to the large percentage of unburned lands has a tendency to dilute the effects of the fire. This larger watershed scale, 5th field, indicates roughly a 0 to 22 percent increase in water yield (see Table 6). Those watersheds with very small water yields increases include Lower Santa Clara River and Upper Cuyama River Watersheds with increases of 5 and 0 percent increases, respectively. Watersheds with the most increases in water yield include Lower Piru and Upper Piru Watersheds with increases of 15 and 22 percent increases, respectively. The total affects of the fire on the accumulated 5th field watersheds results in an increase in water yield of 8 percent realizing roughly 84 percent of the total area contained in these watersheds remains unburned. The total accumulated percentage of burned for 5th field watersheds is 0.16% high severity, 11.85% moderate severity, 4.41% low severity, and 83.58% unburned.

A similar analysis was performed for the 6th field watersheds. This analysis is a more focused evaluation of the fire as it reduces the amount of unburned lands and watersheds are smaller.

Therefore, the 6th field watershed analysis provides a more pronounced increase in water yields by watershed. At this smaller scale increases in water yield range from 0 to 69 percent. The low values reflect very small amount of burn and/or very low severity. Those watersheds with very small water yield increases include Alamo/Beartrap Creek, Lake Piru, and Lower Sespe Creek Watersheds with increases of 3, 0, and 0 percent increases, respectively. Watersheds with the most increases in water yield include Piru Creek/Mutau Creek. Piru Creek/Snowy Creek and Piru Creek/South Fork Piru Creek watersheds will have increases of water yield of 69, 43, and 50 percent, respectively. The predicted water discharge into Santa Paula Creek will increase 16% and the predicted water discharge into Sespe Creek/Hot Springs and Sespe Creek/West Fork Sespe Creek will increase 32% and 57%, respectively. The predicted water discharge into Agua Blanca Creek and Fish Creek will increase 38% and 39%, respectively. The total affects of the fire on the accumulated 6th field watersheds results in an increase in water yield of 15 percent. The total accumulated percentage of burned for 6th field watersheds is 0.27% high severity, 19.82% moderate severity, 7.37% low severity, and 72.54% unburned. See Table 2a and 2b for pre-fire and post-fire water yield data for 5^{th} and 6^{th} field watersheds.

Increases in water yield have the potential to cause a cumulative flooding effect in the Santa Clara River. The initial point of entry of debris and flooding would be at the confluence of Piru Creek and Santa Clara River. Roughly five miles downstream the Sespe Creek enters the Santa Clara River and nine miles downstream the Santa Paula Creek enters the Santa Clara River. Eventually the entire fire area drains into the Santa Clara River. This potential for flooding and debris flow has the added risk of causing erosion to farmlands, erosion control structures and housing developments.

These predicted increases of water yield could result in an emergency and result in flooding along Santa Paula Creek in the community of Santa Paula and along Sespe Creek in the community of Fillmore. The predicted increases of water yield in Piru Creek could result in an emergency and result in flooding below Santa Felicia Dam.

Table 2a Pre and Post Fire Discharge for 5th Field Watersheds by Burn Severity										
Watershed Miles 2		**Discharge by Severity (cfs)**				**Discharge by Watershed (cfs)**		**Discharge by Watershed (cfs/mi^2)**		
5th Field Watersheds	**Ws Area Miles^2**	**High Severity Burn**	**Moderate Severity**	**Low Severity**	**Unburned**	**Pre fire**	**Post Fire**	**Pre-fire flow in cfs/mi2**	**Post-fire flow in cfs/mi^2**	**% increase in Water Yield**
Lower Piru Creek	143.5	10.17	312.40	110.21	915.50	1172	1348	8	9	15
Lower Santa Clara River	134.0	22.32	73.89	7.27	1067.96	1117	1171	8	9	5
Sespe Creek	268.7	9.64	456.50	146.40	1434.30	1820	2047	7	8	12
Upper Cuyama River	297.4	4.36	6.34	1.18	1949.21	1954	1961	7	7	0
Upper Piru Creek	291.1	97.75	733.92	199.35	1320.99	1925	2352	7	8	22
Total Affected Watersheds	1134.6	104.69	848.54	261.68	4181.64	5003	5397	4	5	8

Table 2b Pre and Post Fire Discharge for 6th Field Watersheds by Burn Severity										
Watershed		**Discharge by Severity (cfs)**				**Discharge by Watershed (cfs)**		**Discharge by Watershed (cfs/mi^2)**		
6th Field Watersheds	**Ws Area Miles^2**	**High Severity Burn**	**Moderate Severity**	**Low Severity**	**Unburned**	**Pre fire**	**Post Fire**	**Pre-fire flow in cfs/mi2**	**Post-fire flow in cfs/mi^2**	**% increase in Water**
Agua Blanca Creek	33.5	3.17	254.73	70.51	253.34	422	581.75	13	17	38
Alamo Creek/Beartrap Creek	46.0	6.39	13.48	2.36	518.36	527	540.58	11	12	3
Lake Piru	54.4	0.00	1.58	1.16	591.42	593	594.16	11	11	0

Table 2b Pre and Post Fire Discharge for 6th Field Watersheds by Burn Severity										
Watershed		**Discharge by Severity (cfs)**				**Discharge by Watershed (cfs)**		**Discharge by Watershed (cfs/mi^2)**		
6th Field Watersheds	**Ws Area Miles^2**	**High Severity Burn**	**Moderate Severity**	**Low Severity**	**Unburned**	**Pre fire**	**Post Fire**	**Pre-fire flow in cfs/mi2**	**Post-fire flow in cfs/mi^2**	**% increase in Water**
Lower Sespe Creek	58.4	0.00	2.03	3.16	620.09	623	625.28	11	11	0
Piru Creek/Fish Creek	40.6	10.22	283.14	108.91	270.61	483	672.88	12	17	39
Piru Creek/Mutau Creek	56.7	97.27	602.12	111.30	219.23	610	1029.93	11	18	69
Piru Creek/Snowy Creek	46.3	25.11	360.13	78.75	295.30	530	759.29	11	16	43
Piru Creek/South Fork Piru Creek	39.5	4.51	365.41	133.52	206.09	473	709.53	12	18	50
Pyramid Lake	28.1	14.14	39.16	4.08	350.36	373	407.75	13	15	9
Santa Paula Creek	47.3	27.77	112.54	10.68	471.81	538	622.81	11	13	16
Sespe Creek/Hot Springs Canyon	70.3	6.87	384.73	116.70	429.23	710	937.52	10	13	32
Sespe Creek/Howard Creek	54.1	0.00	0.10	0.15	590.30	590	590.55	11	11	0
Sespe Creek/West Fork Sespe Creek	44.6	6.50	478.81	142.79	182.89	516	810.99	12	18	57
Upper Lockwood Creek	58.6	0.17	141.55	60.24	511.40	625	713.35	11	12	14
Total Affected Watersheds	678.3	116.61	1044.82	316.56	2528.84	3486	4006.82	5	6	15

Sediment Analysis

The storage capacity of Pyramid Lake and Lake Piru could be reduced from increased sedimentation into the lakes. Sediment Rates for the fire were estimated using values from Rowe, Countryman and Storey (1949). These authors estimated sedimentation rates from measurements of sediment accumulation in reservoirs. In their study, sedimentation records included periods associated with a wide variety of discharges. Relationships between computed sedimentation rates and individual peak discharges were established for specific watersheds. Curves representing average relationships between peak discharge and sedimentation rate were developed by these authors and used to determine normal annual sedimentation rates. Adjustments to normal annual erosion rates were made for watersheds affected by fires. These adjustments were made through comparison of burned watersheds to similar unburned watersheds and recovered over a ten year period. These relationships were utilized to predict sediment potential for the Day Fire. The watersheds affected by the 2006 Day fire were also affected by the Wolf fire, 2002 and Piru fire, 2003. While field investigations suggest these areas are hydrologically recovered with respect to increases in water yield, sediment is still a concern. Drainages currently contain large amounts of stored sediment that could mobilize during rain events. The combination of the Day, Piru, and Wolf fires has resulted in a cumulative sediment potential effect. Sedimentation for the Piru and Wolf fires has been included in the sedimentation analysis for the Day fire. Piru is evaluated as a 3 year-old fire and the Wolf a 4 year-old fire. Sediment rates of past events vary by watershed as defined in Rowe, Countryman and Storey, 1949.

Watersheds have been analyzed for sediment potential at both the 5th and 6th field watersheds. The difference in watershed size and the percentage of the watershed affected by the fire dilutes the effects at the 5th field analysis level. Increases in sedimentation potential analyzed at the 5th field watershed level ranges from 11 to 700 percent increase. Those 5th field watersheds that show the greatest increase in sedimentation include Sespe Creek and Upper Piru Watersheds at 513% and 700% increase, respectively; the watershed with the lowest sediment potential is the Upper Cuyama River with only an 11% increase. Total accumulated watershed sediment potential for all affected 5th field watersheds shows an increase of 338%. This value is low due to the amount of unburned area in 5th field watersheds. Increases in sedimentation potential analyzed at the 6th field watershed level ranges from 1 to 6750% increase. This analysis provides a more focused look at sediment potential in a smaller watershed for the first year following the Day fire. Sixth field watersheds with the greatest increased sediment potential are Agua Blanca Creek watershed, 599%, Santa Paula Creek, 648%, Sespe Creek/Hot Springs Canyon Watershed, 1849%, Piru Creek/Snowy Creek Watershed, 1999%, Piru Creek/South Fork Piru Creek Watershed, 2003%, Piru Creek/Mutau Creek, 2692%, Piru Creek/Fish Creek, 3274% and Sespe Creek/West Fork Sespe Creek, 6750%. Sixth field watersheds with the lowest sediment potential include Lower Sespe Creek, Lake Piru, and Sespe Creek/Howard Creek watersheds with a sediment potential increase of 19, 3, and 1 percent increase, respectively. Total accumulated watershed sediment potential for all affected 6th field watersheds shows an increase of 575%. See the hydrology report for more details on the sediment analysis.

A few specific areas were analyzed for first year sediment potential in addition to 5th and 6th field watersheds. While all of the watersheds are important these areas are of special concern and are an analysis that combines one or more watersheds at one or more fields to provide sediment predictions to Pyramid Lake, Lake Piru, and the Santa Clara River. Sediment potential estimates are provided in cubic yards (y^3) and is therefore the predicted sediment

potential for the first year immediately following the fire. The total amount of sediment that is expected to deposit into Pyramid Lake is estimated at 868,567 yds^3 or 2,983 yds^3/mi^2. The total amount of sediment that is expected to deposit into Lake Piru is estimated at 420,736 yds3 or 2,032 yds^3/mi^2. The total amount of sediment that is expected to move down Santa Paula Creek is estimated at 795,947 yds3 or 16,816 yds^3/mi^2. This represents an increase of sediment from pre-fire conditions of 801% for Pyramid Lake, 564% for Lake Piru and 748% for Santa Paula Creek.

These predicted increases of sediment yield could result in an emergency and deposition of significant amounts of sediment into Santa Paula Creek and along Sespe Creek in the community of Fillmore. The predicted increases of sediment yield in Piru Creek could result in significant deposition of sediment into Lake Piru. This will result in a reduced storage capacity of the reservoir.

Table 3 – Sediment Analysis By 5th and 6th Field HUC Watersheds											
Watershed Information						**Sediment Rates by Watershed**					
5th Field Watersheds	**Ws Area Miles^2**	**Miles^2 burned 2006, Day Fire**	**Miles^2 burned in 2003, Piru Fire**	**Miles^2 burned in 2002, Wolf Fire**	**Miles^2 of Unburned**	**Pre-fire Yards^3**	**Post Fire Yards^3**	**% Increase of sediment**	**Pre-fire cy/mi^2**	**Post-fire cy/mi^2**	**% Burned Day Fire**
Lower Piru Creek	143.5	49.3	26.7	0	67.4	90294	436479	483%	629	3042	34.37%
Lower Santa Clara River	134.0	7.9	0.0	0	126.1	331614	1021170	308%	2475	7623	5.88%
Sespe Creek	268.7	86.5	35.3	33.01	113.9	756870	4636652	613%	2817	17257	32.18%
Upper Cuyama River	297.4	0.9	0.0	0.10	296.4	406810	450340	111%	1368	1514	0.31%
Upper Piru Creek	291.1	108.3	0.0	0.71	182.2	108476	868567	801%	373	2983	37.19%
Total Affected Watersheds	**1134.6**	**252.8**	**62.0**	**33.8**	**786.0**	**1694064**	**7413208**	**438%**	**1493**	**6534**	**22.28%**
Sediment yield in cubic yards per square mile							**1493**	**6534**			
6th Field Watersheds											
Agua Blanca Creek	33.5	19.2	10.8	0	3.5	22502	157351	699%	672	4696	57.33%
Alamo Creek/Beartrap Creek	46.0	0.9	0.0	0.1	45	62416	105945	170%	1357	2303	1.97%
Lake Piru	54.4	0.2	10.5	0.0	43.6	45664	47178	103%	840	867	0.40%
Lower Sespe Creek	58.4	1.6	32.9	0.0	23.9	370531	441973	119%	6346	7569	2.73%
Piru Creek/Fish Creek	40.6	29.9	0.1	0.0	10.6	6397	216207	3380%	158	5331	73.69%
Piru Creek/Mutau Creek	56.7	39.3	0.0	0.1	17.3	10275	286446	2788%	181	5054	69.41%
Piru Creek/Snowy Creek	46.3	29.0	0.0	0.0	17.3	10205	213741	2094%	220	4617	62.63%
Piru Creek/South Fork Piru Creek	39.5	25.3	0.0	0.7	13.5	8873	186764	2105%	225	4732	64.21%
Pyramid Lake	28.1	2.3	0.0	0.0	25.8	15215	31437	207%	541	1119	8.22%
Santa Paula Creek	47.3	7.9	0.0	0.0	40.5	106392	795947	748%	2248	16816	16.63%
Sespe Creek/Hot Springs Canyon	70.3	44.5	0.0	12.6	13.2	108011	2106058	1950%	1536	29944	63.31%
Sespe Creek/Howard Creek	54.1	0.0	0.0	17.1	37.0	173657	174849	101%	3212	3234	0.05%
Sespe Creek/West Fork Sespe Creek	44.6	40.3	2.4	0	1.9	26808	1835910	6848%	601	41169	90.41%
Upper Lockwood Creek	58.6	12.3	0.0	0	46.3	27298	113567	416%	466	1939	20.99%
Total Affected Watersheds	**678.3**	**252.8**	**56.7**	**30.4**	**339.2**	**994243**	**6713375**	**675%**	**1466**	**9897**	**37.28%**
Sediment yield in cubic yards per square mile						**1466**	**9897**				

Long Term Soil Productivity

Soil Erosion Analysis

Soil productivity, water quality, and sedimentation are potential values at risk when wildfire burns through an area. Fire removes the duff and litter that provide protection from rain drop impact and soil detachment. The loss of duff and litter leaves water to runoff across bare soils with increased velocity. Fire also induces water repellency of varying degrees, reducing water infiltration, and increasing runoff. The net result is an increase in erosion and an increased potential for a long term loss in soil productivity, negative effects on water quality, and sedimentation. There is a decrease in infiltration and an increase in runoff and peak flows that also creates downstream affects to life and property. The downstream risks of this fire are covered in the hydrology, roads, trails, and archeology analyses for this fire.

Fire is of course a natural occurrence in the ecosystem. The affects of fire are one of the factors that have gone into the current soil and environment. For normal fires, the effects should be consistent with maintaining soil and productivity. Several factors may increase fire effects and create a need to provide soil protection. In some instances fires are unnaturally intense. Roads and trails can concentrate runoff and effectively increase the level of hill slope erosion.

The purpose of the post-fire assessment is to analyze fire effects on soils, determine the potential for negative effects, and consider possible treatment options. Hill slope treatments to prevent erosion and keep soil on hill slopes are the preferred alternative, along with treatments to manage water draining from roads and trails.

Soil water repellency or hydrophobicity was measured in vegetation types; chaparral, pinyon, and pine. Chaparral vegetation includes chamis, ceanothus, manzanita, mountain mahogany, scrub oak, sagebrush, yucca and California buckwheat. Pine vegetation includes Jeffrey pine, ponderosa pine and sugar pine with inclusions of scrub oak and manzanita. Chaparral areas were surveyed along Sespe Creek and near Alamo Mountain. Chaparral burned at mostly moderate to low burn severity and hydrophobicity was evaluated in moderate severity burns. There was significant variation depending on the points and the depth of the test. The moderate severity burn areas exhibited predominantly moderate hydrophobicity from the surface to a depth of one inch. In the unburned area natural hydrophobicity was found underneath the mountain mahogany to a depth of one inch. On the whole, burned chaparral sites were rated about 60% moderate water repellency and 40% low water repellency. An unburned site also tested at moderate water repellency. Based on the results of the field survey, it appears that there was a modest change in overall water repellency from background natural levels. This is possibly the affect of fast moving fire combined with relatively low duff and litter fuel loadings. This would lead to relatively low soil heating and low increases in water repellency.

Two areas of moderate burn severity with pinyon pine and chaparral in Grade Valley were examined for hydrophobicity. The water repellency of the soil was only slight from the surface down to one inch at both sites. The soil hydrophobicity under Ponderosa and Jeffrey pines was examined on Alamo Mountain. Two of the areas were of moderate burn severity and the other area was of low burn severity. In moderate burn severity areas, the soil surface exhibited slight to strong water repellency with moderate repellency extending to one inch. The low burn severity area showed spotty repellency at the surface. Overall the areas of burned pine were

rated low to medium for hydrophobicity. Pinyon pine types had predominantly low tests for water repellency at all depths to 2 inches. The overall water repellency rating for pinyon pine types was low.

The post-fire erosion rates were assessed using the Universal Soil Loss Equation (USLE) (see table 4). The USLE uses rainfall energy (R), soil erodibility (K), slope steepness (S), slope length (L), and soil cover (C) as factors to estimate erosion. The fire has altered the soil cover, exposing the soil and increasing soil erosion risk. Soil erosion rates were estimated for years one and two after the fire. The estimate of the average post-fire erosion rate for the fire was 14 tons/acre in 24 months after the fire. This is comparable to the sediment estimates for the post-fire year of 9897 cubic yards per square mile (15 cubic yards per acre). Estimates of post-fire erosion rates range from 5 to 15 tons/acre, with the Santa Paula, Upper Sespe and Lower Sespe having the highest rates at 15 tns/ac, 13 tns/ac, and 11 tns/ac, respectively. See the soils report for details and more information on the soil erosion analysis.

Table 4 – Estimated Erosion Rates for Post-Fire Conditions.

Watershed	Est. Erosion Rate (24 month, tons/acre)
Upper Cuyama	6
Upper Piru	5
Upper Sespe	13
Lower Piru	6
Lower Sespe	11
Santa Paula	15

No emergency has been identified for soil productivity. The erosion that is expected to result from this fire is not judged to be an emergency relative to long term soil productivity. The expected erosion is considered to be part of the normal pattern for this ecosystem and fire regime.

One potential slope treatment that was considered for the Day Fire is seeding. In the late 1990's after many years of implementing BAER seeding treatments after wildfires, the Los Padres National Forest developed specific post-fire seeding criteria for use by Burned Area Emergency Response Teams. The criteria assists in the decision making process in an effort to only seed areas where the treatment would truly be effective, efficient, and not cause undue environmental effects from the introduction of non-localized species. There are several factors which were considered in the analysis of post-fire seeding (Los Padres National Forest policy letter). Some of the seeding criteria are:

- No seeding on grasslands and oak/grass woodlands
- No seeding on steep slopes (preferably less than 50%)
- No seeding on low burn intensity areas
- No seeding on areas where vegetation cover after two years is expected to be 30% or greater
- No seeding on poor sites

Applying these seeding criteria to the Day Fire resulted in the elimination of most of the area from consideration for seeding. Most of the area is steep and rocky and unsuitable for seeding. Most of the area is in wilderness where seeding is generally avoided. Most of the area is

covered in various chaparral vegetation types which are expected to recover to greater than 30% cover within two years. This treatment type was not prescribed for the Day Fire.

Slope Stability Analysis

Geology and Geomorphology

The bedrock within the boundaries of the Day Fire includes a variety of sedimentary, granitic and metamorphosed granitic rocks within the Transverse Ranges. The sedimentary rocks are varied in both type and origin. Sandstone, shale, and conglomerate are present from sediment deposited in both deep marine and terrestrial environments. There are also more recent landform units consisting of alluvial gravel of varying age, colluvium and landslide deposits. The local rock types and the very high uplift rates of the Traverse Range result in a landscape that naturally experiences high erosion rates and high susceptibility to slope instability, even before the effects of fire are considered. In addition to experiencing 25 feet per 1,000 years of uplift, these mountains have a maximum extrapolated rate of denudation of 7.5 feet per 1,000 years (Scott and Williams, 1978). This geologic situation is locally evidenced by steep slopes, incised channels, abundant landslide features, and significant volumes of material in local channels. Recent experience shows that significant storm events deliver large amounts of material to channels where it is transported to depositional areas along the mountain front. This circumstance is especially evident in tributaries to the Santa Clara River draining from the Topatopa Range. During the 1969 storm and the 2005 storm, the flows along Santa Paula Creek, Sespe Creek and Piru Creek near the communities of Santa Paula, Fillmore and Piru demonstrated down-stream impacts to local communities and reservoirs resulting from this geologic setting. Flooding, woody debris transport, soil slips and debris flows, channel bank erosion and movement of large sediment volumes affected roads, bridges, Piru Reservoir, and structures.

A qualitative slope stability analysis was conducted as part of the BAER assessment. This analysis considered burn severity (or the loss of vegetation increasing the contribution of sediment delivered to the stream network), bedrock types that exhibit a high susceptibility to slope instability and erosion and slope gradient. The primary geologic hazard potentially affecting values-at-risk for the Day Fire are debris flows. Storm events in 1938 and 1969 are well known for having triggered destructive debris flows in this region. More recently, debris flows, debris slides (also known as soil slips) and flooding during the 2005 storm event resulted in similar damage. Soil slips, thin surficial landslides, were both numerous and widespread during the wet winter of 2003 on slopes that had burned during the Piru fire. As a result, large volumes of sediment were added to channels bottoms, which further added bulk and destructive power to debris flows and floods, and increased sedimentation into stream channels and reservoirs. Debris flows, even small ones, cause significant damage and have the potential for loss of life. Damage results from burial, inundation of structures and lateral impact. Damage by lateral impact can be particularly important as debris flows commonly have a boulder snout that forms the leading front as it moves down-channel. Another aspect that makes debris flows important is well described by Susan Cannon of the United States Geologic Survey in her documentation for debris flow hazard maps prepared for the Piru, Simi, and Verdale wildfires of 2003. Increased debris flow susceptibility will be associated with watersheds within the Day Fire that have significant volumes of sediment in the channels or are likely to experience increases in sediment volume from fire-affected slopes. Sediment increases would be associated with significant areas of susceptible bedrock that were subjected to high or moderate burn severity. The basis for this assumption is current research on wildfire-generated debris flows. Rather than being the result of infiltration-induced slope movements into the channels, wildfire-

generated debris flows are a result of progressive bulking of storm flow with sediment within the channel that is deposited from adjacent slopes.

Bedrock with high landslide susceptibility, including debris flow potential, are those units with a tendency to disaggregate into small fragments, weather into soil prone to shallow slippage, or host discontinuities favorable to mass movement. Those units interpreted as having high susceptibility to slope instability and erosion includes alluvial materials, older gravel deposits and landslide features, and shales, both marine and terrestrial. Those units interpreted as having low susceptibility to slope instability and erosion includes conglomerates, granitoid rocks, and sandstone units, both marine and terrestrial.

Slope steepness is a critical factor, especially for landslides, debris flows, and dry ravel. Slope movements and rapid erosion are gravity-driven geomorphic processes. To represent the areas of the watershed prone to slope movements or sediment generation, it is necessary to identify the area of the watershed that is underlain by high susceptibility bedrock on slopes greater than 45 percent. The choice of slope percentage is based on local assessment for slope movement hazard mapping and uses a conservative value representing the lower range for moderate and high hazard.

Six watersheds have significant areas of bedrock with a high susceptibility for slope movement and sediment generation on slopes greater than 45 percent. These areas represent a pre-fire condition where potential for debris flows and related slope movements affected the watershed and sediment available for flood transport. If it is assumed that a significant area (or threshold of concern) is represented by 15 percent or more of the watershed within the fire perimeter, six watersheds have this pre-fire character. These include: Agua Blanca Creek, Pyramid Lake, Santa Paula Creek, Sespe Creek-Hot Springs Canyon, Sespe Creek-Howard Creek and Sespe Creek-West Fork of Sespe Creek. Because Sespe Creek-West Fork of Sespe Creek is nearly 15 percent and another major contributor to Sespe Creek, it is considered a significant watershed for this analysis.

The potential for creating an emergency for debris flow, slope movement, and sediment generation would be associated with those watersheds identified as hosting conditions favorable to slope movements and sediment generation where those conditions were greatly affected by high and moderate burn severity. For this analysis, this would be where more than 45 percent of the high susceptibility bedrock on 45 percent slopes was subjected to high or moderate burn severity. This post-fire condition is found in the following watersheds: Aqua Blanca Creek, Santa Paula Creek, Sespe Creek-Hot Springs Canyon and Sespe Creek-West Fork of Sespe Creek. Therefore, this analysis process indicates that increased debris flows, slope movements, and greater sediment generation are likely from these four watersheds. See the geology report for maps and more information on the slope stability assessment.

A concern was raised by the Ventura County Sheriff's Office of Emergency Services that a debris dam of logs and other material could form at the sharp radius S-curves just upstream of the mouth of the Sespe River above Fillmore. Debris and associated sediment could become lodged between channel banks and cause a disaster if the dam broke. A visual assessment by helicopter showed that many additional locations upstream along the channel have tight radii and could be cause for concern. At the S-curve, channel sides are somewhat rough with some obstructions which could trap debris; however the floodplain appears to be broad enough to pass flood flows and associated debris. Our opinion is that formation of a debris dam at the S-curve, as well as numerous locations further upstream, is unlikely, though not impossible, and we are not aware of any mitigation measures which could lessen the potential of a debris dam.

Debris flows, as discussed above, are much more likely to occur and cause downstream damage.

Another concern was raised by United Water that debris flows could occur in Fish Canyon above Lake Piru and impact the reservoir. A visual assessment by helicopter, as well as review of geologic maps of the area concluded that there is a high likelihood that debris flows could occur, not only in Fish Creek, but also in Agua Blanca Creek and several smaller watersheds such as Turtle and Ruby Canyons. Large quantities of stored sediment were seen both on slopes denuded by the fire, and in ephemeral stream channels in these watersheds. All of these watersheds represent a threat to Piru Reservoir. Additional sediment generated from these watersheds may significantly reduce the water holding capacity of this reservoir, impact flood control capability, or otherwise interfere with its normal operations. Individuals recreating within this watershed during storm events would be under threat from debris flows, high flood flows and slope movements.

The Day Fire has changed conditions within the Santa Paula Creek Watershed that poses a threat to life and property and natural resources from debris flows and slope movements within the watershed and downstream in the vicinity of the Santa Clara River. This changed condition exists for the Sespe Creek-Hot Springs Canyon and Sespe Creek-West Fork of Sespe Creek watersheds. This is concluded to represent a threat to life and property from debris flows and slope movements within the watersheds and downstream along Sespe Creek to, at least, its junction with the Santa Clara River. This would include the portion of Sespe Creek through the Fillmore area.

Threats to Life and Private Property

The following “values at risk” are threatened by debris slides, rock fall, flooding and floating large woody debris augmented by the effects of the fire on steep, erosive and unstable slopes and water channels.

- Private property, including homes, farm and ranch land and facilities, both within and outside the Forest boundary, downstream and down slope from the burned area, especially the North Fillmore area on private property along Grand Avenue and Good Enough Road along the Sespe River and in the Santa Paula area on private property along Santa Paula Creek.
- People traveling through and below burned areas on Forest System roads and trails.
- Lake Piru and Pyramid Lake storage capacity will be affected by increased sediment deposition into the reservoirs. Watercraft and facilities on or adjacent to the reservoir could be affected by large floating woody debris.
- Private property downstream of Lake Piru is subject to increased flood flows.

Threats to Forest Property

Forest System Roads

There are approximately 40 miles of Forest Service System Roads (NSFR) within the Day Fire. Approximately, 31.5 miles of road were assessed. There are 28.1 miles of single lane, maintenance level 2, high clearance native surface roads, and 3.4 miles of maintenance level 3, suitable for passenger cars, single lane asphalt surface roads. There are approximately 31.5

miles of road that need restoration of surface water drainage in the form of road surface blading, inboard ditch cleaning, and enhancing of rolling dips and other cross drain structures. Within the 31.5 miles of road are located 166 over side drain outlets and 15 culverts that range from 18" to 60". In addition, other sites were identified that need surface water drainage structures. All roads surveyed within the burn are on the Los Padres National Forest under Forest Service jurisdiction with the Forest Service being the primary maintainer. There were no roads assessed on the Ojai Ranger District. Forest road systems assessed include the Sewart Mountain Road (FR 6N10), Grade Valley Road/Mutau Flat Road (FR 7N03), Halfmoon Campground Road (FR 7N13), and Alamo Mountain Road (FR 8N03), all located on the Mt. Pinos Ranger District. The Forest Service road system is considered a value at risk. These roads are considered a government investment or asset and are needed for fire and other emergency vehicle, administrative, and recreational access.

As a result of the Day Fire, runoff from future storms is expected to increase, compared to pre-burn conditions. The absence of normal ground cover and vegetation will result in increased, flashy runoff, sediment and debris flow potential, and potential for damage caused by unauthorized off road access.

In their current condition, the forest roads are expected to be impacted if increased runoff occurs. In some areas existing drainage features adequate for pre-burn runoff are expected to be inadequate for increased post-burn runoff. The expected result, if no action were taken, would be moderate amounts of erosion from road surfaces, diversion of runoff down roads, concentration of runoff resulting in hill-slope and stream bank gully erosion, and road washouts.

The resulting sedimentation from "no action" would be expected to negatively affect water quality, aquatic species habitat and sensitive plants. Road surface erosion and washouts would make many of the forest roads inaccessible for critical fire suppression activities and for needed public access and Forest Service administrative access. There is a threat to loss of road function due to culvert or other drainage feature failure.

Forest System Trails

There are approximately 56.85 miles of hiking trails and Off-Highway Vehicle (OHV) trails segments within the fire area requiring treatments due to moderate burn severity. Approximately, 36.42 miles of hiking trails are located on the Ojai Ranger District and 7.99 miles of hiking trails are located on the Mt. Pinos ranger District. In addition, there are approximately 12.44 miles of OHV trails on the Mt. Pinos Ranger District.

As a result of the fire, it is expected that trail sections within the burn area that are located within high and moderate burn severity, on steep gradients and along steep slopes will likely experience increases in runoff and sedimentation from winter storms. The increased runoff will likely result in severe trail incision and complete loss of trail tread and stability over long trail reaches, resulting in significant damage to the trails. Increased runoff on the trails could move off the trails onto burned slopes and increase off trail hill-slope erosion, resulting in soil productivity degradation, long-term watershed instability and increased sedimentation to nearby stream channels. The trail system has a high frequency visitor use due to the burn area's close proximity to the large population centers of Southern California and high levels of visitor demand.

The OHV trails within the Day Fire represent 65% of the popular southeastern section of the Mt Pinos Ranger District's off-highway vehicle (OHV) system. These OHV trails are one of the premier OHV systems in the State of California and have been developed and maintained as a direct result of the district's ongoing partnership with the California State Off-Highway Motor Vehicle Recreation Division for the past 25+ years. An average of $350,000 (appropriated and grant funds) is spent annually to operate and maintain the district's OHV system. Replacement cost for the affected routes is estimated at $410,000 not including costs associated with environmental compliance. Recreational use of these trails is moderate to high year round. Affected routes tie directly into the adjacent Hungry Valley State Vehicle Recreation Area, and Frazier Mountain OHV system. Annual OHV visitation for FY 2005 on the Mount Pinos Ranger District was estimated at 172,200.

At present, initial assessment of the trails indicates an immediate need to send a survey team out to the affected routes to determine the exact treatment needed to prevent unacceptable (above normal) runoff and erosion damage to the trail/route infrastructure as well as protecting adjacent watershed resources.

The OHV trails on the Mt. Pinos Ranger District are located in stands of Jeffery, Ponderosa, and Sugar Pine. The threat of falling trees and branches exists within recreation sites, the general forest area, along roads and trails, and in the wilderness area. Much of the area will be unstable with potential rock falls on steeper slopes throughout the fall and winter months. Within the next winter it is expected that some of these trees will fall across the OHV trails. These fallen trees will block access for initial assessment, patrolling and monitoring the trails during the following winter. In addition, tree hazards exist along OHV trails and hiking trails and they could place trail crews in danger during initial assessment and while emergency treatments are implemented.

Even though OHV users are restricted to designated routes, there is the possibility of some users traveling off the designated routes into the burn area due to decreased vegetative cover. Users (both motorized and non-motorized) venturing off designated routes have the potential to create unnatural channels and nick-points which could become rills and gullies channeling water and debris and impeding the natural vegetative recovery of the burn area.

Potential runoff from denuded slopes during rain events could pose a significant risk to recreationists within the burn area.

Vegetation and Botany

The Day Fire impacted an enormous variety of different plant communities and environments. It burned from Costal Sage Scrub to Great Basin Sagebrush and from Big Cone Douglas-fir Forest to Pinyon Pine Woodland. In relation to the effects of the Day Fire, the potential values at risk are the ecological stability of the following plant communities found within the fire area.

- Coastal Sage Scrub
- Chaparral (Mesic, Xeric and Semi-Desert)
- Big-Cone Douglas-fir Forest
- Jeffery, Ponderosa, and Sugar Pine Forest
- Single leaf Pinyon Pine Woodland
- Desert Sagebrush

The Day Fire burned approximately 90,000 acres of Chaparral, or 55 % of the fire area. Many different types of chaparral or shrub lands were burned. The major shrub types are dominated California Sagebrush (Artemesia californica), Buckwheat (Erigonium fasciculatum), Chamise (Adenostoma fasciculata), Manzanita (Arctostaphylos glauca, A. greggii), Scrub Oak (Quercus berberidifolia), and Canyon Live Oak (Quercus chrysolepis).

Most of these plant communities recover quickly after fire. All species of Chaparral shrubs, forbs, and grasses are well adapted to regenerate rapidly after fire through seed germination and/or re-sprouting. Fire usually kills any seed on the ground surface. However, buried seed and bulbs remain insulated from extreme temperatures. Some seeds, especially those of ceanothus, manzanita, and fire-following herbs, only germinate after fire. California chaparral has numerous species which are obligate seeders after fire. Some of these species can endure fire-free intervals of more than 100 years. The seeds of these species only germinate when soil heating and/or certain unique chemicals in the leachate of charred wood break the seed coat dormancy.

The Day Fire area includes approximately 7,000 acres of Big-Cone Douglas-fir Forest, or 4 % of the fire area. Big-Cone Douglas-fir is one of only a few western conifers capable of sprouting following fire. Mature trees sprout vigorously from the branches and bole after burning. The trunk and main branches of Big-Cone Douglas-fir have many dormant adventitious buds, which are insulated from fire beneath thick bark. The tree often escapes fire damage or is scorched and not top killed. This is because the cool mesic sites where it grows are not prone to high intensity fire. The majority of Big Cone Douglas-fir forest within the Day fire perimeter either burned at low intensity or was unburned.

The Day Fire burned approximately 23,000 acres or 14% of 'Yellow Pine' forest. The general term 'Yellow Pine' refers collectively to Ponderosa Pine and Jeffery Pine. Wildfire is an integral part of the ecology of yellow pine forests. Prior to 1900, most stands experienced low-severity surface fires at an average interval of 20 years. Yellow pines evolved with thick bark and an open crown structure that allows them to survive most fires. Mature trees will self-prune, leaving a smooth trunk which reduces aerial fire spread. The great majority of Yellow Pine forest in the Day Fire experienced low and moderate burn severity. Low burn severity in Yellow Pine forest means that most of the grass and shrubs are consumed, but the forest survived. Moderate burn severity means that all the grass and shrubs are consumed and up to 50% of the over story pine trees were killed.

About 25,000 acres or 16% of the area covered by the Day Fire is Singleleaf Pinyon Pine woodland. In the San Bernardino Mountains Singleleaf pinyon occurs primarily with California and western juniper, curl leaf mountain-mahogany, and big sagebrush. The woodland is generally a climax vegetation type throughout its range, reaching climax about 300 years after disturbance. The trend with increasing age is toward increased tree density and canopy cover and a decline in under story species over time. In southern California, the vegetation structure in Singleleaf Pinyon woodland does not carry fire well, and fire return intervals of several hundred years are considered typical. Because mature Singleleaf pinyon trees are short with open crowns, full of long-lived, highly flammable foliage, and do not self-prune their dead branches, individual trees are susceptible to fire. The great majority of Singleleaf Pinyon Pine woodland in the Day Fire experienced low and moderate burn severity. Low to moderate burn severity in these woodlands results in 10% to 30% tree mortality and recover to pre-fire conditions, more or less in less than 5 years. A small percentage experienced high burn severity. Singleleaf Pinyon woodlands burned at high severity experience canopy fires that

result in heavy tree mortality and require more than 100 years for recovery to pre-fire conditions.

In late winter and spring after the Day Fire, abundant growth of semi-woody, herbaceous, and grass species will germinate from the seed bank, bulbs, and underground rhizomes. First-year post fire herbaceous cover is expected to range from 30 to 80 percent. Observations of past fires in Southern California indicate that recovery of herbaceous vegetation after fire is rapid and abundant. Cover values of 70% or greater are expected in many areas of the Day Fire during the spring 2007, even in areas where the burn intensity was high. Herbaceous species that can be expected to be abundant after the Day Fire include Morning Glory (Calystegia macrostegia), Popcorn Flower (Cryptantha intermedia), Whispering Bells (Emmenanthe penduliflora), Phacelia (several species), Needlegrass (Achnatherum speciosum), and Deerweed (Lotus scoparius).

The recovery of watershed function provided by soil cover (litter) and canopy interception (live vegetation) will take time. Vegetation recovery after year 1 will range from 20 to 45% for all under story vegetation and will range from 0 to 45% for all over story vegetation. Vegetation recovery after year 2 years will range from 35 to 60% for all under story vegetation and will range from 5 to 45% for all over story vegetation.

Table 5 below provides the estimated percent under story and over story cover on January 31 of the first and second year after the fire (assuming average precipitation). These numbers are based on the scientific studies and personal observations discussed above.

TABLE 5 - Estimated Under story and Over story Cover (%) on January 31 of the First and Second Year after the Fire by Vegetation Types and Burn Severity

Vegetation Type	YEAR ONE (Jan 31) Under story	YEAR ONE (Jan 31) Over story	YEAR TWO (Jan 31) Under story	YEAR TWO (Jan 31) Over story
Shrub (Low)	35	5	55	10
Shrub (High)	45	5	60	10
Yellow Pine (Low/Moderate)	45	25	55	25
Yellow Pine (High)	20	5	40	10
Pinyon Pine(Low)	20	45	35	45
Pinyon Pine (Moderate)	30	0	45	5
Average	33	14	48	18

Based on the above information, scientific studies, and specific field observations the probability that the vegetation will recover rapidly, without any treatment, is high. Additionally, natural revegetation of plants and deposition of litter on the soil surface is expected to reduce overland flow and erosion and by providing live vegetation canopy and litter cover.

Sensitive Plants

There are no plants within the Day Fire area that are listed as Federally Threatened or Endangered with the US Fish & Wildlife Service. All known populations of sensitive plant species (above) were overlaid with the burn severity map. No known populations were found to

have burned with high severity. Most known populations within the Day Fire were burned at low severity, with some unburned and some moderate. A subset of the moderately burned plant populations were reviewed in the field. These are listed below:

- •Palmer's mariposa lily - North side of Alamo Mountain
- •Flax-like monardella - Alamo Creek
- •Mt. Pinos onion - Mutau Flat Road
- •Baja pincushion plant - Mutau Flat Road

These populations were surveyed for direct plant effects, site burn severity, soil effects, and the extent of the remaining organic horizon. The plant locations were also overlaid with new dozer line construction areas. Based on this analysis, certain plant populations were identified as possibly being disturbed during suppression activities. The four areas identified with possible sensitive plant conflicts were:

- •Southern alpine buckwheat - Dozer Lines at Long Dave Valley
- •Palmer's mariposa lily & Flax-like monardella – Dozer Line at Alamo Mountain
- •Mount Pinos onion – Dozer Line in Lockwood Valley
- •Late-flowering mariposa lily & Ojai fritillary – Dozer Line Directly above Ojai

Maps of these areas showing known sensitive plant locations and the dozer lines are included in botany report.

Based on conditions found in the field survey and references on the specific fire ecology of each species, these populations should not be adversely affected by the wildfire. In fact, all four of these species are well adapted to endure and/or thrive following wildfire. Certain sensitive plant populations were identified as possibly being disturbed during suppression activities. Because these possible effects were caused by suppression, the suppression rehabilitation implementation team was made aware of this information. The suppression rehabilitation team should verify these conflicts and rehabilitate these areas in such a way that no additional habitat (the soil resource) or individuals are lost.

Noxious Weeds

During fire suppression activities, 19 drop points, 8 staging areas, and approximately 164 miles of dozer lines, were constructed or reestablished during fire suppression activities. There were 55 miles of road that were disturbed in and outside the perimeter of the Day Fire and could serve to disperse weed seeds. Dozer lines, drop points, staging areas, and safety zones may serve as weed dispersal areas or corridors and suppression equipment can act as weed vectors. Movement of fire suppression and rehab equipment can disperse and spread noxious weeds to and from areas within the fire and among home units. Dispersal of weeds from fire equipment movement poses a significant risk to the native plant post-fire regeneration. Roadsides and dozer lines will be most impacted by this threat.

Due to the extreme fire behavior during initial attack, there was not adequate time to set up a washing station to prevent the transport of weed seed into the burned area during suppression activities. Equipment such as tankers, engines, dozers, and excavators were not washed or inspected or cleaned for dirt/plant parts on the way into the fire during suppression and rehabilitation efforts. Because of this, we have no way of knowing if invasive noxious weed seeds were introduced to roadsides and dozer lines within the fire area. Additionally, crews

working on the fire were brought in from other areas known to have yellow star thistle or other potential non-native invasive weed problems.

During the partial BAER team survey, the following noxious weeds populations were confirmed or discovered in the following areas:

- •Yellow Star thistle – Piedra Blanca/Sespe Trail
- •Tocolote – Rose Valley, Piedra Blanca/Sespe Trail
- •Fennel – Highway 33, Rose Valley
- •Spanish Broom – Highway 33, Rose Valley
- •Tamarisk – Sespe Creek, Upper Piru Creek

No other invasive noxious weed populations were observed within the burn area or along the access roads outside of the burn area. Existing weed populations could have been present within the burned area, but because of the time of year (early fall) and the recent fire, evidence wasn't easily observable.

If any weeds were introduced, they could take advantage of the disturbance associated with the fire and displace native vegetation, degrade habitat function, lower ecosystem stability.

Heritage/Cultural Resources

A wide variety of heritage sites exist in the 160,000 acre rugged mountain area burned, primarily representing the native occupants and their activities carried out over thousands of years. The area is prehistorically attributed to the Tejon and Ventureno Chumash, Hokan speaking peoples who occupied the area prior to European contact and settlement. These groups are considered part of the larger Chumash group who occupied this portion of the California coastal mountains from Malibu to San Luis Obispo and the Channel Islands. The highly populous and successful Chumash are known to have had one of the most complex social, political, and economic systems in California. They were also one of the culture groups to have been contacted by early European sea and land expeditions, and notably affected by establishment of the Jesuit missions led by Junipero Serra in the 18th century. Protohistoric inhabitants of the fire area were within the sphere of influence of Mission San Buena Ventura in the town of Ventura.

Historic European use of the area began with early land expeditions and establishment of the missions. As the population grew, more of the backcountry was encountered, likely first by presidio soldiers and padres looking for the native peoples to convert, and later on, to bring them back to the missions. As more Europeans settled in the area, the back country was hunted; minerals, beginning with gold, prospected; and homesteading begun in the mid 19th century. Canyons in the burn area carry names indicating early European use, including Horse Thief Canyon, Piano Box, and Stone Corral Creek. Campgrounds carry names of the early historic period; Saddleskirt, Ant, Log Cabin, and Dutchman. Geographical names of the area also carry Chumash names; Topatopa, Chismahoo, Mutau. US Forest Service administrative history in the area began in 1899 with establishment of the Forest Reserve.

A total of 116 heritage sites, including 8 isolates, are recorded within the Area of Potential Effect (APE). Most of the sites, 92, are from the prehistoric and early historic period representing Native American use. Historic period sites number 30 and represent mineral extraction, homesteading, camping, and administrative use. Six of the sites have both a prehistoric and

historic component. Native American sites include occupation middens, special activity sites such as bedrock mortars, milling stations, quarries and tool manufacturing sites, rock art, and ethnographic areas, such as named villages from mission registers, areas of significance to Chumash cosmology, transportation routes, and isolated artifacts. Historic sites include mineral and oil development activities including associated habitation, homesteading, transportation, camping, and refuse dumps. Early 20th century Forest Service presence is represented by the remains of guard stations (Hartman, Thorn Meadows), lookout towers and cabs built by the Civilian Conservation Corps in the mid 1930's (Topatopa, Thorne Pt.), trails, and campgrounds still in use today.

Two factors affect the potential for adverse effects to the heritage sites from the area burned. The first is the environmental change from the severity of the burn, loss of vegetation, potential for soil erosion or deposition, and superheating of rock outcrops. The second factor is the susceptibility of the individual cultural elements that constitute the sites, or the fragility of the resource.

The fire has or may change the environment for heritage resources in the following ways: Physical effects of fire on the rock outcrops in which the pictographs are located. This results in two effects:

1. Deposits of ash on the painted elements causing accelerated deterioration and
2. Accelerated spalling of the rock surface and consequent loss of painted elements vegetation loss and peak water flows resulting in soil loss or redeposition.

Soils containing cultural materials are often found on slopes. Loss of these soils from erosion is loss of cultural deposits and therefore destruction of that portion of the site and its information potential. There is also the possibility that soil movement will result in deposition of soils on top of sites. Therefore, in areas where soil movement is anticipated, there is a need to clearly define the horizontal extent of those sites at risk prior to the depositional event. Accessibility from removal of vegetation, dozer lines, other fire lines, and widened trails provide for increased access both from adjacent private property and the forest. There is consequently an increased potential for looting due to the local knowledge of the antiquities that have been found in the area. There is historically a high incidence of looting after wildfires. OHV expansion beyond designated areas, such as Hungry Valley, and OHV routes, including unauthorized accesses into areas closed to motor vehicles creates the threat of impacts not related to the fire itself.

Due to the extensive nature of the burned area, the continual burning of islands within the burn area, the large number and extensive distribution of heritage sites throughout the fire area and the unavailability of fire line qualified archaeologists, a BAER assessment for potential damage to heritage resources was not completed. This work is currently occurring and should be complete within the next month and an interim 2500-8 will be submitted upon completion. Assessments have begun for sites along the perimeter of the burn. Sites in the interior of the burn will be conducted when the areas are determined safe for entry and completed prior to the winter rains. Assessment teams, consisting of archaeologists and erosion control specialists, will complete an assessment form for each site, update site records and site maps, GPS site locations, and photograph. During site assessment, protective measures which are simple to implement utilizing available materials such as unburned vegetation and rocks to redirect water and soil flows away from sensitive resources, or shallow drainage channels, can be installed on site at the time.

Wildlife

The overall burn severity consists as a mix between unburned, light, and moderately burned vegetation, of which only slightly more vegetation than a prescribed fire designed to benefit wildlife as a whole was burned. The exceptions to this would be the higher burn intensities near Topatopa Mountain and the north facing slopes of the Sespe drainage that burned in the Santa Ana wind event, the upper Santa Paula Canyon, Pine Ridge, and Alamo Mountain where there is heavy timber which created moderate and high soil burn severity, but left much of the canopy intact. There are three general classes of sensitive wildlife that were affected by the fire: chaparral species, high elevation conifer species, and riparian species.

The chaparral species of special interest is the San Diego Horned Lizard. California legless lizard may also occur in this habitat type.

The high elevation conifer species include; Northern goshawk, California spotted owl, Mount Pinos Lodgepole Chipmunk, Tehachapi White-eared pocket mouse, Tehachapi Slender salamander, Yellow blotched ensatina, and the Southern rubber boa.

The riparian species include; Willow and Southwestern Willow Flycatchers, Least Bell's vireo, Southern Pacific Pond Turtle, California Legless lizard, Two-striped garter snake, Foothill yellow-legged frog, Arroyo toad, Southern steelhead, California red-legged frog, Vernal pool fairy shrimp, and Western red bat.

The California condor and Peregrine falcon roost on cliffs or snags that are located on ridges and fly over the entire area. The Nelson's bighorn sheep use rocky outcrops.

Riparian habitats in general burned very light or not at all with some minor exceptions, so direct impacts to this habitat are minimal. Watershed impacts after rain events are likely to be extensive; large amounts of sediment will be mobilized and water levels will be high, resulting in changes in channel morphology, lowered water quality, and erosion of stream banks and associated riparian vegetation.

Chaparral habitats burned more completely than other habitats, but some unburned areas remain. Horned lizards likely experienced direct mortality and loss of habitat but are expected to eventually move back into the burned areas after the brush recovers in 3-5 years. Areas with moderate to high burn severity would have likely destroyed the legless lizards, which tend to reside in the duff at the base of plants. Unburned areas and areas with very light to light intensity burning may supply source populations which would take several years to reoccupy the more severely burned areas.

High elevation conifer habitats generally burned with low to moderate intensity and left many unburned islands. Species associated with this habitat will suffer some loss, but in general this is not a stand replacing fire that would threaten the viability of isolated pockets of high elevation species.

Cliff habitats were either not affected or very lightly burned due to the low fuel content.

There was not any direct mortality to California Condors from the fire and they may benefit from an increase in foraging areas and snag generation.

One 10/12 a recon flight over the sheep habitat was flow by Forest Wildlife Biologist Kevin

Cooper, Assistant Resource Officer Tom Murphey, and CDFG sheep biologist Rebecca Barboza. The area on the south slope of San Rafael Peak did not burn due to the sparse fuel although heavy brush elsewhere on the south slope of this ridge did burn with high intensity in some areas. The Nelson's Bighorn sheep apparently were either on the south slope of San Rafael Peak or moved there during the fire. Twenty eight sheep were spotted on the flight including 10 unknown, 4 lambs, 9 ewes, 4 class 3 rams, and 1 class 4 ram. The mosaic of burnt vegetation opened up new areas that will provide excellent forage for the sheep, reduce mountain lion cover, and allow access to other rocky outcrops within the Sespe drainage that could provide good sheep habitat.

B. Emergency Treatment Narrative and Objectives:

Life and Private Property

As noted in the previous section, there is a significant threat from debris flows and slope movements within the Santa Paula Creek, Aqua Blanca Creek, Sespe Creek-Hot Springs Canyon and Sespe Creek-West Fork of Sespe Creek watersheds. The treatment within the National Forest would be to close these areas to recreational use through the spring of 2007 or until re-evaluation occurs. Warning signs describing the potential threat from both debris flows and flash flooding should be posted at the major entrances used by the public to access recreation there. Additional explanatory material should be available at other points of contact between the Los Padres National Forest and forest visitors such as District Offices.

The downstream threat is an even greater danger as it could potentially affect a greater number of people as well as considerable property value. The treatment for this would be to share this BAER assessment as quickly as possible with all Federal, State and local governmental agencies with a role to play in mitigating this threat and protecting the public.

It should be noted that the debris flow analysis in this report represents a qualitative and preliminary assessment. A more detailed quantitative assessment is under consideration with the appropriate governmental agencies to secure the assistance of debris flow expert Dr. Susan Cannon of the U.S. Geological Survey to conduct an assessment that provides both a probability range for debris flow occurrence and an estimation of maximum discharge. This would be similar to the work conducted on behalf of the Federal Emergency Management Agency (FEMA) in 2003 for the Simi, Piru, and Verdale Fires.

The operators of Piru Lake should be notified of the conclusion in this report. There is no specific treatment that is likely to mitigate the potential for Aqua Blanca and other watersheds to contribute significant sediment and debris to this reservoir. Within the next few years, during high flow events, the effects of the Day Fire will increase flood flows.

Potential effects of large floating woody debris can be mitigated by installing a floating boom in the upper section of Piru Lake. Discussions with United Water have been conducted regarding the possible use of a floating boom and their interest in financial aid to help pay the cost of a boom. National Forest System lands are located on either side of the lake where the boom would be placed. Discussions at the last interagency meeting (October 20, 2006) with United Water included their assertion that the boom should be placed at a site where National Forest System lands are located on the east side of the lake and private lands are located on the west side of the lake. If this is correct BAER monies could be requested to help pay for this boom.

This is a follow up item that the forest needs to assess and may require the submittal of an interim 2500-8 report.

There are no practical or effective on site treatments proposed to reduce the effects of flooding, debris flows and sedimentation in Santa Paula Creek, Sespe Creek or Upper Piru Creek and Lower Piru Creek. Seeding and other watershed treatments were considered but eliminated, because of the low percentage of high burn severity and most of the fire area being out of prescription for most watershed treatments. The most effective treatment to reduce the threat to life and property is to notify Ventura County officials and other government agencies of the debris flow and flood hazards that exist on private property along Santa Paula Creek, Sespe Creek, Lower Piru Creek, Lower Piru Creek and Santa Clara River. In as much as is practical, some of these private land owners may be able to construct structures that could reduce the damage caused from flooding and or debris flows. Private land owners and municipalities can contact the Natural Resource Conservation Service and Army Corp of Engineers for technical assistance. Coordination between the government agencies is also recommended to determine what monies and other technical assistance are available for flood protection. Discussions have taken place with some interagency contacts regarding the possible installation of an early warning system. In addition, the National Weather Service is developing a flood and debris flow warning system that should be in place this winter. This system could include the installation of 2 automated rain gauges within the fire area as part of a United States Geological Survey (USGS) research project to determine rain fall thresholds for debris flows. The public needs to be aware and have access to these existing systems. Ventura County Watershed Protection District maintains a system of stream gauges used to predict flood events. One of their stream gauges in Sespe Creek is frequently damaged during flood events. A previous site of this stream gauge is located upstream on private land, where a natural control prevents large changes in the channel bottom and a gauge house is located.

Coordination with other agencies has been initiated through 2 meetings with the Natural Resource Conservation Service and 2 additional interagency meetings that were held on October 6 and 20, 2006. The purposes of the meetings were to initiate coordination of the BAER Team's efforts and to brief the findings and recommendations from the BAER Team (see interagency meetings notes from October 6 and 20). A copy of the Day Fire BAER Assessment Report should be sent to the agencies listed in the appendix of this report.

Forest Property

Roads

Close roads to the public within the fire area to protect them from flood hazards and to prevent unauthorized OHV access through the spring of 2007 or until re-evaluation occurs.

Restore drainage function to 31.5 miles of National Forest System road for this winter's rainfall season. This includes: cleaning culverts and catch-basins, ditch lines, and clearing vegetation blocking drainage ways; grade road to drain properly; make the existing drainage facilities and features as effective as possible to handle the anticipated post-burn flows. This proposed treatment will ensure that damage will not occur to the roads that could lead to a loss of the road investment. In addition, these roads need to be passable for the remainder of this winter for access to the private lands at Mutau Flat and to conduct storm patrols. If additional treatments or road maintenance are needed following this winter's rains but prior to next winter's storms, an Interim FS 2500-8 will be prepared at a future date.

The effectiveness of this treatment will lead to a positive cost benefit in the form of reduced maintenance needs. The potential impact of moderate rainfall damage would exceed this treatment's expense.

The following treatments were identified as BAER treatments for the Day Fire burned area:

1. Restore drainage function -This treatment includes a broad range of activities designed to open and restore function. It includes: Cleaning culverts, culvert catch-basins, over side drains, ditch lines, and clear vegetation blocking drainage ways. Grade road to drain, removing ruts and gullies and restoring needed in slope or out slope. Remove floatable and transportable debris, gravel bars, and the like from catch basins and immediate upstream channel to make the existing drainage facilities and features as effective and efficient as possible to handle the anticipated post burn flows. Restore design capacity.

2. Install riprap on existing over side drain outlets – This treatment will provide for energy dissipation at the outlet of existing over-side drains to minimize erosion of hill slopes below the drains. Riprap will be placed at the bottom of over-side drain flumes to dissipate the energy of the runoff and minimize formation of hill slope gullies. The riprap will be machine placed at locations specified by the Forest Service. The riprap will be 12" to 18" and the quantity will be roughly 3/4 cubic yard per site.

3. Install riprap on existing culvert outlets - This treatment will provide for energy dissipation at the outlets of existing culverts to minimize gully erosion of hill slopes below the outlets discharge areas. Riprap will be placed at the bottom of culvert outlets to dissipate the energy of the runoff and minimize formation of hill slope gullies. The riprap will be machine placed at locations specified by the Forest Service. The riprap will be 12" to 18" and the quantity will be roughly 1 cubic yard/site.

4. Install new 18" to 24" over side drains – This treatment will provide for installing over side drains at the outlet of rolling dips, drivable water bars and draw crossings to carry runoff across the fill bank without eroding it. Where runoff leaving the road from rolling dips, drivable water bars or draw crossings could pass over the road fill bank and erode the fill, the Forest Service will designate an over-side drain. These metal drains will be constructed and installed according to Forest Service specifications and drawings. Riprap will be placed to dissipate energy at the outlet end of the over side-drains.

5. Repair and re-install over side drains – This treatment will repair and re-install over-side drains that have been damaged, plugged or made ineffective by roadway erosion. Repair and re-installation of over-side drains designated by the Forest Service will restore their effectiveness. A variety of conditions exist that will be corrected. Some drains are plugged or partially plugged by debris, some are bent, and some are made ineffective by erosion that directs water around the inlet instead of down the inlet and drain.

6. Install drainage armor (riprap) – This treatment is used for fill slope stabilization, drainage dips, and run outs using riprap where needed to prevent erosion of the roadway and prevent hill slope gully erosion below the drains. Shape and prep area to

be treated with heavy equipment. Place adequate amount of 4" to 12" riprap to armor eroded and washed out areas and to armor areas of concentrated runoff.

7. Install hardened crossing (riprap) – This treatment will reconstruct ford-type drainage crossings to prevent erosion of roadbed. Shape roadbed in drainage crossing area to contain stream flow and provide serviceable road template. Armor with riprap to prevent erosion of roadway. Riprap size will be designed for each site based on expected flow and will usually range from 4 inches to 12 inches

8. Install flared (metal) end sections on round and elliptical culvert inlets – This treatment will install metal flared end sections on culverts to improve the hydraulic capacity and debris passage capability of existing culverts. Flared metal end sections will be added to the inlets of culverts designated by the Forest Service. The tapered inlets alter the flow pattern of runoff at the culvert entrance, diverting it into a smoother path and reducing eddying. The result is faster flow through the culvert and more direct flow, which increases the passage of water, sediment and woody debris. Installation of flared metal end sections increase the capacity of existing culverts as an alternative to replacing them with larger culverts.

9. Install vertical riser (snorkel) on culvert inlets – This treatment will provide a vertical riser to allow water to enter a culvert when the conventional inlet is plugged or blocked with debris and / or sediments. Install vertical risers on round culvert inlets. Gauge the height of the vertical riser needed as related to the height of the fill slope from the road edge to the top of the culvert inlet. Anchor vertical riser with guide wires and dead man anchors, cut slots for water to enter the riser install rebar grates 4" grid at top and bottom of riser to keep debris from entering the riser and inlet.

10. Remove roadway hazard trees – This treatment will provide for storm patrol access and safety of users on Forest Roads and to assure that drainage features are not blocked by falling/moving debris. Identify and fell hazard trees that could fall on the road or have fallen on the road. Place trees and limbs on or below road fill or above top of road cut. Do not place trees and limbs in ditches or culvert basins. Additional assessment is needed to identify site specific locations.

11. Install gates – This treatment will provide for the installation of gates to eliminate public traffic on roads and trails as needed to protect the public and natural resources. Construct and install gates at locations designated by the Forest Service. Gate design will meet specifications and drawings supplied by the Forest Service. The gate design is the standard used by the Los Padres National Forest.

12. Install drainage markers (Carsonite Post) – This treatment will provide for the use of vertical fiberglass posts to identify where the roadway drainage structures are located on the ground. This will be especially critical during storm patrols. Locate drainage structure on ground, install vertical post at road edge next to structure, use post pounder to secure vertical post firmly in the road edge at a minimum depth of 6 inches.

13. Install warning signs – This treatment will provide for the installation of signs to inform the public of burned area closures and road closures and the reasons for closures and warn drivers of fire-related traffic hazards. Construct and install signs with text, font, colors, size and shape designated by the Forest Service at locations designated by the Forest Service. Information signs will be 18 inches by 24 inches and will provide

background on reasons for closures and contact phone numbers for further information. Warning signs will be 48 inches by 96 inches, black on yellow, and will alert drivers to traffic hazards in order to minimize accidents. Sign text will be in English and Spanish.

14. Emergency storm patrol assessments – This treatment will provide for emergency storm patrol assessments and initiate corrective action during and after storm events, for risks such as flash flooding, rock fall, debris flow clean up, plugged culverts, and closing gates, when warranted. Insure water flow through drainage facilities. Clear blockages to restore drainage function for next storm. Includes minor slump and slide removal where needed to assure continued operation of drainage facilities.

15. Materials to do road treatments and private contractors to do the treatments will be procured by commercial sources. Forest Service employees will be needed to prepare contracts and conduct contract administration and inspection. The standard cost of administering road contracts is 30%. This could include travel and per diem for a detailer for up to 6 months.

16. A more detailed treatment prescription and cost is included in Appendix B, of the roads report.

Trails

The following treatments and methods are recommended for the identified trail sections at risk within the burn area of the Day Fire:

17. On OHV Jeep trails, rock water bars or rolling dips and berms should be placed according to Forest Service guidelines and where water leaves the road prism onto the slope, rock armor splash should be placed to diffuse runoff energy and to reduce slope incision.

18. On single track OHV trails and hiking/equestrian trails, slopes > 15 to 20% need water bars, preferably made with rock (logs could be used or rolling dips with earthen berms where rock is scarce,) in addition to the placing of grade stabilizers (check steps) on extended sections of steep trail, also rock structures preferred with logs as an option, following appropriate Forest Service trail and road guidelines for installation.

19. Where stream channels cross trails such as ephemeral/intermittent/perennial with smaller peak discharges found within steep gradients > 20% (with the exception of large streams such as Sespe River, Piru Creek or other streams with typical high peak-flows) rock armored spillways below the trails should be installed to reduce channel incision, log armoring could be utilized also in the absence of available rock and where burned trees are available. It is recommended that an experienced trails specialist or watershed specialist/hydrologist provide technical oversight of where these treatments are to be placed and provide instruction during implementation to ensure treatment effectiveness. In addition, a sampling of the treatment sites should be identified for monitoring to determine prescription effectiveness and for documentation purposes. The monitoring sites should also be determined by a qualified watershed or trails specialist. Additionally, all proposed treatment areas should be reviewed by Heritage Resources

Specialists before implementation and provide the necessary protections/mitigations of heritage sites.

20. Assessment of hazard trees along OHV trails and non-motorized trails prior to implementation of treatments to allow safe working conditions for trail crews. An interim 2500-8 will be submitted requesting the monies to remove hazard trees when assessment is complete.

21. Clearing of down trees on OHV trails to allow for storm patrolling and monitoring of the trails during the winter and to access trail conditions before the trails are opened to the public.

22. Burn Area and Trail Closures, Signs - With consideration of the increased hazards within the Day Fire perimeter and instability to trails within the fire area over the next year and the upcoming winter storm season, post-fire watershed responses during storm events pose a significant threat to human safety if visitors are within the burn area. In addition, with the open conditions the burned area provides(lack of ground covering vegetation), illegal OHV use and trespass off OHV routes is a strong possibility that will lead to additional soil and watershed resource degradation, and could lead to other human safety concerns. With these considerations, Los Padres National Forest management and the Day Fire BAER team recommend closure of the burn area to the general public for the winter rain season until mid-April 2007 or when conditions are re-evaluated and threats are reduced. This action will also increase the recovery potential of the burn area by preventing disturbance while minimizing the threat to human safety. Monitoring patrols are recommended to ensure closure compliance and to educate the general public of the safety and resource concerns.

23. Gates, fencing or other methods of closure are recommended at principal points of entry into the burn area such as trailheads, staging areas, etc. Closure signs with language describing hazards should be installed at entry points also to advise the public and to encourage closure compliance.

Noxious Weeds

24. Assess roads, selected trails, dozer lines, drop points, and staging areas for evidence of noxious weeds in the spring when new growth is at its peak. If any small outlying populations are found, a supplementary request for noxious weed treatment will be submitted. Evaluate and eliminate the potential for noxious invasive weed establishment and spread, as a result of fire. Inspect and assess for newly established weed occurrences. A delayed detection survey will include documentation and hand pulling small new weed occurrences at the time of inspection. New weed occurrences will be pulled to root depth, placed in sealed plastics bags, and properly disposed. Documentation of new infestations will include:

    a. GPS negative and positive inspection results
    b. Incorporate data into GIS spatial database
    c. Establish photo points
    d. Map perimeter of new infestation
    e. Estimate number of plants per square meter
    f. Treatment method

g. Dates of treatment
h. Evaluate success in subsequent inspection

BAER funding for noxious weed detection survey is only requested for the first year after the fire. Survey will probably be conducted during May/June 2007. If noxious weeds are detected and additional funding is needed to treat the infestation, then an interim request will be made. If treatments are implemented within one year of the fire containment date, then treatment effectiveness monitoring and further noxious weed treatment, if needed, will be requested for up to 3 years.

Heritage and Cultural Resources

25. Warning signs placed at primary access and entry point into portions of the burn area with concentrations of sites or particularly sensitive sites, such as rock art, will provide for educational messages about the laws that provide for the protection of heritage resources and that the laws will be enforced. This will allow for the likelihood of successful prosecutions should violations occur. Place signs at public entries to the area (trailheads, roads) to educate public users about proper behavior around sensitive and fragile heritage resources, laws protecting these resources, and those violators will be prosecuted. Utilize Site Stewards for assistance in installation.

26. Protect against looting – Provide for patrols during the next year, emphasizing times when the area is most heavily used (spring, early summer, fall hunting season), to deter looting and vandalism, and monitor effectiveness of signs. Utilize Site Stewards to assist in both patrolling and educating the public.

A BAER assessment of heritage and cultural resources is currently being conducted. This assessment will determine if any sites are at risk from post-fire watershed conditions such as erosion and deposition of soils on the sites. The forest archaeologist proposed in the Heritage Resources BAER report that an initial assessment be conducted with an archaeologist and erosion control specialist. This work is currently being done and the results will be submitted in an interim 2500-8 report.

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

Land __ % Channel __ % Roads/Trails **75** % Protection/Safety **95** %

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Land			
Channel			
Roads/Trails	80	100	

Protection/Safety	95	95	

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

Road and trail treatments - $5,182,630 to repair roads and trails, plus loss of access to private property owners in Mutau Flat. This includes the potential loss of life, if the roads and are not adequately closed and loss of value to heritage resources and the long term loss of recreation in the fire area.

F. Cost of Selected Alternative (Including Loss):

$1,364,782 – There is the potential that the road system and trail system could become damaged in the next few months prior to treatments being implemented. It is imperative that treatments are implemented immediately.

G. Skills Represented on Burned-Area Survey Team:

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

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H. Treatment Narrative: This section has been incorporated into B. Emergency Treatment Narrative and Objectives.

I. Monitoring Narrative:

Roads

Monitor conditions and initiate corrective actions, when safe to do so during and after storm events, for risk such as flash flooding, rock fall/debris flow clean up, plugged drainage facilities, and closing gates, when warranted. Clear plugged drainage

structures to restore drainage function before the next storm. Remove minor slump and slide material from roadway to assure access for continued operation of drainage facilities. Report blocked drainage facilities and road blockage requiring heavy equipment to clear. Replaced drainage markers (Carsonite signs) destroyed in the fire will aid in locating drainage structures during emergency storm patrols. Document and determine follow up drainage restoration needs that may be needed and requested in an interim 2500-8.

Trails

It is important that treatment sites should be monitored post-implementation to determine prescription effectiveness and for documentation purposes, and to assess maintenance needs. Without monitoring and maintenance, treatments could lose their effectiveness and the initial investment could be lost. The monitoring sites should also be surveyed by a qualified watershed or trails specialist. Monitoring of treatments should be completed after the first post-fire damage producing storm event occurs and identify maintenance needs and implement treatment needs. An additional round of monitoring and maintenance of the sites should be completed after the end of the typical rain season in spring when damage producing storms are unlikely.

Noxious Weeds Detection Monitoring

Monitoring will need to be conducted to find and prevent newly established weed occurrences. Monitoring will include documentation and hand pulling small new weed occurrences at the time of inspection. New weeds occurrences will be pulled to root depth, placed in sealed plastic bags and properly disposed.

Documentation of new infestations will include:
1. GPS negative and positive inspection results
2. Incorporate data into GIS spatial database
3. Establish photo points
4. Map perimeter of new infestations
5. Estimate number of plants per square meter
6. Treatment method
7. Dates of treatment
8. Evaluate success in subsequent inspection

Inspections and monitoring will be once during May/June 2007. Based upon the first year's survey, additional surveying may be requested for up to three years.

Part VI – Emergency Stabilization Treatments and Source of Funds

			NFS Lands	
		Unit	# of	
Line Items	Units	Cost	Units	BAER $
A. Land Treatments				
Noxious Weeds Detection Survey				
GS-11 Forest Botanist	Day	$ 396	10	$ 3,960
GS-9 Assistant Resource Officer	Day	$ 339	20	$ 6,780
GS-5 Forestry Technician	Day	$ 167	20	$ 3,340
GS-5 Forestry Technician	Day	$ 167	20	$ 3,340
GS-5 Forestry Technician	Day	$ 167	20	$ 3,340
Mileage	Mile	$ 0.42	1500	$ 630
Subtotal Noxious Weeds Detection Survey				$21,390
Archeology				
Protect Against Looting	Lump Sum	$37,587	1	$37,587
Protection of Pictographs	Lump Sum	$6,350	1	$6,350
Subtotal Archeology				$49,937
Subtotal Land Treatments				**$65,327**
B. Channel Treatments	**NONE**			
C. Roads/Trails				
Roads				
Restore Drainage Function (ML- 2)	Mile	$1,400	28.1	$39,340
Restore Drainage Function (ML- 3)	Mile	$700	3.4	$2,380
Install riprap on over side drain outlets	Each	$250	166	$41,500
Install riprap on culvert outlets	Each	$325	40	$13,000
Install 18" to 24" over side drains	Each	$3,000	20	$60,000
Repair and re-install over side drains	Each	$2,000	10	$20,000
Install drainage armor (riprap)	$Yard^3$	$300	100	$30,000
Install hardened crossing (riprap)	$Yard^3$	$480	110	$52,800
18" culverts	Each	$1,800	1	$1,800
36" culverts	Each	$2,500	3	$7,500
42" culverts	Each	$3,000	2	$6,000
48" culverts	Each	$3,600	4	$14,400
60" culverts	Each	$4,200	1	$4,200
30" X 42" elliptical culverts	Each	$2,500	3	$7,500
40" X 52" elliptical culverts	Each	$3,200	1	$3,200
Install 48"x12' vertical riser culvert inlet	Each	$12,500	1	$12,500
Install 48"x6' vertical riser culvert inlet	Each	$10,850	1	$10,850
Install gates	Each	$10,000	6	$60,000
Install drainage markers	Each	$35	275	$9,625
Storm Patrol	Each	$6,500	10	$65,000

30% administrative costs (includes contract preparation and contract administration)				$143,700
Subtotal Roads				$605,295
Trails				
Treatments Type 2: Closure Monitoring and Patrol: ORD	Lump Sum	$73,296	1	$73,296
Treatments Type 2: Closure Monitoring and Patrol: Mt. Pinos	Lump Sum	$34,200	1	$34,200
Treatments Type 3: Emergency Trail Treatments: ORD	Lump Sum	$163,497	1	$163,497
Treatments Type 3: Emergency Trail Treatments: Mt. Pinos	Lump Sum	$72,300	1	$72,300
Subtotal Trails				$343,293
Subtotal Roads/Trails				**$948,588**
D. Protection/Safety				
Remove roadway hazard trees	Mile	$5,000	3	$15,000
Install warning signs on Roads	Each	$800	3	$2,400
Physical Closure of Trails: ORD	Lump Sum	$16,955	1	$16,955
Physical Closure of Trails: Mt Pinos	Lump Sum	$32,950	1	$32,950
Trail Hazard trees assessment	Lump Sum	$20,000	1	$20,000
Subtotal Protection/Safety				**$87,305**
E. BAER Evaluation				
Assessment				
Administrative Salary				$126,664
Per Diem				$27,358
Materials				$75
Subtotal Assessment				$154,097
BAER Implementation				
Implementation Overhead				$21,210
Implementation Leader				$43,940
Subtotal Implementation				$65,150
Subtotal Evaluation				**$219,247**
F. Monitoring				
Heritage Resource Area Closure Effectiveness Monitoring	Lump Sum	$6,000	1	$6,000
Trail Treatments Monitoring, Ojai RD	Lump Sum	$22,000	1	$22,000
Trail Treatments Monitoring, Mt. Pinos RD	Lump Sum	$22,000	1	$22,000
Subtotal Monitoring				**$50,000**
G. Totals				
Previously approved				$0
Total for this request				**$1,370,467**

PART VII - APPROVALS

1. /s/ *Kenneth E. Heffner* October 26, 2006
Forest Supervisor (signature) Date

2. /s/Beth G. Pendleton (for) 10/20/2006
Regional Forester (signature) Date

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