

Jesusita Fire Watersheds

Watershed Fire Statistics

Watershed	Acres Burned	Percent of Watershed
Maria Ygnacio (East Branch)	427	38%
San Antonio	1,257	42%
Atascadero	251	50%
Cieneguillas	295	66%
Barger Canyon	754	84%
San Roque	2,051	75%
Mission	1,698	69%
Rattlesnake	1,342	67%

Legend

- Watershed Boundary
- Jesusita Fire
- Los Padres Forest Boundary



- Emergency Watershed Response Plan
- BAER Team Recommendations
- Bren School Recommendations
- USDA Forest Service Studies
- Jesusita Burn Area Mulch Area Development
- Similar Projects
 - Angora Fire, South Lake Tahoe
 - Gap Fire
- Quality of Mulch Materials

JESUSITA FIRE
Emergency Watershed Response Plan
Santa Barbara County Operational Area
Operations Section

- Prepare existing downstream creek channels to convey the maximum flow rate possible;
- Excavate the existing sediment basin at Atascadero Creek (Goleta Slough) in order to begin the season at maximum basin capacity;
- Install debris racks where feasible to intercept woody debris;
- Clean the existing Debris Basins in the affected Watersheds;
- Perform aerial mulching;**
- Provide emergency protective measures at selected key locations as identified;
- Operate sand bag stations to provide sand and bags to residents who live within and downstream of the burn area;
- Operate an aggressive winter operations program to maintain capacity in creek channels, debris basins, and the Atascadero Creek sediment basin;
- Prepare locations for disposal of flood debris and sediment;
- Coordinate assistance to private land owners with flood protection measures and erosion control through the Natural Resources Conservation Service; and
- Coordinate efforts and share information among responding and responsible agencies.



Burned Area Emergency Response (BAER)

<http://www.fs.fed.us/r5/lospadres/fire/baer/jesusita/jesusita-baer-rdctl.pdf>

Table 2: Summary of Soil Burn Severity and Sediment Yield to “Pour Point” Watersheds

Analysis Watersheds (appendix A)	Low & Unburned Burn Severity Acres¹ (all lands)	High & Mod Burn Severity Acres¹ (all lands)	Fraction of watershed mod & high	Erosion per acre² 1st year (yd3)	Sediment Yield² 1st year (ac-ft)	Erosion x backgrd³
Atascadero Creek	165	101	0.38	39.9	6.6	11.3
Atascadero East	158	123	0.44	45.4	8.0	12.9
Cold Spring Canyon	1,896	360	0.16	22.7	32.0	6.4
Fire area outside delineated watersheds	19	10	0.35	39.0	0.7	11.9
Lauro Canyon	160	209	0.57	61.3	14.2	17.4
Maria Ignacio Creek	3,367	400	0.11	13.3	31.3	4.1
Mission Canyon	540	1,312	0.71	80.3	93.0	22.7
Rattlesnake Canyon	988	1,121	0.53	61.1	80.6	17.3
San Antonio Creek	1,868	989	0.35	26.1	46.7	8.0
San Roque Creek	834	1,479	0.64	68.8	99.5	19.5
Sycamore Tributary	413	47	0.10	16.7	4.8	4.5
Upper Arroyo Burro/Barger	219	649	0.75	79.8	43.3	22.6

¹ Soil burn severity as mapped by satellite BARC imagery and ground survey

² Erosion as modeled by RCS

³ RCS considers background erosion rates at 10 years post-fire

Appendix C. Potential treatment benefit on steeper slopes

Jesunita Fire: Estimated Erosion Benefit with Treatment (25-60% slopes)

Watershed	FS Treatable with hydro-mulch (ac)	Non-FS Treatable with hydro-mulch (ac)	FS lands (cu yd) Benefit	Non FS lands (cu yd) Benefit	Combined Benefit (cu yd)	No Treatment (cu yds)	Percent Reduction Combined	Percent Reduction FS lands only
Atascadero Creek	0	65	0	4,981	4,981	10,633	47	0
Atascadero East	0	91	0	6,973	6,973	12,763	55	0
Cold Spring Canyon	21	135	2,010	12,920	14,930	51,165	29	4
Fire area outside delineated watersheds	0	5	28	440	468	1,164	40	2
Lauro Canyon	13	132	1,060	10,766	11,827	22,651	52	5
Maria Ignacio Creek	288	37	21,726	2,791	24,517	50,014	49	43
Mission Canyon	190	350	17,913	32,998	50,912	148,786	34	12
Rattlesnake Canyon	133	483	12,539	45,538	58,077	128,929	45	10
San Antonio Creek	154	410	12,269	32,665	44,935	74,671	60	16
San Roque Creek	114	626	9,298	51,058	60,356	159,140	38	6
Sycamore Tributary (Tea Fire)	3	27	302	2,721	3,023	7,686	39	4
Upper Arroyo Burro	41	375	3,331	30,469	33,800	69,345	49	5
Total acres	957	2,736.00						

Land Treatments: Aerial Mulch Application – The BAER assessment team recommends the use of either hydromulch, a wood and paper mulch matrix with a non water-soluble binder; or wood straw, a wood strand erosion control material; on approximately 160 acres of moderate/high severity slope within the Maria Ygnacio sub-watershed, above State Highway 154 and private residences. Frequent and high winds are common in the area and a mulch material that resists blowing after application must be used. Mulch would be applied to National Forest System lands directly above State highway 154, on slopes <60% where there are no rock outcrops.

State Highway 154 runs through National Forest Lands, and is a critical access route for commuters and emergency medical service personnel such as local fire suppression departments, through San Marcos Pass of the Santa Ynez Mountains. If left untreated, there is a high likelihood that road infrastructure could be plugged, resulting in flooding and sedimentation on the roadbed, creating hazardous conditions for motorists. Increased frequencies of road closures could potentially impact revenues of businesses along State Hwy 154, as well as cause increased costs to commuters.

Estimated cost is approximately \$****/acre for either material. Due to numerous variables such as rock outcrops, high winds, effectiveness during intense storm events, and availability of product, the BAER Assessment Team felt the final recommendation on type of material should be made by the implementation team, at which time more intense reconnaissance of the proposed treatment area can be conducted.

This treatment regardless of final product selection is considered to be the most effective treatment available for National Forest System lands given the complete loss of vegetative cover, topography, and access. This treatment will reduce the potential for increased flood flows, erosion and sedimentation, but will not eliminate the potential for these adverse effects, nor the potential for debris flows. Therefore, it is critical to recognize that this treatment coupled with Cal Trans proposal to:

1. Have 24 hour storm patrols during storm events,
2. Have equipment mobilized during storm events to maintain road infrastructure,
3. Be prepared to implement highway closures

would be the most effective combination of treatments to protect life and downstream properties at risk.

The BAER Assessment Team evaluated the effectiveness of applying mulch on all 11 sub-watersheds within the burn area, Table 2 below. The benefit of hillslope treatments was modeled on Forest Service and private lands, and outputs were calculated at watershed “pour points” shown in Figure 1. We developed the following criteria to identify possible treatment areas within these watersheds:

- Slopes of 25 to 50% on Forest Service lands (50 to 60% was also modeled)
- Slopes of 25 to 60% on private lands
- Areas of moderate and high soil burn severity
- Values at Risk are considered to be High
- % of Watershed to be treated....estimate 30-40% to be effective

Figure 2 delineates areas of moderate and high severity with slopes between 25% - 50%, and 50% - 60%. These areas represent potential treatable acres on National Forest and private lands, based on a GIS excersize. Actual treatable acres may be reduced due to rock outcrops, and other geographic features. Therefore, treatable acres need to verified on the ground.

The expected effectiveness and benefits of treating Forest Service lands by mulchin is generally low in most watersheds because of their very steep, rocky terrain and lack of suitable slope for treatment. The Maria Ignacio Creek area is an exception. Maria Ignacio was subsequently sub-divided (East Fork of Maria Ignacio not shown in table) to analyze the benefit to Highway 154 and associated culverts. Approximately 160 Forest Service acres of mostly high soil burn severity could be aerially mulched. This area is located in the extreme NW corner of fire below the Painted Cave Road. This treatment is expected to reduce annual sediment yield by about half (a reduction from 10 ac-ft to 5 ac-ft) as modeled by RCS. As described above, this reduction or benefit should not be seen as “fixing the emergency”. There is a low expectation that mulching will have any significant effect on mitigating the threat of debris flows.



Bren School of Environmental Science & Management
University of California, Santa Barbara

Post-Fire Sedimentation and Flood Risk Potential in the Mission Creek Watershed of Santa Barbara

A Group Project submitted in partial satisfaction of the requirements for the degree of
Master's in Environmental Science and Management

By

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Milli Chennell
Erica Eisch
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Rainstorm Duration and Intensity

	Small Storm	Large Storm
Large Fire	Mid-range likelihood & magnitude of hazard	Lower likelihood, Higher Magnitude of Hazard
Small Fire	Higher likelihood, Lower Magnitude of Hazard	Mid-range likelihood & magnitude of hazard

Figure 4-B: Risk is determined by the size and intensity of fire and precipitation. The combinations of events that have the lowest likelihood have the highest risk and vice-versa.

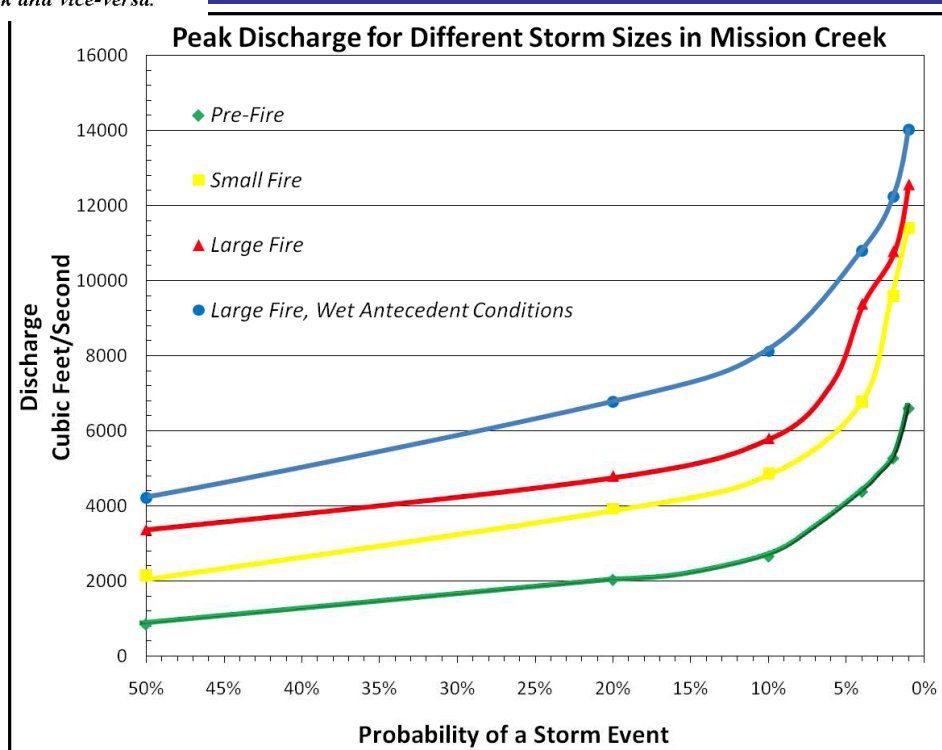


Figure 5-E: Predicted Peak Discharges at the Mission St. gauging station (USGS 11119750) for the 2-, 5-, 10-, 25-, 50-, and 100-year storms under four scenarios

8. RECOMMENDATIONS

Local management of post-fire risk requires planning and decision making at multiple levels of government and within communities (as discussed in Section 3.5). The methods and results of this project will contribute to future predictions of post-fire flooding and sedimentation in Mission Creek and similar watersheds. Furthermore, this information may improve long term environmental planning for post-fire winters and emergency situations in Mission Canyon and downtown Santa Barbara.

The information generated from this project assists in evaluating the appropriateness and effectiveness of various emergency post-fire measures for Mission Creek watershed or similar areas. More importantly, local officials can use the results of this study for management decisions and planning actions well before a wildfire occurs. Planning for the inevitable fire in the upper watershed by understanding the potential magnitude of risk associated with increased erosion, flooding, and debris flows can reduce the need for extensive emergency watershed protection measures. Recommendations focus on both specific mitigation actions to reduce runoff or sediment delivery to downstream areas and on coordinated emergency and long-range planning for local agencies and community leaders.

The results of this project support the following recommendations:

• **Emergency Post-Fire Actions**

- A. Excavate sediment basins to maximum capacity (if not completed before the fire)
- B. Increase channel capacity (emergency channel clearing and debris control)

C. **Stabilize hillslopes by applying hydromulch**

• **Long Term Planning Actions**

- D. Increase channel capacity (strategic infrastructure and flood control projects)
- E. Incorporate post-fire risk into city and county General Plans
- F. Incorporate post-fire risk into Winter Storm Emergency Response Plans
- G. Establish public information systems

8.1 Emergency Post-Fire Actions

Post-fire management actions include physical barriers on hillslopes or in channels to reduce the volume and rate of runoff and erosion at the source. Additionally, many jurisdictions perform emergency dredging or excavation of sediment basins to increase capacity and prevent debris accumulation and flooding downstream. City and county agencies may undertake any combination of locally appropriate measures during the interval of time between the fire and the first rains of the winter. However, since emergency mitigation measures can be very expensive, the efficacy of such actions needs to be considered on a watershed basis.

C. Stabilize Hillslopes by Applying Hydromulch

As described in Section 6, the Erosion Risk Management Tool (ERMiT) has the capability of estimating the relative decrease in sediment production using various mitigation treatments, including mulching. Erosion may decrease by up to 90%, and it is most effective in small to moderate storms.

Mulching is the most widely applied post-fire mitigation measure on U.S. Forest Service (USFS) land in Southern California. According to the USFS, a fire in upper Mission Creek watershed would necessitate the application of straw or hydromulch on burned hillslopes due to the presence of residential and commercial areas downstream of forest lands. Based on BAER team recommendations, the entire Gap Fire burn area in the Los Padres National Forest (including much of the San Pedro watershed) was sprayed from the air with hydromulch at a cost of \$3,200/acre or around \$4 million total (Mary Moore, USFS, pers. comm.).

United States
Department
of Agriculture
Forest Service

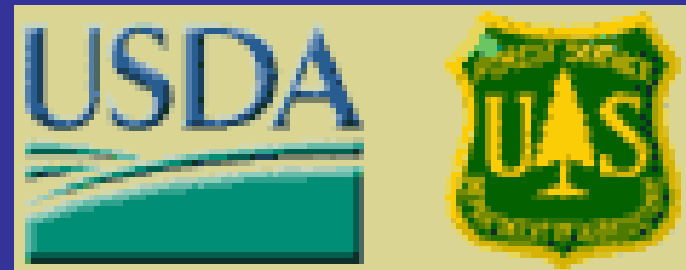
**Rocky Mountain
Research Station**

General Technical
Report RMRS-GTR-63

September 2000

Evaluating the Effectiveness of Postfire Rehabilitation Treatments

**Peter R. Robichaud
Jan L. Beyers
Daniel G. Neary**



(Keeley Session)

EVALUATING THE EFFECTIVENESS OF MULCHING AS A POST-FIRE EROSION CONTROL TREATMENT

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INTRODUCTION

In fire-prone Southwestern ecosystems, it has been well documented that wildfire can dramatically alter the erosion response of upland landscapes (Wohlgemuth et al. 2006). The protective vegetation canopy and ground surface organic material are removed. Moreover, the combustion of soil organic matter can create a subsurface water-repellent layer that restricts infiltration and promotes overland flow. All these factors enhance sediment production.

Accelerated post-fire erosion and sedimentation can threaten life, property, and infrastructure at the wildland/urban interface. Moreover, post-fire environmental degradation can destroy habitat and populations of endangered species along sensitive riparian corridors. To mitigate these undesirable post-fire consequences, federal land managers have developed a Burned Area Emergency Response (BAER) program of hillslope and stream channel rehabilitation treatments for the purpose of erosion control (USDA Forest Service 1995). Unfortunately, the benefits of many of these erosion control measures have yet to be quantitatively demonstrated in rigorous field studies (Robichaud et al. 2000).

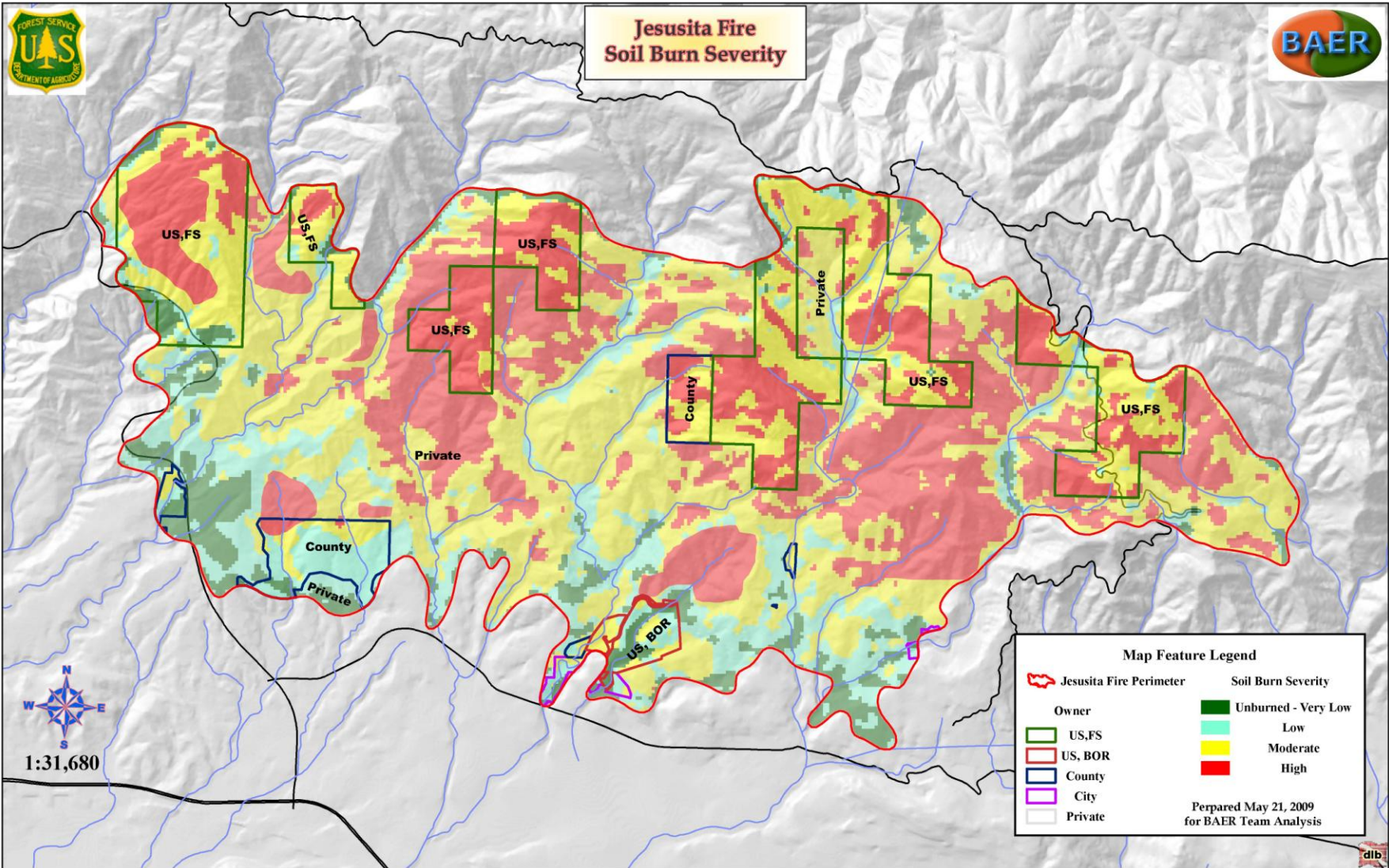
Mulching is the wet or dry application of materials that act as a ground cover to protect the denuded soil from the agents of erosion. During the 2003 southern California fire siege, straw was used as a mulch on the Old/Grand Prix Fire. The straw was applied both by hand and by helicopter at a rate of 2.3 megagrams per hectare (1 ton per acre). Depending on labor charges, the cost of hand-applied straw could exceed \$1250 per hectare (\$500 per acre). Aerial straw mulching could be applied much quicker, but at a cost of \$1900 per hectare (\$750 per acre) (Hubbert 2004). Also in 2003, a proprietary hydromulch mixture was applied to a small section of the Cedar Fire. A combination of a bonded wood fiber matrix and a tackifier, the hydromulch was delivered as a slurry at a cost of \$5000 per hectare (\$2000 per acre) (Hubbert 2004). Because of differences in land management agency philosophies, the hydromulch was delivered at two application rates: 100 percent coverage on the Capitan Grande Indian Reservation, and 50 percent coverage in 30 m (100 foot) contour strips on adjacent Forest Service land. The purpose of this study is to evaluate the effectiveness of the mulch applications in reducing erosion on burned landscapes.

METHODS

The performance of the straw mulching on the Old/Grand Prix Fire was monitored by repeat photography at established photo points (Hubbert 2004). Photos were taken at the time of mulch application and periodically thereafter at irregular intervals. Although erosion at the study

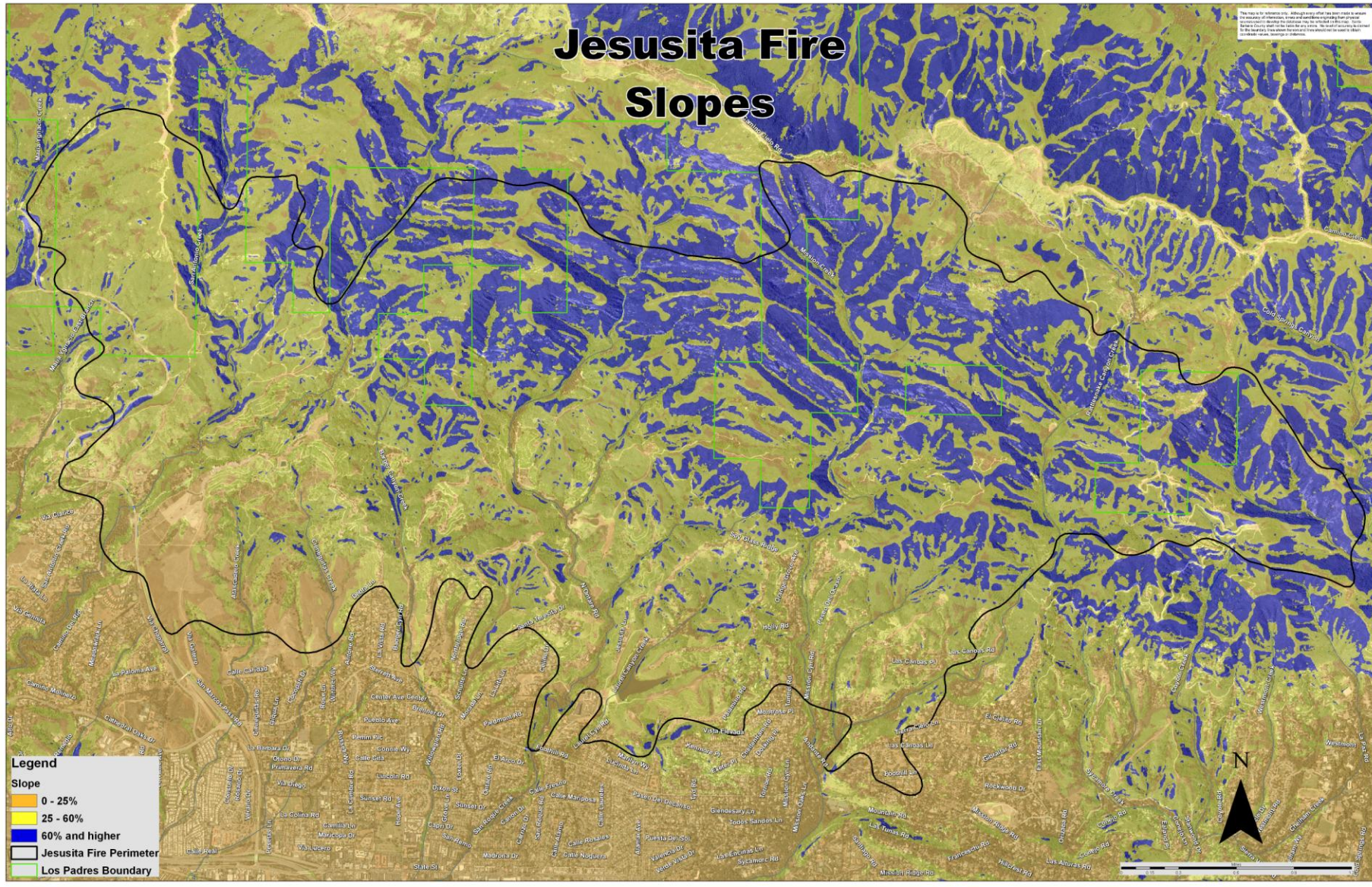


Jesuita Fire Soil Burn Severity



Jesusita Fire Slopes

This map is for reference only. Although every effort has been made to ensure the accuracy of the information, the user should not rely on this information for any purpose. The user should verify the information with the appropriate authorities. The user should also be aware that the information is subject to change without notice.



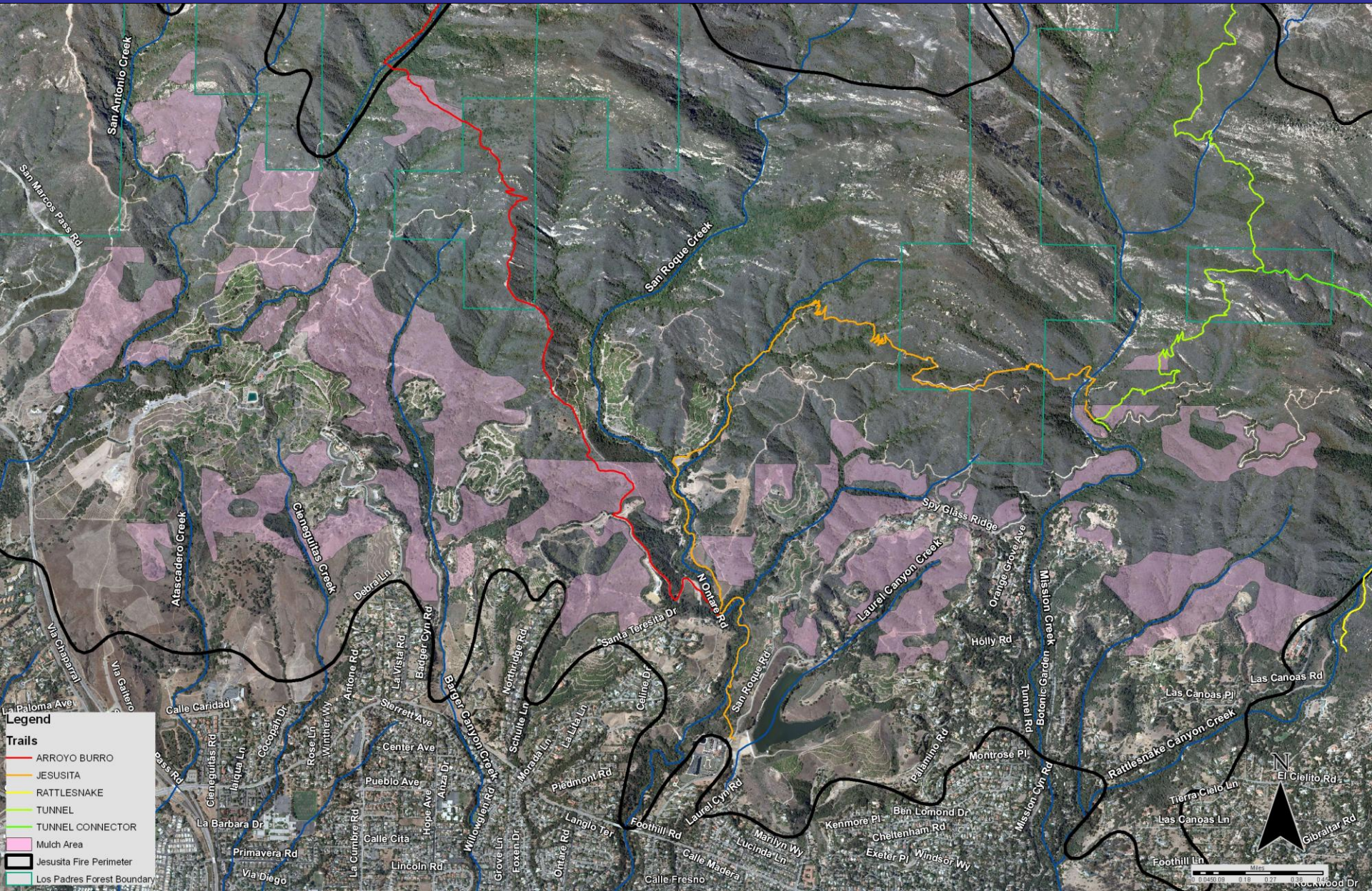
Legend

Slope

- 0 - 25%
- 25 - 60%
- 60% and higher
- Jesusita Fire Perimeter
- Los Padres Boundary



Mulch Areas (Draft) & Hiking Trails



Legend

Trails

- ARROYO BURRO
- JESUSITA
- RATTLESNAKE
- TUNNEL
- TUNNEL CONNECTOR
- Mulch Area
- Jesuita Fire Perimeter
- Los Padres Forest Boundary

Scale: 0 0.10 0.20 0.30 Miles

North Arrow

El Cielito Rd

Tierra Cielo Ln

Las Canoas Ln

Las Canoas Pk

Las Canoas Rd

Gibraltar Rd

Rockwood Dr

Devastation and Recovery in South Lake Tahoe

Beginning on June 24, 2007, and continuing for nearly a month until it was controlled July 19, the Angora Fire in South Lake Tahoe, CA, burned 3,100 acres, 2,736 of which were National Forest System lands. More than 250 homes and 75 commercial structures were destroyed. Soil on the burned sites needed to be stabilized quickly because many more homes were threatened by potential sediment and runoff. The Angora Fire was the most destructive blaze to occur in the Tahoe Basin in more than 100 years.

The US Forest Service named Aero Tech, based in Clovis, NM, the prime contractor to provide aerial hydromulching services to stabilize the site and protect it from erosion. The hydromulch would be used to trap moisture and foster an environment where new growth could be established. The company subcontracted Loomis, CA-based Selby's Soil Erosion Control Co. to aid it with mixing operations. Other contractors had set straw wattles in place as a temporary emergency measure on the site, and on September 12, Aero Tech began using its five AT-802 Air Tractors to treat 636 acres that were affected by the burn.

Workers hydromulched areas near the South Tahoe High School, Angora Ridge Road, an area close to Angora Lakes, and an area near Highway 50. The magnitude of the project was its biggest challenge, with many airplane loads that needed to be completed each day.

"We applied approximately 2.3 million gallons of mulch to the mountainside in 14 days. We did 3,187 airplane loads," says Ted Stallings, Aero Tech's president, adding that the company used a 60% wood, 40% paper hydromulch mixed with Super Tack, a combination he described as typically standard for use on post-fire sites. "Getting maintenance completed at night on the aircraft, everything just had to go perfect, and it did.

The Forest Service told us that the Angora Fire was the largest, most successful aerial hydromulch project to take place in the state of California. We are the first contractor that has been awarded straight 10s across the board."

The decision to hydromulch a post-fire site without using seed is something Stallings says is practiced on about half of the post-fire recovery work that his company performs. This depends on how hot the fire-damaged area became and if the germination in the soil has been destroyed.

Dietz agrees. "The native seed palette is designed to survive," he says. "There are even seeds that are post-fire germinate."

The result of the Angora fire that had started as a result of an illegal campfire



Photos: Ted Stallings

These aircraft are indispensable tools for applying hydromulch.



Gap Fire hydromulch
October 2008





United States
Department of
Agriculture

Forest
Service

Los Padres
National Forest

Santa Barbara Ranger District
3505 Paradise Road
Santa Barbara, CA 93105
(805) 967-3481
TDD: (805) 968-6790

File Code: 2520-3

Date: January 15, 2009

Brian Trautwein
Environmental Analyst
Environmental Defense Center
906 Garden Street
Santa Barbara, CA 93101

Dear Mr. Trautwein:

Thank you for your letter dated January 14, 2009, expressing your concerns about materials other than paper, wood fragments, and a stabilizer/tackifier that were discovered in hydromulch applied in the burn area of the recent Gap Fire in Santa Barbara County. Please accept my assurance that your concerns are shared by the USDA Forest Service and the Santa Barbara Ranger District. We were surprised to discover that the hydromulch contained these materials and conducted an internal investigation to assess the volume and extent of the material in the hydromulch application. Our investigation revealed that although this material was present in the hydromulch area, it constituted a tiny percentage of the applied volume and weight of hydromulch at any specific location. We also investigated whether any steps could be taken to prevent inclusion of this type of material in future applications of hydromulch on National Forest System (NFS) lands. The language used for the Gap aerial hydromulch contract specified paper/wood fiber mulch mix. For future contracts we plan to add additional language requiring the hydromulch materials to be 100% plastic free and we plan to conduct further inspections to ensure this does not happen again.

If you have any further questions or need further information, please call Jim Webb, the Lands and Resource Officer here at the Santa Barbara Ranger District at 805-967-3481 (x252).

Sincerely,

CINDY CHOJNACKY
District Ranger

Cc: Tom Fayram, Santa Barbara County Flood Control
Peggy Hernandez, Forest Supervisor, Los Padres National Forest
Brent Roath, USDA Forest Service, Region 5



Extra Precautions to be taken on Jesusita:

- Specs require certified 100% plastics free and contaminant free
- Flood Control assigning full time inspector at site of mulch mixing operations
- Paper representative going to be present full time
- EDC offered to be present as well.