Sayre Fire

Burned Area Recovery Team (BART) Report

DRAFT

Affecting Watersheds in Los Angeles County
and
The City of Los Angeles, California

December 13, 2008

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DISCLAIMER

The scope of the assessment and the information contained in this report should not be construed to be either comprehensive or conclusive, or to address all possible impacts that might be ascribed to the fire effect. Post fire effects in each area are unique and subject to a variety of physical and climatic factors which cannot be accurately predicted. The information in this report was developed from cursory field examination by licensed resource professionals and should be viewed in conjunction with other relevant sources of information. Neither the State of California nor any Agency or Department participating as a member of the Burn Area Response Team (BART) makes any warranty, express or implied, nor assume any legal liability for the information disclosed herein.

EXECUTIVE SUMMARY

SAYRE FIRE CA-LFD-1460

Affecting watersheds in the County and City of Los Angeles, California

Introduction

An initial Burned Area Recovery Team (BART) has been deployed to the Los Angeles County area to evaluate Values at Risk in the affected burn area of the Sayre Fire. The BART has three key objectives:

Post-fire watershed assessment and recovery operations are conducted to:

- Identify on-site and downstream threats to public health or safety from landslides, mudslides, debris torrents, floods, road hazards, and other fire related problems.
- Identify threats to watershed resources, including: excessive erosion; impaired water quality; threats to wildlife, fisheries, and botanical values; and cultural resources.
- Determine measures needed to prevent or mitigate identified threats.

The Sayre Fire began on November 14, 2008 burning approximately 11,262 acres as a wind-driven fire before being declared contained on November 21, 2008. The fire burned north of the I-210 freeway in the foothills north of the Sylmar and Granda Hills areas of the City of Los Angeles. The northwest trending Golden State Freeway, Interstate 5, divides the Sayre burn area into that portion above the Granada Hills in the southern flank foothills of the eastern Santa Susana Mountains west of the freeway and that portion above Sylmar in the western San Gabriel Mountains, on the east side of the freeway. Of the total area burned, about 50% (5,668 acres) are lands owned by the U.S. Forest Service, administered by the Angeles National Forest; the remainder of the area is comprised of approximately 3,000 acres (26%) of State of California, Direct

Protection Area (DPA), and 2,594 acres (24%) within local jurisdictions of the County and City of Los Angeles.

The Sayre Fire was bordered on the east by the recent Marek Fire and along the west by the Sesnon Fire. These two fires occurred in October of 2008. It should be noted that the three fires combined to create a fire complex that broadens the scope of identified values at risk downslope of the San Gabriel and nearby mountains. The scope of this BART report is focused on the aftermath of the Sayre Fire.

The recommendations found in this report are to be used as a guideline for possible mitigation to decrease to risk of damages to life and property. It is an initial assessment to disclose values at risk (VARs). The treatments fall into one of two broad categories. Those treatments which can be considered temporary (short-term) measures designed to be quickly and relatively inexpensively implemented; and long-term treatments designed to facilitate the recovery of the watershed at an accelerated pace while concurrently minimizing the exposure of the VARs to the threats identified.

Watershed Evaluation

The burn area falls within the Ventura-San Gabriel Coastal Basin of Southern California Coastal Sub-region and covers portions of the following three hydrologic sub-areas (HSAs): Sylmar, Bull Canyon, and Eastern. Please see Appendix 2 for *Burn Severity by the Hydrologic Sub Areas*. All of the drainages affected by the Sayre Fire in Los Angeles River watershed flow south and eventually drain into Los Angeles River. Los Angeles County Department of Public Works (LACDPW) and City constructed large debris basins and dams at the mouth of several major canyons to control debris flow and sediment laden flooding.

There are 8 large debris basins with engineered spillways associated with the 8 major canyons starting west from Stetson Canyon to the east at Pacoima Dam. In addition to these major drainages, there are a number of smaller drainages on the south edge of the burned area that are not under the control of any major debris basin. The estimated sediment loads on all debris basins are comparable to their maximum capacity; at Wilson, May-1 and Sombrero debris basins, the load would exceed their maximum capacity with a 2% probability. It is important to clean the debris basins so that the full capacity of the debris basins would be immediately available to hold the increased amount of debris. LACDPW has been proactive in rapid cleanout and maintenance of several debris basins affected by the fire. The areas that were field reviewed by the BART include Loop, Wilson, Hog, Sombrero, Elsmere and Bee Canyons, as well as the area around the Pacoima Reservoir.

Values at Risk

The principal concern with the Sayre Fire is loss of human life and property due to an increase in the potential for in-channel floods, hyper-concentrated floods, debris torrents, mud sliding, and debris flows. Houses and communities near or within stream channels near Sylmar and below Pacoima Dam have been specifically identified where significant in-channel floods, hyper-concentrated floods, debris torrents, mud sliding and debris flows are possible. In addition, possible loss of life resulting from localized debris sliding, debris flows, and sediment laden floods onto individual homes beyond the areas described previously is also possible.

For locations of Values at Risk for human life and property see *Risk to Lives and Property Map (Appendix 6)*

A. Loss of Human Life and Property

The Pacoima Dam has high risk of sediment build up. A significant debris flow event may cause clogging of the water intake/outlet structure and failure of valves. The Dam could become inoperable with uncontrolled water release leading to water overtopping of the Dam. Uncontrolled water release from the dam could have catastrophic impacts to human lives and properties downstream. It is highly recommended that early warning systems, if not already in place, be installed to warn the down steam residents of the potential for catastrophic flooding if these conditions do occur. It is also recommended that responsible agencies have a dam safety specialist and technical experts evaluate the condition of the dam, and prepare and implement a plan to address this issue.

The Pacoima Dam Office is situated at the base of a steep rock slope and is already subject to a significant rock fall hazard. The hazards to lives and property at this facility are present as evidenced by the presence of a masonry retaining wall and a chain link fence that have been placed near the toe of the slope to partially mitigate the rock fall hazards. This hazard potential has been increased due to the Sayre fire from denuding upslope areas of vegetation and the thermal effects of fire on exposed rock faces. Recent rock fall debris, dry ravel, burnt timber lagging, and an impact scar to the masonry wall were observed during the BART reconnaissance of this site.

In addition, houses and other features may be affected by local floods and slope failures as identified below. The magnitude of post-fire damage will be determined by the intensity and duration of rainstorms that impact the area. VARs near or within stream channels and those located adjacent to the basin spillways that outlet to the streets may be affected significantly. A specific site was observed at Gavina access road where the culverted road crossing was found to be obstructed by debris and sediment. The culvert at the road crossing is already at two-thirds of its design capacity. Flooding is likely to the neighborhood downslope of the culvert if it is not cleaned and maintained before significant storm events occur.

B. Threats to Wildlife and Botanical Values

Rare plant and natural community locations from the California Natural Diversity Data Base (CNDDB, 2008) were overlain with fire burn severity data and mapped bulldozer fireline location information to identify potential areas of impact from fire suppression and repair activities. This information was used as a cursory evaluation of impacts to sensitive species and natural wildlife/plant communities. Burn Area Reflectance Classification (BARC) maps did not correspond well with Burn Severity Maps and therefore were not relied upon by the BART for this analysis).

Eight rare plant species and five sensitive plant communities have been reported to occur in the region of the Sayre Fire area, although two of them are not known from State Responsibility Lands (Table 8). As a result of the fire and the impacts from the loss of vegetation and burn severity evaluation biological and botanical habitat is at an increased risk to the threat of flooding, rockfall, debris torrents, mud sliding and debris flows, sedimentation, and chemical pollution. Fire Suppression activities (e.g. “dozer lines”) have also contributed to the current risk to biological and, botanical species.

The risk is greatest in the vicinity of the Vernal Pools near O’Melveny Park where the Sesnon Fire met up with the Sayre Fire. The potential for direct mortality to sensitive and endangered species as well as dozer lines adjacent to the vernal pool that borders these two fires may experience adverse impacts due to erosion and sediment deposits.

Upland wildlife species may sustain the greatest impacts from this fire. The San Diego coast horned lizard, silvery legless lizard, burrowing owl, and San Diego desert wood rat are State Species of Concern, (CNDDB 2008) with occurrences in the general vicinity of the Sayre Fire. Populations in this region inhabit sandy washes within chaparral, coastal sage scrub communities and chaparral habitats. Sedimentation and debris flow, continued or increased habitat disturbances from public use and habitat conversion are all possible factors that could result in habitat degradation or loss.

C. Threats to Public Safety and Property from Hazard Trees

An assessment of the fire area revealed that native species, adapted to the fire regimes, will likely survive intact or resprout quickly. Those species planted as ornamentals that are not adapted to the local environment are more susceptible to mortality caused by the fire and subsequent attacks from insects and pathogens.

The principal values at risk from fire damages trees are to people and property. Fire killed or damaged trees can fall or drop limbs or uproot either without warning or during the frequent high wind events experienced in this area. During field evaluations, it was discovered that many hazard trees were being treated by local agencies. More trees can be expected to die from fire caused mortality within the next four to five years.

D. Threats to Cultural Resources

As a result of the fire and the impacts from the loss of vegetation and burn severity evaluation of watersheds natural and cultural resources are at an increased risk to the threat of flooding, rockfall, debris torrents, mud sliding and debris flows. Additionally, there is an increased risk of the exposure of cultural sites as a result of the fire or the associated suppression activities removing protective vegetative cover. Since the BART did not have an archeologist available for the field assessment team. Therefore, it is highly recommended that local administrators seek additional assistance to evaluate threats to cultural and prehistoric archaeological resources. In addition, it is recommended that an archaeologists work with the City and County of Los Angeles to develop avoidance mitigation measures to prevent harm to these valuable resources. Furthermore, reference should be made to the Angeles National Forest's Burned Area Emergency Response Team's (BAER's) Cultural Specialist Report to assist in identifying these resources in the region. The risk from the fire is greatest to those cultural sites that have been exposed as a result of the fire or the associated suppression activities that could be vandalized or otherwise compromised.

E. Soil Burn Severity

Soil burn severity is the amount of heat that is released by a fire and how it affects other resources. Soil Burn Severity on the Sayre Fire has been determined to be as follows:

High:	2%	225 acres
Moderate:	60%	6757 acres
Low: to unburned	38%	4279 acres

F. Public Assistance

The areas of interest with regards to Public Assistance are relatively confined to the debris basins, dams, mud flow protective measures, Olive View Hospital and damage to the Pacoima Dam. Also, any potential emergency protective measures that were put in place by the various City and County agencies within the 1810 DR incident period of 11-10-08 to 11-28-08.

Summary

The fire and the resultant impact to the VARs previously discussed have an increase risk for storm events to result in flooding, rockfall, debris torrents, mudsliding and debris flows. As storm intensity or duration rises, there will be an associated increased elevation in risk for the storm event to trigger flooding, mud sliding, debris torrents, debris flows, and sedimentation. The threat posed by flooding, mud sliding, debris torrents, and debris flows includes the loss of life and property. All imminent VARs identified herein could be adversely affected. In the cases mentioned where VARs are high, it is imperative to take precautionary actions to protect life and property, particularly with the approaching winter storms.

All VARs identified during the Scoping Mission on November 21st and identified in the Sayre Fire Scoping Report were evaluated during in the Sayre Fire BART Report.

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The Sayre BART would like to extend a special acknowledgment to the Courtyard by Marriott Santa Clarita hotel for their assistance in providing State Rate rooms for the team members. Also, for extending their hospitality to include the use of a meeting room everyday for the team to meet to discuss the daily issues that arise during field investigations and report writing.

DRAFT TECHNICAL SPECIALIST'S SUMMARY
Burn Area Recovery Team (BART)

Engineering Geology

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The most significant near term geologic threat to the burn area is an increased potential risk from rock falls, debris flows and mud torrents flowing down the slopes and canyon bottoms as a result of locally intense or seasonally sustained rain fall on the preexisting slope failures and fire denuded hillsides.

Of the thirty four (34) at-risk sites identified by the BART survey, only 2 sites (Pacoima Dam office building and reservoir) were found at to be at potential geologic risk from rock fall and landslides, and 26 sites (primarily the Dam reservoir and other Debris Basins) from debris flow or mud torrent flood inundation. The remaining sites were evaluated to not have a significant geologic impact from the fire to the observed risk potential.

The Pacoima Dam Office is situated near the toe of a steep rock slope and is already subject to a significant rock fall hazard. The rock fall hazard potential has been substantially increased due to the Sayre Fire from the denuding of the slope and thermal effects of the fire on the exposed rock face. Recent rock fall and dry ravel debris on the slopes and behind the walls, along with burnt timber lagging of several walls, and damage to the masonry wall were observed during the BART reconnaissance of the site.

The Pacoima Dam reservoir pond is also already subject to significant rock fall and landslide hazards from the adjacent slope areas. This potential risk has become increased due to both the Sayre Fire on the western side and the Marek Fire on the eastern side of the reservoir due to the denuding of the slopes and an increased susceptibility of soil or rock movement due to rainfall events.

The VARs considered in this assessment include the possible loss of life and property due to landsliding, debris flow, rock fall, debris flow, mud torrents, and flooding from increased surface water runoff. In general, only 2 sites (Pacoima Dam Office Building and Reservoir) were found at risk from the direct geologic impacts of rock fall and slides, and 26 sites (chiefly the dam reservoir and debris basins) from debris flow or mud torrent flood inundation. The potential for these processes to be exacerbated by fire is primarily dependent upon burn severity and slope steepness, both of which are highly variable in the Sayre Fire area.

Treatments to Mitigate the Emergency

- Pacoima Dam Office Building
  - Mitigate rock fall to protect life and property.
- Pacoima Dam Reservoir
  - Mitigation of slopes is not considered economically feasible.
  - Restore and maintain reservoir capacity and function by removal of sediment load.
- Other debris basins
  - Mitigation of the debris flow, mud torrents, flood waters into and overtopping the basins is paramount to reduce the potential loss of property. This can be accomplished by monitoring and maintaining the debris basins. The potential loss of life is minimal due to the ability to evacuate when necessary by elevated public awareness and early warning of pending events.

The site-specific observations included with the Technical Specialist Geology report should be considered in any emergency response plan develop by the local emergency agencies and stakeholders. Each area should undergo a more thorough analysis by a suitable licensed professional to address the specific hazard(s).

Hydrology

The Sayre Fire consumed large areas of vegetative material and large woody debris in multiple watersheds. The Soils Burn Severity Map indicates that 24% of the area burned at a low level and 60% at moderate level and only less than 1% at high level. The hydrophobicity tests ranged from low to moderate with small patches of high confirming the burn severity map.

Peak flows equivalent to 193% to 243% pre-fire peak flow for a 2- year storm event were estimated on drainage areas of major the debris basins and for the Pacoima reservoir. The sediment loads on all debris basins were estimated to be comparable to their maximum capacity; at Wilson, May-1 and Sombrero debris basins, there is a 2-5% probability that their maximum capacity would be exceeded.

Evaluations of the major debris basins in the area indicate some initial signs of sediment build up. The Pacoima reservoir has high risk of sediment build up, and the inlet/outlet

works at Pacoima dam may be clogged and fail to release water in the event of a major storm event.

Multiple residential catchment basins and small drainage areas behind a number of homes were evaluated with minor erosion sediment observed from recent storm events; however, a number of private and commercial buildings have risk of damage from sediments, debris flow, and flooding.

The VARs considered in this assessment include the possible loss of life and property due to land-sliding, debris flow, rock fall, debris torrents, and flooding from increased surface water runoff. The sites posing such imminent threats require immediate action to reduce their risk. It is important to cleanup the debris basins so that the full capacity would be immediately available to hold the increased amount of debris. Responsible agencies should have dam safety specialist and experts evaluate the condition of the Pacoima dam, and prepare and implement a plan to resolve the post-fire sediment issue.

Treatments to Mitigate the Emergency

- Implement erosion control Best Management Practices (BMPs) with the objective of protecting life property and natural resources (including cultural resources):

    - Clean up sediment at major debris basins, and repair and maintain outlet structure.
    - Installation of silt fence, fiber rolls, debris barriers, construction of V-ditches along the upper slope of homes.
    - Monitor before and after rain events for debris flow on all resources listed
    - Initiate/re-evaluate ALERT Early warning systems/Evacuation plans.

Expect higher than normal flows with possible debris flow in all rain events. The higher the rainfall intensity the higher the risk for significant severe flooding and debris flow throughout all burned areas and potentially miles downstream of the damaged watersheds.

Soils

This assessment evaluated the soils located in State and private lands. Potential values at risk from debris flows, mudslides and flooding include: human lives, homes, water supplies, drainage crossings, roads, bridges and parks.

The principal concern with the Sayre Fire is an increase in the potential for erosion caused by increased runoff and decrease in infiltration. The Soils Burn Severity Map indicates that 84% of the area burned at a low to moderate level. The hydrophobicity

tests ranged from low to moderate with small patches of high confirming the burn severity map. The soils in the Sayre Fire are in the loam category and have a moderately high susceptibility to erosion and will produce moderate sediment flows.

Evaluations of the Los Angeles County Public Works Debris Basins indicate some initial signs of increased sediment load. The access road at the Pacoima Reservoir was reported to have had up to 3 feet of erosion sediment blocking the main access to the Dam. The box culvert under Gavina Avenue was observed to have up to two-feet of sediment, but could easily become completely blocked. Multiple residential debris basins and small drainage areas behind a number of homes were evaluated with minor to no erosion sediment observed from recent storm events.

Mulching, fiber rolls, and straw bales with silt fencing may be used to prevent erosion at high value sites or to prevent runoff damage to specific roads or site improvements. Timely maintenance after storm events on road drainage crossings, culverts, and catch basins can help keep access open and homes safe. it is recommended that signs be posted to deter activities that would increase erosion damage. Road access could also be limited by maintaining locked gates at entrance points to major roads.

Water Quality

Areas of concern are residential areas immediately downstream of the burned area, especially below culverts and drainages. The values at risk are: possible loss of life and property due to flooding caused by blockages, debris flows, slope- and water-generated landslides, rock fall, associated hazards, and impacts to water quality.

The Oakridge Mobile Home Park, which is located at the base of the foothills in Sylmar, California, consumed approximately 480 mobile homes in a catastrophic fire event. It is assumed that because the structures were lost, are on a slope, and that burned man-made materials remain, the potential for these materials to be mobilized is increased during a rain event. If that is the case, there is potential for impact to waters of the state or U.S. If the drainage from Oakridge (if the burned materials remain) is not diverted, contained, or sent to a water treatment facility. It is also expected that increased turbidity downstream will occur as a result of increase in sediment and debris coming from the burned Sayre Fire area.

Structural Engineering

Multiple residential structures were damaged or destroyed by the Sayre Fire. Seven key infrastructure debris basins need remediation, one county agency bridge needs repair, one equipment shed was destroyed, numerous Metal Beam Guard Railing (MBGR) timber posts along Fwy. 210 North and South bound Connector to Interstate 5 do require replacement. Four major bridge structures (Glenoaks, Yarnell, and Fwy 210 North and South bound to Interstate 5) close to the vicinity of the fire area have not suffered any structure damage.

Evaluations of the Los Angeles County Public Works Debris Basins indicate some initial signs of increased sediment load. Lives and property are potentially at risk at sites in flood prone areas, or on roads where flash flooding may cause washouts due to runoff in excess of culvert capacity. Regional water quality supply is potentially at risk from loss of water control on hill slopes.

A design check, field inspection, clearing channel obstructions and increasing basin capacities are recommended to assure these facilities will accommodate the excess flows created by additional mud and debris flow caused by the recent fire. Post mud slide and flood warning signs, and establish evacuation plans for property owners within and downstream of these basins. A detailed structural inspection, structural analysis and a repair design plan for the bridge and the equipment shed at the Pacoima Dam facility should be prepared by an Engineer and to be submitted to Los Angeles County agency for consideration. Finally, replace and repair fire damaged timber posts of the metal beam guard railing along the North and South Bound Freeway of the 210 to the Interstate 5 Freeway.

Forestry

Most of the fire area is generally considered chaparral and coastal sage scrub, tree species include: Coast Live Oak, Scrub Oak, California Sycamore and Southern California Black Walnut existing in lower drainages, and various debris basins.

Around the Olive View Hospital and homes within the Wildland Urban Interface (WUI), a variety of species including Eucalyptus, Aleppo Pine and Canary Island Pine are planted as ornamentals. Overall burn intensities are moderate to low. Areas with native tree cover were mostly low, being subject to under burning with some group and individual tree torching.

Chapparal species and oak's native to this area are expected to recover from the fire damage, either by suffering no significant harm or by resprouting. Non native species and those not accustomed to fire are at an increased risk of fire-caused mortality. Additionally, fire damaged trees are at increased risk to beetle infestation and tree disease.

Values at Risk from trees damaged by fire principally include people and property, with some increased risk to natural resources. Risk to people and property would be in the form of damage and/or injury resulting from trees or limbs dropping either without warming or during a wind or rain event. Damage to life property and natural resources may also occur when downed trees combine with debris flows and landslides.

Mitigation to reduce the risks to live, property and natural resources are already being observed within the fire area. It is recommended that licensed professionals be employed to evaluate individual hazards and propose mitigation.

Wildlife Biology

Habitats within the fire perimeter burned at predominantly low to moderate severity. Although areas of high severity were observed in most drainages, the broadest expanse of habitat that consistently burned with moderate severity occurred in the Elsmere Canyon area.

Fires affect wildlife primarily through changes in habitat. Although individuals may have perished during the fire event, most wildlife populations should re-colonize the area as habitat recovers.

Habitats impacted by frequent fires are at risk of type-conversion, which may reduce the possibility of full recovery to pre-fire habitat condition. Post fire sedimentation in riparian systems also poses a significant risk to sensitive wildlife species. Several species may be at risk from long-term displacement or extirpation.

Treatments to Mitigate the Emergency

- Implement appropriate BMPs upstream of sensitive riparian habitats to minimize sediment load.
- Conduct post-fire surveys in riparian zones to detect and immediately eradicate non-native species (e.g. arundo).
- Conduct post-fire surveys to assess wildlife populations and habitat recovery.
- Conduct long-term monitoring of key species to document population trends.
- Avoid livestock grazing in burned areas until at least the 2009-2010 growing season.
- Coordinate with local agency representatives prior to and during maintenance activities to avoid, minimize, and mitigate additional impacts to species, particularly along riparian zones.

Treatment objectives are to protect rare plants and rare natural communities from human-caused disturbance, to promote native plant re-colonization of burned areas and dozer lines, to curtail invasive weed infestations in their incipient stages, and to avoid spreading invasive weeds into currently unoccupied areas.

Botany

Botanical values including rare plant species and natural communities were identified as being at-risk within the fire area. Rare plants and natural communities should recover from the fires naturally. Human activities post-fire present the greatest potential threat due to the potential for to damaging rare plants, inhibiting native plant regeneration, introducing invasive weeds, and type conversion of shrublands and oak woodlands to non-native annual grassland dominant systems due to increased fire frequency.

Botanical resource emergencies fall into three major categories: 1) threats to rare plants from fire and implemented post-fire treatments, 2) loss of natural community integrity from invasive weeds and post-fire treatments that inhibit the growth of native plants and promote the establishment of non-native weedy species, and 3) type conversion of shrublands and oak woodlands to non-native species due to increased fire frequency and spread of non-native weedy species.

Treatments to Mitigate the Emergency
Treatment Types

- Dozer line remediation
  - Restoration, invasive species suppression, and monitoring.
- Minimizing intervention and disturbance
  - Close burn areas to public access for at least three (3) years
- Restoration of sensitive species habitat in disturbed and high intensity burn areas.

Treatment objectives are to protect rare plants and rare natural communities from human-caused disturbance, to promote native plant re-colonization of burned areas and dozer lines, to curtail invasive weed infestations in their incipient stages, and to avoid spreading invasive weeds into currently unoccupied areas.

Recommended treatments to mitigate the emergency include pre-activity surveys prior to ground disturbance in known rare plant habitat, avoiding seeding and mulching, monitoring for type conversion of native vegetation communities, and invasive weed surveys in key areas with prompt weed control.

The greatest threat to rare plants and natural communities is related to human-caused disturbance post-fire and the affect of high frequency fires on the native habitat which contributing to type conversion.

Public Assistance

Within the Sayre Fire area flood control basins could pose a moderate risk from post fire erosion, flash flooding and massive debris accumulation at basins. The BART recommends a design check and field inspection to assure these facilities will accommodate the excess flows created by additional mud and debris flow caused by the recent fire. Clearing channel obstructions and increasing the basin capacity may help mitigate the effects of accelerated storm flows and sedimentation to property. Post mud slide and flood warning signs and establish evacuation plans. Increase awareness of the potential storms flows to the property owners.

In addition to the above listed items, lives and property are potentially at risk at sites in flood prone areas, or on roads where flash flooding causes washouts due to runoff in excess of culvert capacity. In this area, known for frequent high winds, additional hazards can be damaged trees, dead trees, and limbs along major street corridors or

hiking and equestrian trails. Regional water supply is potentially at risk from loss of vegetation on hill slopes. The Los Angeles County Public Works is currently working on various basins to remove the silt and debris. Several basins have had a significant increase in sediment and debris from a recent storm.

The Pacoima Dam at the Los Angeles county maintenance yard's bridge (15ft x 30ft steel frame "5 ton limit") was burned. This bridge is one ingress and egress route between the maintenance yard and the Pacoima trail road. The bridge substructure and two abutments appeared to be in good condition. The Hoist House is concrete masonry with a metal corrugated roof building (10ft x 12ft) that housed the engine and transmission cables located at the base of the Pacoima Dam. The house needs to be reconstructed to pre-disaster conditions. Rock Retention Barrier Walls (steel piles with wood planking) need to be reconstructed. This impacts approximately 1,040 linear feet of walls. The walls are located on the access road to the dam behind the dam office. A John Deere 444E loader was also damaged or destroyed and needs to be repaired or replaced. The operating area of the dam and its facilities need to be protected from the run-off of the burned steep slopes by emergency protection measures such as, k-rails, hay bales, etc.

The Oak Ridge Mobile Home Park is full of potentially hazardous debris from the burnt mobile homes. This should be protected from any runoff escaping into the areas storm drains or streams by utilizing erosion protection measures such as; hay wattles, sand bags, straw bales and/or k-rails.

The Olive View Hospital has several areas that are located to the West Campus of the hospital that has been assessed by the Los Angeles County Fire Department HAZ-MAT team and hospital facilities department. All issues concerning HAZ-MAT have been addressed by the hospital facilities department and protection measures have been implemented. The above remedial actions may be necessary if the facilities in question do not fall within the exclusive authority of another Federal agency. The occurrence of mud flows, debris flows, and flooding may have the following effects.

Debris flows may be deposited on public roads, preventing the use of these roads for ingress and egress. Debris basins, spreading basins, and flood control channels, may be partially or completely filled with sediment, rock, timber, and other debris, compromising their effectiveness to provide protection during the future storms. Only measures necessary to provide protection for a flood associated with a five-year storm event are eligible.

DRAFT TECHNICAL SPECIALTIST'S
Burned Area Recovery Team (BART)

Resource: Geology

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I. Resource Condition Assessment

A. Resource Setting

The Sayre Fire began on November 14, 2008 burning approximately 11,262 acres as a wind driven fire before being declared contained on November 21st . The fire burned north of the I-210 freeway in the foothills north of the Sylmar and Granda Hills areas of the City of Los Angeles. It is bounded by the previously burned areas of the Marek Fire on the east and the Sesnon Fire on the west. The northwest trending Golden State Freeway, Interstate 5, divides the Sayre burn area into that portion above the Granada Hills in the southern flank foothills of the eastern Santa Susana Mountains west of the freeway and that portion above Sylmar in the western San Gabriel Mountains, on the east side of the freeway. Of the total area burned, about 50% (5,668) acres are on lands owned by the US Forest Service, administered by the Angeles National Forest. With about 3,000 acres (26%) being burned within the Direct Protection Area (DPA) of the State of California and the remaining 2,594 acres (24%) burned within local jurisdictions (County and City of Los Angeles).

The Sayre Fire burn area is located in the hillside areas north of the San Fernando Valley, in Los Angeles County. Both the Santa Susana and San Gabriel Mountains are situated in the Transverse Ranges province of California. The Transverse Ranges province is characterized by roughly east-west trending, structural features in contrast to the predominant northwest-southeast structural trend found in the other geomorphic provinces within California.

Regional geologic mapping indicates that the burned areas are underlain by recent to Holocene age alluvial deposits, Quaternary and Tertiary age alluvial deposits and sedimentary rocks, Mesozoic age intrusive rocks, and older (Precambrian age) metamorphic rocks, with several intervening age breaks in

between. In addition, artificial fills (man made), landslide, and other forms of slope instability deposits, (soil slumps, mud and debris lows) mapped and unmapped, are also known to occur and were observed throughout the burn area. A geologic map (after Dibblee, 1991 and 1992) depicting the regional geologic conditions of the Sayre Fire burn area is presented as Figure 1.

Structurally, the local region consists of a series of east-west trending faults and folds along with the San Gabriel, Santa Susana, Mission Hills, and Hospital (Sylmar) faults. Besides faulting, the other predominate geologic structure of the area is the bedding or layering found in the Quaternary and Tertiary sediments. The regional geologic mapping of the area indicates that the bedding is highly variable due the local folding and faulting of the area.

The Sayre Fire burn area is located in the highly seismically active Southern California where moderate to severe seismic shaking has and is likely to occur. Significant historic earthquakes have been felt in the vicinity of Sayer Fire area include the 1857 Fort Tejon, and the 1994 Northridge Earthquake. A more detailed discussion of the active fault potential is beyond the scope of this evaluation.

In addition to strong seismic shaking, another seismic effect is induced slope instability due to the strong ground shaking. The State has designated Seismically-Induced Landslide Hazard Zones (CGS, 1998 and 1999) over vast portions of the hillsides in the burn area. Several landslides and other areas of surficial slope failures or potential instability have been previously identified. The performance of hillside areas are determined in part by the underlying geologic materials, geologic structures such as bedding and soil moisture content or groundwater conditions. Four primary types of slope failures were observed during the post fire reconnaissance of area, including:

- Translational bedrock failures.
- Rotational bedrock failures.
- Surficial rock instability including toppling, shallow rock slope creep, slope creep in zones of moderately to highly weathered sedimentary bedrock,
- Shallow soil failures, slumps, and creep occur within the surficial soils and colluviums covering the slopes.

Many of these slope failures are suspected to have reactivated or failed during high intensity shaking due to earthquakes such as those in the 1971 Sylmar and 1994 Northridge earthquakes.

The most significant near term geologic threat to the burn area is from debris flows and mud torrents flowing down the canyons as a result of locally intense or seasonally sustained rainfall on the preexisting slope failures on the fire denuded hillsides. Another source of materials susceptible to failure is the dry ravel debris that is accumulating in the drainage swales and near the toe of slopes.

All threat assessments included within this report that relate to flooding, debris flows, and associated geologic (near term) slope instability are based upon a five-year storm event producing 4.1 TO 4.7 inches of rain within a 24 hour period. It is important to remember this when evaluating the predictions contained within this report.

Topographically, the burn area ranges in elevations from 1400 feet above mean sea level (msl) along the southern margins of the fire, to a high over 2770 feet (msl) for the western burn portion (Mission Peak) and a high of 4003 feet (msl) (Fernando 2) for the eastern burn portion of the fire. The slopes within the fire area are generally steep (70% of the fire area has slopes greater than 60%), with incised canyons that run in a general north-south pattern. The burn area generally lies below the elevation subject to rain-on-snow events, although snow may occasionally fall near the higher peak elevations. Most of the mountainous portions, and all of the lower elevation foothill portions along the southern flank of the mountains drain into south-flowing watercourses along the southern side of the burn area. On the north side of the eastern portion of the burn area some watercourses do drain to the north.

B. Survey Methods

To evaluate the potential risk to life, property, natural and cultural resources a field reconnaissance of portions of the burn area were conducted over the period from December 3 to December 6, 2008. The purpose of these reconnaissance surveys were to observe and identify where sites may be present, concentrating on developed residential areas. Road and "on foot" observations were conducted in areas with potential sites. Rural areas where no houses, businesses, structures, or other risks were identified, or those areas where egress was restricted were viewed from a distance. Evaluations of road-related features, such as culverts, roads, freeways, and bridges, are addressed in the Engineering Specialist's report in the appendices of this report.

Values at Risk are: possible loss of life and property due to in-channel floods, hyper-concentrated floods, debris torrents, mud or debris flows, slope-generated landslides, rock fall, and associated slope movements.

II. Findings of the On-The-Ground Survey (Observations)

A. Identify Values at Risk

The principal concern with the Sayre Fire burn area is an increase in the potential for in-channel floods, hyper-concentrated floods, debris torrents, and mud or debris flows. The primary mechanisms for this are the loss of mechanical support of hillside materials that was provided by vegetation and vegetative litter. In those areas where the fire burned with a high intensity,

the infiltration may be affected by the development of hydrophobic soils. Related is the increase in runoff resulting from reductions in interception of the rain fall by the vegetation cover and infiltration due to the hydrophobic soil conditions. Hydrophobic soils develop where the waxy substances released by plant materials during hot fires follow thermal gradients into the soil and congeal as continuous surfaces/layers. (Further explanation is in the Soil Report.)

Values at Risk near or within stream channels and those located adjacent to the basin spillways that outlet to the streets may be affected by significant in-channel floods, hyper-concentrated floods, debris torrents, and debris flows. It is our understanding that the USDA Forest Service, in concert with the US Geological Survey and CAL FIRE are developing models to assess the potential magnitudes of post-fire events.

Houses and other features may be affected by local floods and slope failures as identified below. The magnitude of post-fire damage will be determined by the intensity and duration of rain storms that impact the area.

B. Describe Condition of Values at Risk

In addition to the sites previously identified by USDA Angeles National Forest Burned Area Emergency Response (BAER) Team. and the CAL OES Sayre Fire BART survey team observed residences and other sites within and down slope from the burn area. The purpose of this survey was to evaluate potential risks from near-site debris flow, rock fall, floods, and other geologic hazards that may not have been identified in the regional evaluation. Of the thirty four (34) Values at Risk summary identified (see Appendix 1) by the survey team, only 2 sites (Pacoima Dam Office Building and Reservoir) were found at risk from the direct geologic impacts of rock fall and slides, and 26 sites (chiefly the dam reservoir and debris basins) from debris flow or mud torrent flood inundation. The remaining sites were evaluated not to have a geologic impact.

The Pacoima Dam Office is situated near the toe of a steep rock slope and is already subject to a significant rock fall hazard. A masonry wall, two timber lagging wall, and chain link fence have been placed at or near the toe of the slope to partially mitigate the hazard. The rock fall hazard potential has been increased due to the Sayre fire from denuding of the slope and thermal effects of the fire on the exposed rock face. Recent rock fall debris and dry ravel, along with the burnt timber lagging, and an impact scar to the masonry wall were observed during our reconnaissance of the site.

The Pacoima Dam Reservoir is also already subject to a significant rock fall and landslide hazards from the adjacent slope areas. These potential risk have become increased due to both the Sayre Fire on the western side and

the Marek Fire on the eastern side of the reservoir due to the denuding of the slopes and an increased susceptibility of soil or rock movement due to rainfall events.

III. Emergency Determination

The Values at Risk considered in this assessment include the possible loss of life and property due to landsliding, debris flow, rock fall, debris flow, mud torrents, and flooding from increased surface water runoff. In general, the risk from landslides, debris flows and rock falls are possible where roads, residences, structures, or other development located within and/or adjacent to canyon stream channels, on alluvial fans, toes of slopes, below existing failures or debris. It should be noted that these hazards are part of the natural processes in this environment, and that these risks were present under pre-fire conditions. Many existing structures in the burn area have been and will continue to be at risk from these hazards. The potential for these processes to be exacerbated by fire is primarily dependent upon burn severity and slope steepness, both of which are highly variable in the Sayre Fire area.

IV. Treatments to Mitigate the Emergency

A. Treatment type(s)

Pacoima Dam Office Building

Mitigate rock fall to protect life and property.

Pacoima Dam Reservoir

No mitigation of slopes possible

Maintain reservoir capacity and function by removal of sediment load.

Other debris basins

Mitigation of the debris flow, mud torrents, flood waters into and overtopping the basins is paramount to reduce the potential loss of property. The potential loss of life is minimal due to the ability to evacuate when necessary by elevated public awareness and early warning of pending events. The potential damage to or loss of property can be lessened or mitigated.

B. Treatment objective(s)

The stated objective of the treatments is the protection of life and to reduce property loss. The protection of the Dam's office building has a high potential for loss of life and property damage from the rock fall hazard. For the reservoir, the function of the outlet structures is crucial.

Should their function become impaired due to sediment blockage, the potential for the loss of life and property down stream is substantial.

For the debris basins the objective would be for the protection of the property down stream.

V. Recommendations

A. General Recommendations:

1. The site-specific observations should be considered in any emergency response plan developed by the respective emergency agencies.
2. Post-fire flooding potential information developed by the U.S.D.A. Forest Service, Los Angeles County of Public Works, and Los Angeles City Department of Public works should be used to evaluate risks to lives and properties near or below the debris basins in or adjacent to the burn area.
3. The existing debris basin systems should be inspected by the appropriate controlling agency to evaluate potential impacts from floods, hyper-concentrated floods, debris torrents, debris flows and sedimentation resulting from winter rains.
4. Once inspected, the basins should be repaired and maintained as necessary to restore function as designed, and to lessen the potential for over topping.
5. The sediment load and depth contained in the Pacoima Dam reservoir should be evaluated and removed if deemed necessary to restore capacity and maintain full function of the outlet facilities.

B. Specific Recommendations:

1. The rock slope behind the Pacoima Dam office building should be mitigated to protect life and property. This may be accomplished by the construction of: a) rock fall catchment structures at the toe of slope between the slope and the building, b) draping of a wire mesh rock fall netting over the face of the slope, c) repairing the damaged masonry and timber lagging wall, d) continued maintenance and repair of both the existing facilities and new structures, and e) moving the building away from the danger zone at the toe of the slope. Each of the options has an associated cost and all should be properly engineered, designed and constructed.
2. The rock fall and land slide potential into the Dam reservoir may not be mitigated. However, the existing sediment and increased sediment and debris load can be removed to restore capacity and function to the structure as designed.
3. Each of the debris basins should be inspected, repaired and maintained as necessary to restore function as designed.

4. Property owners located below those debris basins that outlet directly onto the streets should be made aware of the potential hazard in the event the respective basin become overtopped.
5. The sites identified as at risk to live or property should be evaluated by Engineering Geologists or Professional Engineers with experience in slope stability and debris flow hazard identification and mitigation to fully document the scope of the problems at each site.

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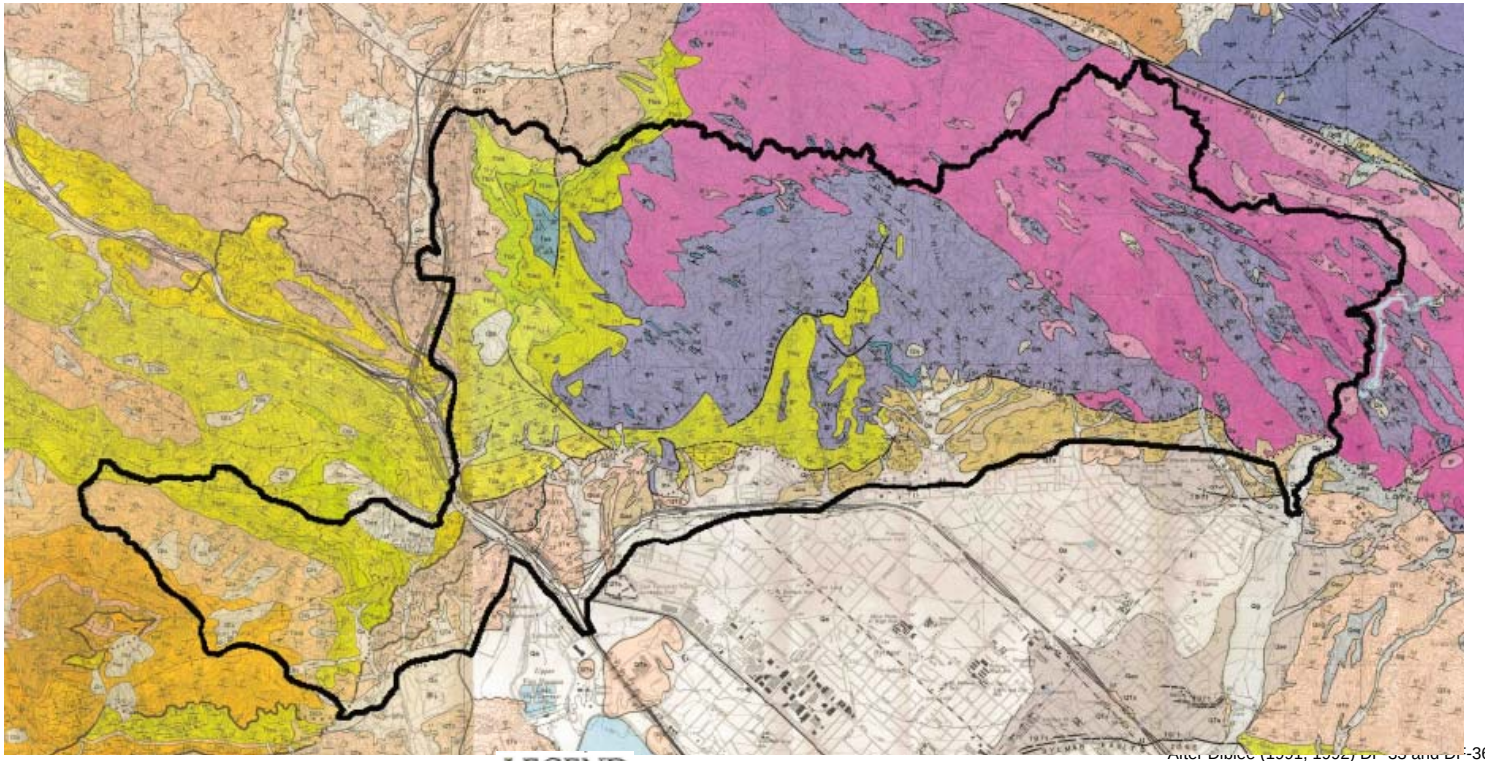

After Bilice (1991, 1992) DF-33 and DF-36

Not To Scale

LEGEND

—UNCONFORMITY—

af

Qg

Qa

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Qae

Qos

Qog

OLDER —UNCONFORMITY— IENTS

Qp

PACOIMA FORMATION

—UNCONFORMITY—

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Tps

Ttos

Ttoc

Ttog

TOWSLEY FORMATION

—UNCONFORMITY—

Tmc

Tmg

MINT CANYON FORMATION

Tes

Tsu

UNNAMED MARINE STRATA

gr

LEUCOCRATIC GRANITIC ROCKS

—UNCONFORMITY—

qd

QUARTZ DIORITE

METAMORPHIC ROCKS

gn

ml

mgn

MENDENHALL GNEISS

Figure 1

REGIONAL GEOLOGIC MAP
SAYRE FIRE BURN AREA

December, 2008

DRAFT TECHNICAL SPECIALTIST'S
Burned Area Recovery Team

Resource: Hydrology

Fire Name: Sayre Fire CA-LFD-1460 December 2008

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I. Resource Condition Assessment

A. Resource Setting

The Sayre Fire began on November 14th 2008 and burned approximately 11,262 acres in Northern Los Angeles County along the San Gabriel Mountain Range. The predominantly wind-driven fire burned North of Interstate-210 Freeway in the vicinity of the Sylmar area of the City of Los Angeles, it was bounded by the Marek Fire burn to the East and the Sesnon Fire to the West, across and Interstate-5. The fire was declared contained on November 21st. The topography of the fire area is generally steep (70% of the fire area has slopes greater than 60%), with incised canyons which run in a general north-south direction Of the total area, about 50% (5,668) acres are on lands owned by the US Forest Service, administered by the Angeles National Forest. Of the remaining acres, about 3,000 acres (26%) occurred within the Direct Protection Area (DPA) of the State of California and the remaining 2,594 acres (24%) occurred within local jurisdictions (county and city).

Climate

The Sayre Fire burn area has a Mediterranean climate, with mild wet winters and warm dry summers. A substantial part of the annual rainfall occurs during the months from December through April. According to the Department of Water Resources climate data, the average annual rainfall at Pacoima Dam is 20 inches; the mean annual precipitation ranges from 18 inches at the mouth of tributary canyons to approximately 36 inches at the upper elevations near May Peak. According to Los Angeles County Public Works Hydrology Manual, The 50-year 24-hour rainfall in the burn area ranges from 7.0 to 8.0 inches.

Watershed

The burn area is in Ventura-San Gabriel Coastal basin of Southern California Coastal sub-region and covers portions of following three hydrologic sub-areas (HSA): Sylmar, Bull Canyon, and Eastern. Among these three HSAs, Sylmar and Bull Canyon belong to the Los Angeles River watershed, and Eastern is in

the Santa Clara- Calleguas watershed (see map-2). Please see Table–1: for Burn Severity by the Hydrologic Sub Areas

All of the drainages affected by the Sayre Fire in Los Angeles River watershed flow south and eventually drain into Los Angeles River. Los Angeles County Department of Public Works (LACDPW) and City of Los Angeles constructed large debris basins and dams at the mouth of several major canyons to control debris flow and flood. For the purpose of this analysis, the burn area is divided into 14 sub drainage areas, and they are named after the associated debris control structure such as debris basins or the dam (see map-3).

There are 8 large debris basins with engineered spillway associated with the 8 major canyons starting west from Stetson Canyon to the east at Pacoima Dam (see map-3). In addition to these major drainages, there are a number of smaller drainages on the south edge of the burned area that are not under control of any major debris basin.

Reservoir & Dam Information

The Los Angeles County Public works operates the Pacoima Dam. The purpose of the dam includes flood control, debris control and water storage. The structure is a concrete-arch dam, and it has an original capacity of 6,060 acre-feet. The current capacity is approximately 3,000 acre-feet (per 2005 survey). The total drainage area is 18,048 acres; the average annual inflow is 7,420 acre-feet; average annual ground water recharge at down stream facilities is 5,500 acre-feet. Its probable maximum flood event is 24,700 cubic feet per second (cfs), and design debris event is 2.42 million cubic yards. Sediment has been removed 19 times since its construction in 1929; average annual sediment deposition has been about 94,410 cubic yards per year.

B. Survey Methods

Field surveys were conducted on December 3 through December 6, 2008, evaluating fire effects and associated activities to the watershed and adjoining areas. Team members worked in groups according to field safety regulations. Survey walks were conducted from roadside locations to accessible areas of concern; GPS points were taken and recorded on maps with corresponding photographs and field notes. Team members performed hydrophobicity tests and evaluated the burned vegetations and soils at many locations throughout the burn area to ground truth the burn severity. The standards described in the Soils Report were used to determine the burn severity, and the results were compared to the Soil Burn Severity Map provided by National Forest. A number of sites at risk were identified during the field survey. They are listed in Appendix 1. Each site was assigned an identification number. Values at Risk and risk to human life and property were identified.

VI. Findings of the On-The-Ground Survey (Observations)

A. Identify Values at Risk

The purpose of the survey is to identify Values at Risk within and down stream of the burn area. Among them, life, property, and resources will be addressed related to hydrology.

The principle concerns with the Sayre Fire area are the potential for increase runoff and sediment flows into the large debris basins and into the Pacoima Reservoir. The Soil Burn Severity for the fire area ranged from mostly moderate (60%) to low and unburned (39%). Burn Severity is summarized for the major drainage areas in Table-2 (Burn Severity Summary for Drainage Areas). The Soil Burn Severity Map provided by the National Forest was used as a guide during the field survey. Field reconnaissance indicated that the map generally reflects the ground condition within the burn area, except it did not show the spotty nature of the burn. The pattern of the burn severity is a mosaic of numerous smaller patches of low and moderate severity with a very few spots of high burn severity. The major drainages such as Wilson Canyon, Loop Canyon, Sombrero Canyon, Hog Canyon and Stetson Canyon, and drainage areas to the Pacoima Reservoir have moderate burn severity (>95% moderate); while drainage areas along the North edge of the fire perimeter have lower burn severity. Typically higher runoff rates and stream flows can be expected during mild to moderate rainfall events due to the increased hydrophobicity and lack of vegetation on the soils.

B. Describe Condition of Values at Risk

Condition of Watersheds - Peak Flow Estimates

The post-fire peak flow estimation was made on drainage areas within fire perimeter rather than on much larger hydrologic sub-areas. The result is listed in Table-3; each of the values in the table is the ratio of post-fire peak flow over pre-fire peak flow in percentage. The increased run-off would have severe impact on the debris basins and down stream channels. For example, the Wilson debris basin drainage area will have a peak flow equivalent to **243% pre-fire peak flow for a 2- year storm event** (a storm event with reoccurrence interval of 2 years), and a peak flow equivalent to **171% pre-fire peak flow for a 5-year storm event**. The estimation shows that there will be a higher risk of flooding in the downstream areas.

Condition of Major Debris Basins - Sediment Production Estimation

The computer program ERMit (Erosion Risk Management Tool) was used to estimate post-fire sediment production at each drainage areas. This software uses climate information, soil texture and rock content, vegetation type, percentage of brush, grass and bare soil, and topography info to estimate the sediment production rate. Instead of a single deterministic value, the software generates sediment production rates for a single event utilizing different

probabilities. The software estimates sediment production rates for several years after a fire, for different scenarios such as un-mitigated and with different types of erosion control measures. The assumptions used for this evaluation were unmitigated watershed and first year impacts post fire.

LACDPW owns seven major debris basins at the mouth of Canyons that protect residential and business down stream in Sylmar. They are May-1, May-2, Wilson, School House, Hog, Sombrero, and Stetson Debris Basins. City of Los Angeles owns Loop Debris Basin. The result of sediment yield at these debris basins are presented in Table-4.

May-1 debris basin reportedly has a capacity of 64,000 cubic yards (cy); its estimated sediment load has a 2% chance of exceeding 93,094 cy (145%) and a 5% chance of exceeding 73,343 cy (115%). Sombrero Debris basin reportedly has a capacity of 88,000 cy; its estimated sediment load has a 2% chance of exceeding 139,035 cy (160%) and a 5% chance of exceeding 109,535 cy (136%). Wilson Debris basin reportedly has a capacity of 313,000 cy; its estimated sediment load has a 2% chance of exceeding 335,143 cy (107%). Therefore, these three debris basins were considered having a low risk of overflow during a 50-year storm event.

The remaining debris basins have maximum capacities exceeding the 2%-probability sediment loads; therefore the risk at these debris basins is considered very low.

Field surveys indicated that there would be increased sediment loads to the debris basins after the Sayre Fire. There has been some initial debris deposited so that the full design capacities of these debris basins are not available. LACDPW is in the process removing sediment from Sombrero debris basin, and it was reported that more than 13 feet of sediment has been built up after a recent rain event of 1.5 inches after the fire.

Condition of Smaller Catch Basins

A number of smaller drainage areas along the south edge of the fire perimeter are not under control of the major Debris Basins listed above. Homes and business in down stream of these areas are protected by concrete V-ditches, debris barriers, and smaller catch basins. Field survey revealed that most of the debris control infrastructures have being well maintained, except a few of them require maintenance and clean-up. However, large storms have the potential to overwhelm these catch basins with debris flow and flood water such that the streets may be impacted by flooding and debris inducing potential risks to nearby residences and businesses.

Condition of Pacoima Reservoir & Dam

The west slopes of the reservoir and tributary canyons were burn in Sayre Fire (465 acres), and its east slopes were burned in Marek Fire (217acres). There is

a total of 682 acres burned by these two fires with the burn severity mostly moderate. Increased debris flow and sediment production brought by the fires is a major concern to the reservoir and dam. Significant potential impacts include: 1) reduced reservoir capacity, 2) reduced ability of the Dam to control flood waters, 3) reduced groundwater recharge, 4) impaired dam seismic safety, and 5) clogging of inlet/outlet works for releasing water. The Sayre Fire may cause excessive debris flow and falling rocks into the reservoir, and as a result, the main canyon would have a risk of being blocked. Sudden debris flow waves into the reservoir may also damage the dam. The 2005 survey revealed that the Dam only has approximately half of its original capacity, and based on the datasheet provided by Los Angeles Public LACDPW, 4% of DDE (design debris event) will fill the reservoir up to seismically safe elevation, and a 20% of DDE will fill the reservoir to top of valve riser operation.

VII. Emergency Determination

The Values at Risk considered in this assessment include the possible loss of life and property due to land-sliding, debris flow, rock fall, debris torrents, and flooding from increased surface water runoff. The result of the moderate to high burn severity in some areas within the Sayre Fire perimeter created a high potential for large scale flooding and debris flow during light to moderate rainfall events. The possibility and likelihood of increased runoff and debris flow during rain events places all resources at an increased risk. The sites posing such imminent threats require immediate action to reduce their risk.

The estimated sediment loads on all debris basins are comparable to their maximum capacity; at Wilson, May-1 and Sombrero debris basin, the load would exceed their maximum capacity with a 2% probability. It is important to cleanup the debris basins so that the full capacity of the debris basins would be immediately available to hold the increased amount of debris. Other temporary or permanent measures should also be considered to enlarge the capacity of the debris basins, such as installation of wood boards at the basin crest to raise the debris level inside the debris basin. LACDPW has been proactive in rapid cleanout and maintenance of several debris basin affected by the fire.

The Pacoima Dam has high risk of sediment build up. A 20% DDE may cause clogging of water intake/outlet structure and failure of valves. The Dam would become un-operational; water would not be able to be released from the reservoir in a controlled manner, and consequently, may result in potential of overtopping of the Dam. Uncontrolled water from the dam could have catastrophic impacts to human lives and properties down stream. Responsible agencies should have a dam safety specialist and experts evaluate the condition of the dam, and prepare and implement a plan to address this issue.

VIII. Treatments to Mitigate the Emergency

Treatments for the burn area will be very difficult, if not impractical or unnecessary because of the topography, sparseness of urban development, and the fact that many of these conditions were pre-existing. Fire may introduce excessive amounts of slope erosion at locations adjacent to homes and roads. Erosion control BMPs such as fiber rolls or seeding need to be implemented only at critical locations.

A. Treatment type(s)
   Erosion control Best Management Practices (BMPs)
   Reduce the imminent risk to homes and business

B. Treatment objective (s)
   Reduce imminent risk to homes and business.
   Control erosion, and reduce debris and sediment generation

C. Treatment description(s)
   Installation of silt fence, fiber rolls, debris barriers, construction of V-ditches along the upper slope of homes.
   Put gravel on the dozer lines to reduce the amount of soil washed away by run-off.

IX. Recommendations

A. General Recommendations:
   1. Monitor debris flow and run-off, install early warning systems, and collect data for verification of existing hydrology model and for building of new post-fire hydrological models.
   2. The existing road drainage systems should be inspected by the appropriate controlling agency to evaluate potential impacts from floods, hyper-concentrated floods, debris torrents, debris flows and sedimentation resulting from winter rains.

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DRAFT TECHNICAL SPECIALTIST'S
Burned Area Recovery Team (BART)

Resource: Soils

Fire Name: Sayre Fire CA-LFD-1460 December 2008

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I. Resource Condition Assessment

A. Resource Setting

The Sayre Fire began on November 14th 2008 and burned approximately 11,262 acres in Northern Los Angeles County along the San Gabriel Mountain Range. The predominantly wind-driven fire burned north of the Interstate-210 freeway in the vicinity of Sylmar area, was bounded by the Marek fire burn area to the East and the Sesnon Fire burn area to the West, across the Interstate-5. The fire was declared contained on November 21st. The topography of the fire area is generally steep (70% of the fire area has slopes greater than 60%), with incised canyons which run in a general north-south pattern. Of the total area, about 50% (5,668) acres are on lands owned by the US Forest Service, administered by the Angeles National Forest. Of the remaining acres, about 3,000 acres (26%) occurred within the Direct Protection Area (DPA) of the State of California and the remaining 2,594 acres (24%) occurred within local jurisdictions (county and city). The areas evaluated are located in Loop, Wilson, Hog, Sombrero, Elsmere and Bee Canyons, as well as the area around the Pacoima Reservoir.

The concentration of this assessment is the evaluation of the soils located in State and private lands. Potential features at risk from debris flows, mudslides and flooding identified by the Burn Area Recovery Team (BART) include: people, homes, water supplies, drainage crossings, roads, bridges and parks.

All threat assessments included within this report that relate to flooding, debris flows and associated geologic instability are based upon a five-year storm event producing 4.1 to 4.7 inches of rain within a 24 hour period. It is important to remember this when evaluating the predictions contained within this report.

B. Survey Methods

The hydrology, geology and soils team evaluated the values at risk by conducting soil hydrophobicity tests, slope measurements and estimating vegetation loss in

several locations within the burn area. The site evaluations were supplemented by reviewing the soil burn severity map, County soil survey documents and other specialized reports. Including the Burn Severity Classes modified from Frazier 1989 and Parsons 2003) below.

BURN SEVERITY CLASSES (FRAZIER 1989). (See Parsons (2003) for more detailed descriptions.)

1. High Severity

    a. Hydrophobicity—soils are strongly water repellant; they will repel water for greater than 40 seconds. Very strongly hydrophobic soils may repel water for several minutes or longer. Hydrophobicity may be from the soil surface downward, from about 1/8 of an inch in depth to many inches, or it may begin below surface.
    b. Organic Ground Cover Density—less than 20% cover of litter, duff, or woody debris remains. Often fully consumed in very high severity burns.
    c. Vegetation—Trees: crowns fully burned, no needles or leaves remaining. Some or many branches may be consumed. Brush: crowns partially or fully volatilized; no leaves remaining. Herbaceous plants: usually fully consumed, often including roots and sometimes, residual seed.

2. Moderate Severity

    a. Hydrophobicity—soil will repel water for 10-40 seconds. Longer than that is strong hydrophobicity; less than that is weakly hydrophobic.
    b. Organic Ground Cover Density—Approximately 20-50% density.
    c. Vegetation—Trees: crowns remain but needles/leaves are singed to the extent that more than 50% of the crown is discolored (i.e., the crown of a pine tree has more than half to all the needles browned by fire). Brush: crowns remaining but leaves mostly discolored by burn. Herbaceous plants: mostly consumed, but patches remain.

3. Low Severity

    a. Hydrophobicity—soil will repel water for less than 10 seconds. Often water will infiltrate within a second or two.
    b. Organic Ground Cover Density—greater than 50% density. Often the fire will consume only fine woody debris and scorch the surface of a duff layer.
    c. Vegetation—Trees: crowns remain. Fire will often only scorch the tree bole and perhaps a few lower branches on smaller trees. All or nearly all the crown will remain green. Shrubs: mostly unburned, but some scorching may be present on lower parts. Herbaceous plants: usually singed or partially burned, but will recover.

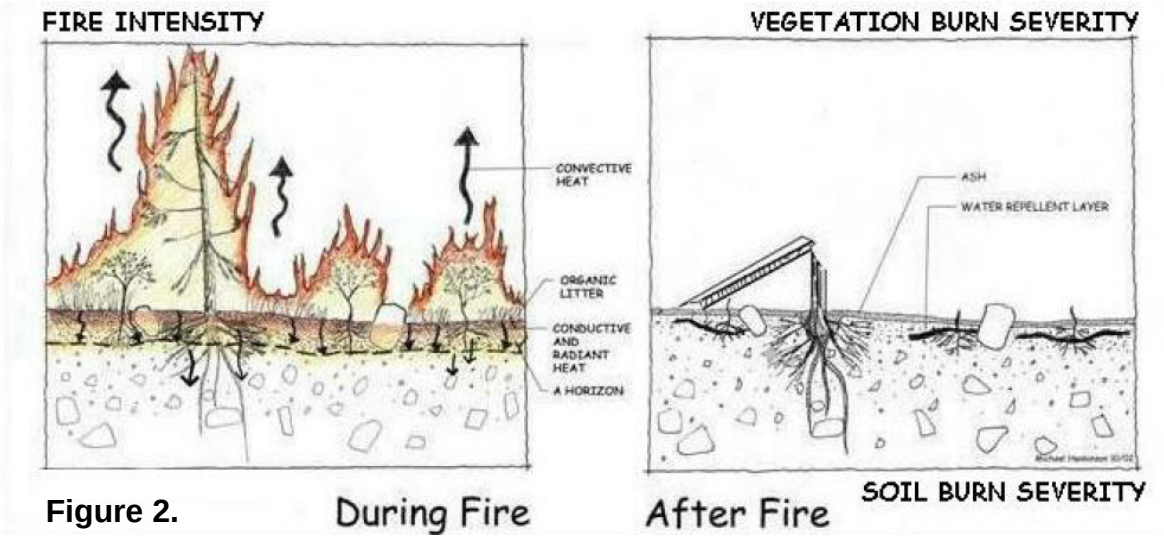

Figure 2.

II. Findings of the On-The-Ground Survey (Observations)

A. Values at Risk

The principal concern with the Sayre Fire is an increase in the potential for erosion caused by increased runoff and decrease in infiltration. The Soils Burn Severity Map indicates that over 80% of the area burned at a low to moderate level and less than 1% burned at a high rating. (see Soil Burn Intensity Map.) The hydrophobicity tests ranged from low to moderate with small patches of high confirming the burn severity map. (see Table below).

A hydrophobic layer can form during a fire and vary with the intensity of the burn. (Figure 2 above.) During a high intensity fire event, all plant material is consumed and the waxy substance from the plants penetrates the soil as a gas and when cooled it solidifies around the soil particles. This layer can range from one-half to over three inches beneath the soil surface. At a moderate level, soils do have a decreased infiltration rate that can cause erosion and increase the potential for debris flows, mudslides and flooding. Recent rains indicated infiltration was affected slightly and soil moisture was observed in several locations at 12 inches below the soil surface.

Burn Severity	Percent (%)	Area Burned (acres)
High	0.02	2.3
Moderate	59.70	6723.4
Low	23.75	2674.7
Unburned	16.53	1861.6
	Total	**11,262**

The soil type is a large component in the erosion potential from a burn area. Soil types with a low erosion potential are the shaly clay loams and gravelly loamy sands with high water infiltration rates (>2 in/hr). Conversely, soil types with high

potential for erosion are the silty clay and sandy loams with a low water (< 2 in/hr). The Los Angeles County, West San Fernando area soil survey indicates the soils in the Sayre Fire are in the loam category and has a moderately high susceptibility to erosion and will produce moderate sediment flows.

B. Describe Condition of Values at Risk

Evaluations of the Los Angeles County Public Works Debris Basins indicate some initial signs of increased sediment load. Small amounts of sheet and rill erosion was observed in the local area surrounding the basins. During the on-site evaluation of the Sombrero debris basin, Los Angeles County Public Works was in the process of removing up to 13 feet of sediment that was reportedly produced during the post-fire storm event (11/25 and 11/26) of up to 2 inches of rain. The topography in the local area of the basins ranged for 33 to 75% slope. Erosion, flooding and mudflows are considered naturally occurring phenomenon during pre-fire conditions. However, burn severity combined with slope steepness accelerates the process.

The access road at the Pacoima Reservoir was reported to have had up to 3 feet of erosion sediment blocking the main access to the Dam. The sediment originated from the area adjacent to the road and was the result of recent Marek Fire (October 12, 2008).

The six-foot box culvert under Gavina Avenue was observed to have up to two-feet of sediment in the flow line of the structure. The amount of blockage is moderate at this time, but could easily become completely blocked if a combination of debris and sediment passed through the channel.(see hazard point in appendix 1)

Multiple residential debris basins and small drainage areas behind a number of homes were evaluated with minor to no erosion sediment observed from recent storm events.

III. Emergency Determination

The Values at Risk considered in this soils assessment include the possible loss of life and property due to erosion sediment flow and flooding from increased surface water runoff. In general, there is a low risk of loss of life and moderate risk for loss of property due to increase runoff from a 4.1 - 4.7 inch – 24 hour rain event. In this case there is no Emergency action recommended for property and structures, but recommendations have been made for treatments and monitoring.

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IV. Discussion/Summary/Recommendations

Landscape level erosion control treatments are impractical for treating the entire fire area, but mulching, fiber rolls, and straw bales with silt fencing may be used

to prevent erosion at high value sites or to prevent runoff damage to specific roads or site improvements.

Timely maintenance after storm events on road drainage crossings, culverts, and catch basins can help keep access open and homes safe.

In addition to sediment from steep slopes, erosion from roads and dozer lines can also be sources of sediment. Post-fire erosion control measures should be applied to areas disturbed by fire suppression activities, such as dozer lines, to help prevent sediment production.

In order to reduce impacts of un-regulated off-highway use, especially along steep slopes, it is recommended that signs be posted to deter such the above mentioned activities. Road access could also be limited by maintaining locked gates at entrance points to major roads.

A. Treatments

The objective is to minimize erosion on slopes and thereby reduce sediment laden floodwaters likely to occur during large rainstorms. However, treatment for the burn area will be very difficult due to rugged, steep sloped topography. Landscape level treatments for erosion control are either extremely expensive (e.g. aerial application of mulch or grass seeding) or not likely to be successful during the future storms.

Relevant agencies and/or property owners should consider implementing Best Management Practices (BMPs) to protect homes and assets located downstream from the burn area, and designated as moderate to high risk for debris flow and flooding.

Typical example of BMPs are:

- Fiber Rolls (straw, flax or other material)
- Gravel Bag Berms
- Sand Bag Berms
- Geotextiles and Mats (erosion control blankets)

The description, installation, and operation of these practices are well documented in the California Storm-water BMP Construction Handbook and the Burned Area Emergency Response Treatments Catalog. During the field survey, the team was pleased to note that some of these BMPs are being proactively implemented at some of the sites.

V. References

The Natural Resources Conservation ServiceSoil Conservation Service (NRCS). Soil Survey of Los Angeles County, California, West San Fernando Valley Area. http://soildatamart.nrcs.usda.gov

NRCS, Wildfire Risk Reduction and Recovery Tips for Homeowner, June 2002 ftp://ftp-fc.sc.egov.usda.gov/CA/programs/EWP/azpmsarwldfrrecovery.pdf

California Soil Survey Committee, 1989

California Stormwater BMP Construction Handbook http://www.dot.ca.gov/hq/construc/stormwater/CSBMPM_303_Final.pdf

Burned Area Emergency Response Treatments Catalog www.fs.fed.us/eng/pubs/pdf/BAERCAT/lo_res/06251801L.pdf

BAER – Soil Burn Severity Definitions and Mapping Guidelines, 2003 http://www.fws.gov/fire/ifcc/esr/Remote%20Sensing/soil_burnsev_summary_guide042203.pdf

DRAFT TECHNICAL SPECIALTIST'S
Burned Area Recovery Team (BART)

Resource: Water Quality

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I. Resource Condition Assessment

To attempt to identify values at risk, field visits were conducted from December 1, 2008 through December 5, 2008. Reconnaissance began in the higher elevations of the mountainous areas, which allowed for an initial overview of the burned areas. The field investigation then focused on areas that most likely posed additional risks to life and property due to increased sediment flow and/or flooding resulting from the burn (i.e., debris basins, burned residential areas, Pacoima Dam) as well as interviews with people knowledgeable of the relative areas in question. Areas of particular concern are residential areas immediately downstream of the burn area below culverts and drainages. During November an approximate 2-inch rain event occurred which mobilized burned and sediment debris into every debris basin that was examined (see Hydrologist's Specialist report). That gave the Sayre Fire team an approximate metric by which to measure potential impacts from future rainfall or storm events.

The area was surveyed by vehicle and on foot; notes and photo documentation were made in the field. Two way radios and cell phones were utilized to communicate in the field.

Values at Risk are: possible loss of life and property due to flooding caused by blockages, debris flows, slope- and water-generated landslides, rock fall, associated hazards, and impacts to water quality.

II. Findings of the On-The-Ground Survey (Observations)

A. Values at Risk

Areas of principal environmental concern:

- Potential effects to water quality downstream of the burned area due to an increase in water turbidity. Increase turbidity downstream is expected as a result of increase sediment and debris coming from the burn area.

- Potential impacts to water quality from burned anthropogenic (man-made) sources.

B. Conditions of Values at Risk

Areas with the high soil burn severity produce the greatest changes. High soil burn areas exhibit hydrophobicity, a condition of water repellency created by heat of the fire which volatizes the organic matter. High soil burn areas also have little organic material left, or display white ash. Areas with moderate soil burn severity produce less change, with more organic material present. Areas with low soil burn severity produce very little change and unburned areas produce no change. In light of the defining conditions above, most of the observed burn areas in the Sayre fire are moderate to low burns.

Because the precipitation is not absorbed as it usually is, and instead is immediately mobilized, the effects from burned areas are probably the most severe during the first significant storm event, which is also dependent on the amount of precipitation. Consequently, years with expected higher rainfall should expect compounded effects from the fire regarding erosion, turbidity, and debris flows.

Excluded from the general term of moderate burn above is the Oakridge Mobile Home Park (Oakridge) which is located at the base of the foothills in Sylmar. Approximately 480 mobile homes burned to the ground. Much of the remains of most of the mobile homes were the metal frames that were not consumed in the combustion. However, it is assumed that because the structures were lost, are on a slope, and that burned anthropogenic materials remain, the potential for these materials to be mobilized is increased during a rain event. If that is the case, there is potential for impact to waters of the state or U.S. if the drainage from the materials at Oakridge is not diverted, contained, or sent to a water treatment facility.

On Thursday, December 11, 2008, I and another member of the Sayre Fire team made a return inspection to Olive View Hospital (Hospital) because of concerns of purported possible hazardous materials exposed onsite. We met a Compliance Officer at the Hospital who indicated that a “county hazmat team” had previously visited the site with instructions regarding specific burned areas. With that in mind, we toured the area with the hospital facility planner staff. Some areas were fenced off and being cleaned up with attendant personnel. No outstanding hazardous materials seemed to be exposed during our inspection.

III. Emergency Determinations

The ability to assess the degree of contamination caused by the fire in and around Oakridge, or the avenues of drainage from the area was not within the scope of this report. However, it is suggested that until the concerns above are either validated or denied the potential of impacts of water quality exist. In order to prevent water degradation of water quality, it is advised that local public agencies (1) inspect the remains of materials present at Oakridge; (2) make a determination where the drainage is collected or diverted to a water treatment facility; or (3) if Oakridge drains to the watershed; and (4) as soon as possible.

IV. Recommendations

Municipalities, government, and public awareness is crucial in preventing loss of life, property, or averting degradation of water quality due to flooding or debris torrents that can potentially be caused in the aftermath from the Sayre Fire. County, city, and community organizations need to be identified which in turn should notify the potentially effected public of the risks above. Items listed below are some suggested ways that local officials can inform the public of the dangers and impacts from the fire that still remain:

- Public agencies may want to take precautionary actions prior to storm events to control turbidity (turbidity is the measure of suspended sediment, are you referring to sediment and debris? that may go beyond the capacity of the respective debris basins.

- Culverts should be inspected, cleaned, and protected with trash racks where appropriate.

- Prior to the first typically expected significant rain event, notify residents in the areas that have been previously designated in this report, and:

    - Provide the public with contact information to the appropriate agency if it appears that excess turbidity is occurring in an area not known for such flows.

    - Prior to the first significant storm event, post public notices.

V. References

"Full containment on Sayre Fire" on the web:
http://abclocal.go.com/kabc/story?section=news/local/los_angeles&id=6507461

Robert Ross and Robert Berry – Dept. of Facility Planning and Azar Kattan – Compliance Officer – Olive View Hospital– UCLA Medical Center, Sylmar

DRAFT TECHNICAL SPECIALTIST'S
Burned Area Recovery Team (BART)

Resource: Structural Engineering

Fire Name: Sayre Fire CA-LFD-1460 December 2008

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I. Resource Condition Assessment

A. Resource Setting

The Burn Area Recovery Team (BART) assigned to the 11,262-acre Sayre Fire inspected the burned area December 1, 2008 through December 12, 2008, as an entire team and with specialist groups. The Sayre fire began on November 15, 2008 and burned a total of 11,262 acres on National Forest System (NFS), state, and private lands. A total of 5,513 acres burned on the Angeles National Forest. Six hundred and thirty six residences were either damaged or destroyed. Majority of the watershed around May #1 & #2, Wilson, Sombrero, Hog, Schoolhouse and Stetson were burned.

Fires greatly alter physical characteristics of hillside slopes, stripping natural protective vegetation cover, organic litter and removing barriers that stabilize soil and hold sediment. In addition, chaparral in Southern California has a natural tendency to develop water repellent soils due to their naturally high wax content. This water repellency dramatically increases after a wildfire because waxes vaporize and are driven into the soil by heat. Water repellency reduces infiltration and increases runoff rates. According to the U.S. Forest Service (USDA Forest Service Gen.Tech.Rep.RMRS-GTR-63.2000), peak flows increase 500 to 9,600 percent during the first year after a fire. As a result, burned watersheds generally respond to runoff faster than unburned watersheds and commonly produce flash floods, debris flows, and landslides, which can be devastating to property and human life.

B. Survey Methods

The BART methodology included:

1. Discussing the fire areas with fire personnel familiar with the fires from both Cal Fire and the USFS

2. Performing a literature review of available maps and documents that included:
   - Topographic maps,
   - Geologic maps,
   - Soils maps,
   - Vegetation maps,
   - Burn intensity maps,
   - Fire history maps,
   - The USFS BAER report (BAER, 2008).

3. Performed ground reconnaissance of the fire areas

II. Findings of the On-The-Ground Survey.

A. Identify Values At Risk

Multiple residential structures were damaged or destroyed by the fire. Seven key infrastructure debris basins need remediation [see Appendix 1], (May #1, #2, Wilson, Schoolhouse, Hog, Sombrero and Stetson) One county agency bridge needs repair) (see Appendix 1)one equipment shed was destroyed [see Appendix 1], numerous Metal Beam Guard Railing (MBGR) timber posts along Fwy. 210 North and South bound Connector to Interstate 5 do require replacement [see Appendix 1]. Four major bridge structures (Glenoaks, Yarnell, and Fwy 210 North and South bound to Interstate 5) closed to the vicinity of the fire area have not suffered any structure damaged.

In addition to the above listed areas, lives and property are potentially at risk at sites in flood prone areas, or on roads where flash flooding may cause washouts due to runoff in excess of culvert capacity. Regional water quality supply is potentially at risk from loss of water control on hill slopes. More information is covered in the Hydrology, Geology, Wildlife, and Botany reports for this fire assessment, which also references the above-mentioned sites.

B. Condition of Values at Risk

A sediment or desilting basin is formed by constructed embankment so that sediment-laden runoff is temporarily detained under stable conditions, allowing sediment to settle out before the runoff is discharged. Without mitigation, these basins would pose a moderate degree to Values of Risk from post fire erosion, flash flooding and massive debris accumulation at these basins.

Timber planks of Los Angeles County Department of Public Work's maintenance yard's "Bailey" bridge was burned. Vehicle tires may be damaged when crossing. This bridge is the link between maintenance yard and the Pacoima trail road. It serves as an alternate access bridge

structure to the Pacoima dam. Bridge substructure and two abutments appeared to be in good condition. It possesses a low value of risk to the maintenance worker when crossing.

The equipment shed located at the base of the Pacoima Dam possed a low Value at Risk. After the Sayre Fire damaged the equipment shed, a new jig crane was installed on the top of the dam, therefore making repair and clean up services for the Pacoima Dam possible once again.

Along several I-5 onramps, burned timber posts used for Metal Beam Guard Railing (MBGR) pose a moderate degree value of risk to the passing vehicles. The guard rail is able to sustain vehicular impacts with minimal or no damages. It also provides a directional guide to traveling vehicle. The damaged sections are totally ineffective in redirecting “run-off road vehicles” as they await repair.

III. Emergency Determinations

Emergency actions are not recommended for property and general structure recovery at this time, but recommendations have been made for treatments and monitoring that may be conducted to improve structural integrity of the structure.

IV. Treatments to Mitigate the Emergency

No Emergency or immediate mitigation plan for property and general structure recovery at this time.

V. Discussion/Summary/Recommendations

Debris basin and Sediment retention pond

- A design check and field inspection is recommended to assure these facilities will accommodate the excess flows created by additional mud and debris flow caused by the recent fire.
- Clearing channel obstructions and increasing basin capacities will help mitigate the effects of accelerated storm flows and sedimentation to Values at Risk.
- Post mud slide, flood warning signs, and establish evacuation plans for property owner within downstream of these basins.
- Increase awareness of the potential increase in storms flows to the public and property owners.

Los Angeles County Maintenance Bridge

- A detailed structural inspection, structural analysis and a repair design plan for the bridge should be prepared by a Professional Engineer and submitted to Los Angeles County Department of Public Works for consideration.

Pacoima Dam Equipment Shed

- Replace and repair fire damaged shed structure.
- Replace or repair crane equipment.

Metal Beam Guard Rail (MBGR) posts

- Replace and repair all fire damaged posts and metal beam guard rail.

DRAFT TECHNICAL SPECIALTIST'S
Burned Area Recovery Team (BART)

Resource: Forestry

Fire Name: Sayre Fire CA-LFD-1460 December 2008

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I. Resource Condition Assessment

A. Resource Setting

The Sayre Fire began on Friday, November 14, 2008 at 10:49 p.m. and burned approximately 11,262 acres in Northern Los Angeles County along the San Gabriel Mountain Range. The predominantly wind-driven Fire burned north of the I-210 freeway in the vicinity of the city of Sylmar, and was bounded by the previous Marek Fire burn to the East and the Sesnon fire to the West, across the I-5 interstate. The fire was declared contained on November 21st. The topography of the fire area is generally steep (70% of the fire area has slopes greater than 60%), with incised canyons which run in a general north-south pattern which are part of the east-west trending transverse ranges in Southern California. Of the total area, about 50% (5,668 acres) are on lands owned by the US Forest Service, administered by the Angeles National Forest. Of the remaining acres, about 26% (3,000 acres) occurred within the State Responsibility Area (SRA) of the State of California and the remaining 24% (2,594 acres) occurred within local jurisdictions (county and city).

Most of the fire area is generally considered chaparral and coastal sage scrub, tree species include: Coast Live Oak (*Quercus agrifolia*), Scrub Oak (*Quercus berberidifolia*), California Sycamore (*Platanus racemosa)* and Southern California Black Walnut (J*uglans californica Wats. var. californica*) existing in lower drainages, and various debris basins.

Around the Olive View Hospital and homes within the Wildland Urban Interface (WUI), a variety of species including Eucalyptus (*Eucalyptus spp.*), Aleppo Pine (*Pinus halapensis*) and Canary Island Pine (*Pinus canariensis*) are planted as ornamentals. Overall burn intensities are moderate to low. Areas with native tree cover were mostly low, being subject to under burning with some group and individual tree torching. Soil burn severity for the fire area was 39% Low, 60% Moderate and 1% High.

Chaparral species are well adapted to fire, with many species having the capability to sprout back from root crowns or through adventitious buds. As notable tree species, Coast Live Oak (*Quercus agrifolia*) and Scrub Oak (*Quercus berberidifolia*) are expected to recover well from the low to moderate intensity burns.

Eucalyptus trees are non-native species widely planted ornamentally, for windbreaks, and to prevent soil erosion. Eucalyptus trees tend to have complete duff and litter consumption with the fast moving wind-driven fire, but the canopies were largely unconsumed but scorched by the flaming front. An accurate estimate for scorch mortality is not available, but it would be reasonable to expect a fair amount of mortality to occur. In addition, trees weakened by fire may create favorable conditions for Eucalyptus Long-horned borers (*Phoracantha semipunctata and P. recurva*) and pine bark beetles to flourish, with an increase in insect mortality. Trees weakened by fire or insects are also at an increased risk of succumbing to a variety of infections from disease, fungus or rot. In any of these occurrences, dead trees may pose an increase in fire hazard, limb breakage, and wind throw.

B. Survey Methods

Field reconnaissance methods were performed by both vehicle and by travel on foot through portions of the fire. Areas surveyed include the Wilson Truck Trail & Debris Basin, Placerita Canyon Road, Sand Canyon Road, Edison motorways, Elsmere Canyon area, De Campos Trail, Weldon Canyon Motorway and areas North of Sesnon Boulevard. During this time, Los Angeles County Public Works was observed evaluating and treating hazard trees in proximity to road areas within the burned area.

In addition to field surveys, aerial photography (Source: Tele Atlas) was also reviewed to determine pre-fire vegetation communities and to compare with post-fire conditions.

II. Findings of on the Ground Surveys

C. Identify Values At Risk

Specific Values at Risk (Refer to Appendix 1):

Site #19 is an example of hazard trees. Along a road is a stand of Aleppo Pine that are likely dead as a result of fire damage (90-100% needle burn). These trees are leaning over a roadway and pose a fall hazard.

Site #26 is an example of applied Best Management Practices (BMP's) that have been impacted by recreational use. In this instance, waterbreaks installed along a fire control line have been trampled by what appears to be horses and mountain bikes. If allowed to continue without mitigation, the waterbreaks could cease to function as designed causing impacts to water quality from excessive erosion.

General Values at Risk:

Values at Risk from fire-caused damaged trees include; roadways, utility lines, homes, businesses, vehicles and people which would result either from direct damage (i.e. tree fall) or from a cumulative impact (trees and limbs as part of a mud or debris flow).

The most common damage or injury comes from direct falling of either the entire tree, or a portion of the tree bole or branches (widow-makers). While the impact caused by falling trees and limbs is typically to property or infrastructure, the potential does exist for people to be injured from this same falling material.

Fire damaged or otherwise weakened trees are more susceptible to limb breakage, having tops snap out or having the entire tree uproot either during high rain events or high winds.

Within the fire area, a wide variety of conditions were observed. Most of the native oaks, walnuts and sycamores observed within the fire area will either survive intact or sprout. For the non-natives, including the many variety of Eucalyptus present, a more detailed and site-specific evaluation should be performed. While some of the burned Eucalyptus are already showing signs of main stem sprouting, portions of these trees may still present a hazard.

Predicting tree mortality from fire can be a very complex process, requiring specialized expertise and licensing. Typically, the following applies to evaluating tree mortality:

- Most fire related mortality occurs within 3-4 years post-fire, although fire damage can pre-dispose a tree to future mortality from other factors (drought, wind or insect attack)

- Trees that were already declining or susceptible to damage are more likely to die from fire effects.
- Non-native species not adapted to fire-regimes or local climates are more susceptible than local native species. Some of these have obviously been killed by the fire but others may take time to show signs of mortality.
- Even if the main stem is killed, a majority of native hardwood and brush species will sprout back from the root collar.
- Most native oaks are well adapted to normal fire intensities, like those observed on the Sayre fire. Oaks in general have thicker barks which allow them to survive the high heat. In addition, acorns that fall from oaks tend to have a higher rate of survivability in soils devoid of other competing vegetation.
- In addition to Coast Live Oak, Canary Island Pine is unique among conifers in its ability to resprout and recover after torching or crown fire.
- With the exception of oak trees, when no green foliage remains on a fire damaged tree, the tree is either already dead or likely to die. Caution should be taken when dealing with other deciduous trees since they may recover the following spring. Expert input should be sought in these instances but public safety should be considered when allowing these trees to stand.
- For most conifers, foliage death is roughly equivalent to twig and bud death. For these trees, if 35% or more of the foliage remains green, the tree is likely to survive.
- The amount of cambium killed at the base of the bole is also an important consideration in tree survival. The above guidelines for crown damage assume that light to moderate cambial kill has occurred. For most conifers, this means cambial kill of less than 25% of the circumference of the bole at the base of the tree. Cambial kill can be difficult to assess, particularly when the damage is light to moderate. When bark is completely blackened and has been eroded to the point where its structure is no longer discernable, assume that the cambium beneath is dead.

D. Describe Condition of Values at Risk

Of the Values at Risk identified in both Appendix 1 and generally within the fire area, the potential for harm to humans is generally low and the threat to property is moderate, if not mitigated. The actual damage or injury that could result from these hazards is purely speculative and highly variable depending on site specific conditions.

Burned oak trees, in addition to other native and ornamental species, were observed within close vicinity to many of the homes, outbuildings,

driveways, frequently traveled roads, and other improvements. As these burned trees continue to weaken, limbs may break off (widow makers), the bole of the tree may snap off, or the entire tree may uproot. There is a moderate risk that these weakened trees may cause damage to property. This risk will increase through time as the trees continue to decay and especially during times of strong winds.

There is an overall concern that the short fire interval and recovery between the Foothill Fire of 2003 and the Sayre Fire may contribute to a loss in overall oak woodlands and type conversion to non-native woodlands.

III. Emergency Determination

There is no information to conclude that an emergency condition exists, either at an individual location or within the fire area. An examination of the fire area showed conditions of general concern that can be mitigated by careful observation and prudent actions, by both government and private entities (including the general public).

IV. Treatments to Mitigate the Emergency

No emergency exists at this time, therefore no emergency treatments are recommended.

V. Discussion/Summary/Recommendations

Overview of Recommendations

Large trees of any species within the 2008 Sayre Fire area should be evaluated for mortality. Those that have the potential to harm live, property or natural resources should be evaluated for fire induced mortality over the next three to four years. Evaluate existing stands of trees to determine current mortality and future mortality. Trees that have been damaged but have not been killed by the fires should be also evaluated due to the inherent risk of bark beetle (pines) and Longhorned Borers (eucalyptus) attack over the next one to three years. In addition, any of these trees may also become susceptible to tree diseases which can cause rot, root and/or bole damage and, in some instances, rapid death.

Increased fuel load due to lack of post fire management (i.e. removal of downed materials) could lead to increased risk for future catastrophic fire and increased resistance to suppression activities. Areas that have increased mortality should be considered for fire salvage and or biomass where practical, e.g. Eucalyptus surrounding the Olive View Hospital.

Specific Recommendations

Any hazard trees discovered within the fire area can be mitigated either by tree removal or by pruning any dead portions of the tree. Any diagnosis and/or treatment of a hazard tree should be made by a professional (such as a professional arborist) who has demonstrated competence in this field by a combination of education, experience and professional licensure.

A professional arborist is trained in tree biology, identification and selection, soil-water relations, nutrition and fertilization, tree planting and establishment, pruning concepts and techniques, cabling, bracing and lightning protection, problem diagnosis and management, climbing, safe work practices, and risk assessment. A certified urban forester or Registered Professional Forester also may possess the required knowledge.

Professionals that can assist, guide and recommend options include Certified Arborists (International Society of Arboriculture), Registered Consulting Arborists (American Society of Consulting Arborists), Certified Urban Foresters (California Urban Forests Council), Registered Professional Forester (State of California) and County Foresters. (County of Los Angeles Fire Department)

It is recommended that monitoring be conducted periodically throughout the first year in areas where potential hazardous trees have been identified.

1. Site #19 in Table X should be revisited by a qualified tree expert to determine the extent of mortality and to recommend safe mitigation measures.

2. Site #26 would benefit from a reevaluation to determine the adequacy of all erosion control structures, in consideration of recreational uses. Either direct trail closure, or a combination of access restrictions and education can be effective in reducing the long term impacts from such activities.

3. Any tree weakened by fire, insect or disease should be evaluated for possible limb or whole tree loss due to the high wind events which are common in this area. Special consideration should be given for area where significant modification has occurred because of the loss of other vegetation or structures which previously provided some shelter from the wind.

4. For neighborhoods where a significant number of trees may be impacted, consider developing and distributing informational brochures to enlist homeowners with a preliminary evaluation of trees on or adjacent to their property. This effort can assist not only with hazard tree

identification, but can also serve as a valuable public education tool for a variety of fire and public safety topics.

5. Oak trees and sycamore trees are very sensitive to changes in grade, as in the addition of sediments within their drip-line. Sediment removal operations in debris basins should avoid even the temporary stockpiling of material within that area. Accumulated sediment removal may be a beneficial management action.

6. It must be stressed that all oak trees of the genus *Quercus* within the unincorporated area of Los Angeles County are protected by the County's Oak Tree Ordinance. Under this ordinance, a person shall not cut, destroy, remove, relocate, inflict damage, or encroach into the protected zone of any tree of the oak tree genus, which is 8 inches or more in diameter four and one-half feet above mean natural grade or in the case of oaks with multiple trunks combined diameter of twelve inches or more of the two largest trunks, without first obtaining a permit. The County Forester should be contacted for any issues related to oak tree care and maintenance within County unincorporated areas, including pruning or removal of dead trees.

The City of Los Angeles has it's own applicable oak ordinance. This ordinance protects all native oak tree species that are four inches or greater in diameter as measured four and one-half feet above mean natural grade.

7. Provide the public with contact numbers for the individuals responsible for hazard tree evaluation and/or removal in each jurisdiction. Below is a summary of those contacts available at the time of this report:

County of Los Angeles Fire Department, Forestry Division
Environmental Review Unit
12605 Osborne Street
Pacoima, CA 91331
(818) 890-5719
http://fire.lacounty.gov/Forestry/EnvironmentalReview.asp

City of Los Angeles, Bureau of Street Services
Urban Forestry Division Headquarters
1149 South Broadway Street, 4th Floor
Los Angeles, CA 90015
(213) 485-5675
(800) 996-CITY (2489) Service Request:
http://www.lacity.org/boss/UrbanForestryDivision/index.htm

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DRAFT TECHNICAL SPECIALIST'S
Burned Area Recovery Team (BART) Report

Resource: Wildlife

Fire Name: Sayre Fire CA-LFD 1460 December 2008

Author Name: Terri Stewart,
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California Department of Fish and Game
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San Diego, California 92123
Office: (858) 467-4209

I. Resource Condition Assessment

A. Setting

The 11,262 acre Sayer fire started on November 14, 2008 and was fully contained on November 20, 2008. The burn area is located in both the Santa Susana Mountains and the western end of the San Gabriel Mountains, which are part of the east-west trending transverse ranges in Southern California. Burn area elevations span from 4,003 feet at Fernando 2, to around 1,240 feet in the lower Bee Canyon area southwest of I-5 and I-210 freeways.

Habitats affected by the burn include chaparral/shrublands (7889 acres), oak woodlands/hardwood forests (1361 acres), native and non-native grasslands (431 acres), Conifer Forest/Woodland (141 acres), and 953.7 acres of miscellaneous (barren, urban, rock). Coastal sage scrub and chaparral habitats (chamise-redshank chaparral, mixed chaparral) dominate this landscape, which is interspersed with native and non-native grasslands, and coastal oak woodlands. Valley oak woodlands and montane hardwoods dot the higher elevations, and riparian habitats occur in lower-elevation drainages. Habitats within the fire perimeter burned at predominantly low to moderate severity. Although areas of high severity were observed in most drainages, the broadest expanse of habitat that consistently burned with moderate severity occurred in the Elsmere Canyon area.

Sizeable portions from the recent Sesnon Fire and portions of this fire burned into two branches of a local wildlife corridor in the same vicinity. The Sesnon Fire burn area fell within the western branch of the Santa Monica-Sierra Madre wildlife corridor as identified by South Coast Wildland's Missing Linkage Report, and the Sayre Fire burned through the eastern branch of the same corridor (Appendix 11). The San Gabriel-Castaic Wildlife Corridor is outside the fire

perimeter on the eastern side but due to the fire history over the last decade or more, each corridor is important and redundancy is necessary to compensate for temporal habitat losses in this geographic vicinity. The corridors are amongst the last remaining areas that provide connectivity between the coast and inland mountain ranges, which are essential elements for preserving the natural ecological and evolutional processes on a fragmented landscape (Penrod et al 2006). The fact that the Sayre Fire is situated in-between the Marek Fire to the southeast, and the Sesnon Fire to the northwest accentuates habitat loss issues, including temporal loss of wildlife corridors and loss of available refugia for wildlife species.

B. Survey Methods

The California Natural Diversity Database (CNDDB 2008) was queried for occurrences of sensitive species within and immediately adjacent to the fire perimeter. Local ecologists familiar with this landscape were consulted, and literature was reviewed for potential occurrences of sensitive species that have not yet been documented in the CNDDB. GIS maps of pre-fire vegetation type and species occurrences were created from resulting data layers. Additional maps provided by the State Office of Emergency Services and Cal Fire included fire severity (LANDSAT satellite image), some fire suppression dozer line data, fire history, and pre-fire habitat data. In addition to CNDDB occurrences and map analysis, site visits to assess impacts to wildlife resources and habitat were conducted.

II. Findings of the On-The-Ground Survey (Observations)

A. Identify Values at Risk

This report assesses the effects of the Sayre Fire and those proposed by the BART to State and Federally listed endangered or threatened species, and state species of concern.

Table 5 is a list of sensitive species potentially at risk with CNDDB occurrences within the fire perimeter. Species observed during the BART assessment are also included. Specific treatments will focus on those values immediately at risk.

Table 6 is a list of sensitive wildlife with suitable pre-fire habitat within the burn and occurrences documented in literature, or with CNDDB occurrences adjacent to the burn. A complete list of sensitive species potentially at risk is not the focus of this report; however, resident native and sensitive species not specifically discussed will receive benefits from the recommended treatments.

I. Resource Condition Assessment

A. Resource Setting

Fires affect wildlife primarily through changes in habitat. Although individuals may have perished during the fire event, most wildlife populations should re-colonize the area as habitat recovers. A significant portion of this landscape burned at low to moderate intensities, and patches of habitat remained unburned. In some areas, resident native wildlife should receive benefits from the fire. However, portions of this fire-adapted system are at risk of degradation or outright loss because of frequent fire events. Frequent fires reduce seed stock for certain native species allowing fast-growing non-native grasses to become established, which are often more susceptible to fire than the native vegetation (Brooks 2004; Smith 2000). This can result in type conversion reducing quality and quantity of suitable habitat for nesting, breeding or foraging. This is particularly true for areas that were recently burned in 1992 (Sylmar Fire) and in 2004 (Foothill Fire), which were the largest of fourteen fires that have occurred in this general vicinity since 1990 (Figure 2). Such habitat losses can potentially place sensitive species at risk from long-term displacement or local extirpation.

Wildlife corridors are critical features of the landscape, connecting areas of habitat fragmented by urban development. Facilitating dispersal of wildlife between patches of remaining habitat is critical for maintaining rich biodiversity in this region (Penrod et al 2006). Sensitive focal species of the South Coast Wildlands Project (such as the American badger) are potentially at risk if suitable habitat is unavailable, or if sediment flows from the burn area prevent movement within the corridor.

II. Findings of the On-the-Ground Survey

A. Resource condition resulting from the fire

Upland Habitats

Upland habitats (annual grasslands, coastal sage scrub, chaparral, oak woodlands and hardwood forests) generally burned in an irregular mosaic pattern with low to moderate intensities. Some oak woodland communities in Wilson Canyon burned moderately, with some areas of higher intensity. The steep slopes around Pacoima Dam and Pacoima Wash are currently barren of vegetation but without comparison to pre-fire vegetation condition, it is difficult to determine if there was, or how much vegetation there was, prior to the fire. Pacoima Wash itself was low to moderately burned with patches of upland vegetation remaining on the berms of the wash. Upland habitat, specifically laurel sumac shrubs, showed signs of basal sprouting within just 3 weeks of the burn.

Riparian Habitats

In general, burn patterns were low intensity and patchy within riparian habitats. Pacoima Wash contained areas of light to moderate intensities where *Baccharis* and willow species showed some evidence of partial burning. One area visited included the riparian habitat associated with Van Norman Lake. This area has occurrence records of the federal and state endangered least Bell's vireo, however, all riparian habitat was intact and not within the fire perimeter. Potential exists for downstream impacts associated with increased water or sediment flows that may reduce the quality of occupied habitat for the vireo.

B. Potential consequences of the fire on Values at Risk

Upland species

Direct mortality to individuals is an immediate impact of fire. Many animals avoid the initial event by fleeing or burrowing underground, while others succumb to toxic effects of smoke and ash.. Two coyotes were seen during the assessment; one individual seen in the lower Pacoima Wash area was particularly thin and slow-moving. Its mannerisms and appearance causes one to believe it may have been injured or burned during the fire. Wildlife habitat recovery is determined by burn intensity and pattern, as well as post-fire impacts such as drought and disturbance

Coastal sage scrub habitat recovers quickly from fire, often within five years (FEIS website). Bird species associated with this plant community are expected to re-establish populations within areas of suitable post-fire habitat. The California condor is known to utilize portions of the Angeles National Forest for foraging but not for nesting. Two designated critical habitat areas for the condor occur, one to the north of the fire perimeter (Tehachapi Mountains) and one to the west (Sespe-Piru) of the Sayre Fire area. Golden eagles and other raptors generally respond well to fire, and are often attracted to disturbed sites in search of prey (CWHRS 2008). Recovery of forage habitat for small mammals and rodents will affect the persistence of golden eagle in this area. Potential negative effects from the fire to California condor, golden eagle and other raptors include habitat disturbance from an increase in human recreational activities (horseback riding, bicycle, motor bikes, and hiking) where prior to the fire the area was inaccessible due to heavy brush. Examples of human use in burned areas include Pacoima Wash (bike and/or motorcycle tracks) and Wilson Canyon (equestrian). Additionally, exposure of partially burned waste within the burn area and increased dumping of residential and contractor waste and debris in areas now open to the public can contribute to harmful effects of condors scavenging through the debris. Specifically, the area along Hubbard Road along Pacoima Wash showed evidence of newly dumped debris (wood and PVC pipe). This can be a safety hazard to not only wildlife but to humans as well. Efforts to preclude recreational uses and public access in burned areas should be conducted until habitat recovery occurs (approximately 3 years).

The northern area of the Sayre Fire is within designated critical habitat for the federally listed California gnatcatcher. The "Proposed Coastal California Gnatcatcher Critical Habitat Units" (Federal Register/Volume 65, No 25, Feb 7, 2000) shows Unit 15 as

including breeding areas in Placerita, Box springs Canyon and Plum Canyon. The Federal Register states Unit 15 is the northern distributional extreme of the gnatcatcher's current range. Placerita is just north of the Sayre Fire perimeter however suitable gnatcatcher habitat did occur within the burn area. As stated above, coastal sage scrub, if left to recover, is likely to return to the quality it was pre-fire. If too frequent of fires occur the potential exists for habitat conversion, primarily from coastal sage scrub to non-native grasslands. This would increase the chance that gnatcatchers would not continue to breed in the northern Unit 15.

Western mastiff bat occurs in the northwestern area just outside the fire perimeter, but not within the burn area. Little is written about responses of molossid bat species to fire, and it is unknown if the potential for habitat conversion will have an impact upon this population, or upon their insect prey-base. If adequate cover and forage is available, and if rock outcroppings remain available, western mastiff bat should continue to utilize this area. Suppression damage to rock outcroppings does not appear to have occurred.

Upland wildlife species may sustain the greatest impacts from this fire. The San Diego coast horned lizard, silvery legless lizard, burrowing owl, and San Diego desert woodrat are State Species of Concern, (CNDDB 2008) with occurrences in the general vicinity of the Sayre Fire. Populations in this region inhabit sandy washes within chaparral, coastal sage scrub communities and chaparral habitats. In particular, suitable burrows were seen along Pacoima Wash that may be inhabited by burrowing owls. None of these above species had CNDDB occurrences within the fire perimeter. Sedimentation and debris flow, continued or increased habitat disturbances from public use and habitat conversion are all possible factors that could result in habitat degradation or loss. The Monarch butterfly, a species ranked as sensitive and one that is unique in its need for mature Eucalyptus trees for congregating while migrating, has a species occurrence just outside the Sayre Fire perimeter. A stand of Eucalyptus was sighted near the convergence of the Sesnon and Sayre Fires, at the North West edge of the Sayre Fire. Burn damage appears to have been light and no impacts to Monarch butterflies are expected.

Aquatic Habitats

Wetland areas that provide habitat seasonally or year-round are important habitats for amphibian species. A CNDDB record in the Pacoima Wash area exists for the Sierra Madre yellow-legged frog. This nomenclature is an old name for the Mountain Yellow-legged frog (MYLF) which is federally listed as endangered. This occurrence dates back to 1918, at one mile above the mouth of Pacoima, San Fernando Canyon (USGS Report "Natural History and Recovery Analysis for Southern Populations of the MYLF (*Rana muscosa", 2003*). Locations of 1937 and 1939 records in the Pacoima area were resurveyed during 2000-2003 and were found to be extirpated. The Pacoima population is not one of the 8 remaining of 142 historical populations for the MYLF. The area, however, has potential for recovery and reintroduction of MYLF if habitat is suitable. Post fire surveys to determine habitat quality should occur in the near future.

The western spadefoot toad is a state species of concern, with one occurrence just outside the fire perimeter (CNDDB 2008). However, the potential for this species to have occurred in the vernal pool located at the Sayre/Sesnon Fire edge is highly likely. Vernal pools with specific temperature and persistence attributes are essential for successful breeding and recruitment. It is expected that direct mortalities related to the fire suppression activities were high even though western spadefoot are thought to be relatively inactive in underground burrows for most of the year, emerging only after the first autumn rainfall (CWHRS 2008, Jennings and Hays 1994). An area about 1/2 acre in size had evidence of heavy equipment usage and damage to the vegetation and natural contours of the site. The dozer tracks were within the watershed of this vernal pool first noted in the Sesnon Fire assessment. The pool is located in a city-owned park on the western edge of the Sayre Fire perimeter, or the eastern edge of the Sesnon Fire perimeter. An internet search revealed that this park is very popular with local residents and mountain bikers, and high use of this area was observed during the Sesnon Fire assessment. Less public activity was seen during this most recent assessment (12-4-08). Although human disturbance is a pre-existing condition, fire exacerbated the fragile nature of this habitat. The fire suppression damage and creation of additional fuel breaks surrounding the vernal pool leave it vulnerable to substantial sediment and debris deposits, which could alter its suitability for western spadefoot toad. Excavation and re-contouring of the slope (vernal pool watershed) and soil stabilization should occur prior to any rains. Sedimentation of the pool could potentially result in extirpation of this species, and others associated with this vernal pool community.

Riparian Species

Riparian habitats were not severely impacted by fire, and it is anticipated that the majority of wildlife species will re-colonize these zones as habitat recovers. Although there were no CNDDB occurrences of riparian species within the fire perimeter, several records of riparian obligate species occur just outside the fire. Least Bell's vireo and southwestern willow flycatcher habitat could be impacted if heavy sediment and debris-flow from moderately burned upstream slopes occurs, leaving the species at risk for long-term displacement or extirpation. Tri-colored blackbird may have populations in fresh water systems in the area (based on CNDDB records nearby) but no documentation exists for this species within the fire perimeter.

III. Emergency Determination

The Sayre Fire was generally a low to moderate severity burn in an irregular mosaic. However, those areas that burned at higher intensities are associated with major drainages. Extensive post-fire sedimentation potentially affects down-stream habitats. In addition, habitats impacted by frequent fires are at risk of type-conversion, which may reduce the possibility of full recovery to pre-fire habitat condition. Several species may be at risk from long-term displacement or extirpation.

IV. Treatments to Mitigate the Emergency

. Treatment Objective

The treatments' objectives are to monitor wildlife populations and encourage adaptive management of sensitive wildlife species recovery post fire.

1. Treatment Description

Erosion Control

- Oak slash should remain in place wherever feasible.

- Stabilize slopes between 20 and 50 percent, where feasible, with biodegradable matting to limit slope erosion while also limiting impacts to recovering native vegetation and wildlife habitat.

- Avoid use of hydroseed and hydromulch. Hydromulch and hydroseed are ineffective because of the lack of soil moisture for them to be efficient, they inhibit natural recruitment from the native seed bank, and they introduce exotic weed species into native habitat.

- Avoid removal of vegetation important to sensitive species, especially unburned habitat in known nesting or foraging territories.

- Use appropriately sized culverts as determined by an appropriate agency when replacing or improving drainage structures. Restrict vegetation removal from culverts and drainages to what is necessary for expected flow.

- Avoid disturbing islands of unburned vegetation, which provide wildlife habitat as well as seed sources for natural re-vegetation.

Re-vegetation of Native Habitat

- Re-vegetate riparian habitats in burn areas to encourage habitat re-growth. Riparian vegetation will promote soil stabilization as well as provide refugia for wildlife species.

- Restore and monitor habitats impacted by recent, frequent fires (Figure 2), which are at risk of habitat conversion.

Population surveys and long term monitoring

- Conduct long-term bird monitoring for California condor, California gnatcatcher and burrowing owl within and adjacent to the burn area to evaluate the likelihood of direct mortality, the extent and duration of displacement, and the rate and extent of habitat recovery.

- Conduct long-term small mammal monitoring throughout the burn area to evaluate mortality rates.

- Conduct long-term monitoring of upland and riparian herpetofauna to evaluate the likelihood of direct mortality, the extent and duration of displacement and the rate and extent of habitat recovery.

- Consult natural resource agencies, including the Department of Fish and Game, U.S. Fish and Wildlife Service, and U.S. Geological Survey regarding protocols and season of wildlife surveys.

- Document unburned habitat and monitor for use of sensitive species.

Local agency Coordination

- Local agencies and jurisdictions should coordinate activities with the above-mentioned natural resource agencies to avoid, minimize, and mitigate impacts to sensitive species during post-fire recovery efforts.

- Coordinate local jurisdiction and private landowner activities within riparian areas and sensitive species' habitat to address wetland permitting (including, but not limited to Department of Fish and Game, Regional Water Quality Control Board, and U.S. Army Corps of Engineers).

- Consult natural resource agencies, including the Department of Fish and Game and U.S. Fish and Wildlife Service regarding the suite of species, appropriate vegetation protocols, and season for re-vegetation efforts.

- Recommend the above-mentioned government and non-government groups mutually staff and participate on a Sayre Fire recovery and remediation team, upon completion of the BART assessment. This will facilitate coordination, timeliness and environmental sensitivity of current and future projects proposed for the burned area's watershed.

A. Site Specific Post Fire Treatment Recommendations

1. Specific Recommendations

- Vernal Pool – rehabilitate fire suppression staging area and dozer lines in the immediate vicinity of the pool. Excavate and re-contour to pre-fire conditions. Treat the soil with a stabilizer to reduce potential for sedimentation of the pool. Place straw bales or waddles in select areas to

preclude sedimentation while using care to not alter the natural drainage pattern of the pool's watershed. Restrict public access to the burned area.

- Post signage and restrict public access to areas along Pacoima Wash (Hubbard Road) and in Wilson Canyon where direct evidence and/or observations of human recreational activities and illegal dumping of waste and debris is occurring.
- Minimize the amount of vegetation removed while clearing chokepoints in channels to only that essential for reducing risks to life and property. Vegetation smaller than 3 inches in diameter should remain in the channel, and only the actual channel be cleared (unless a threat to life and property exists upslope of the channel).
- Remove newly exposed debris and waste and any post-fire accumulation of debris and waste as quickly as possible so that California condors are not attracted to the area and do not scavenge in the waste.

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U.S. Forest Service, Fire Effects Information System (FEIS) website, http://www.fs.fed.us/database/feis/

DRAFT TECHNICAL SPECIALTIST'S
Burned Area Recovery Team

Resource: Botany

Fire Name: Sayre Fire CA-LFD-1460 December 2008

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I. Resource Condition Assessment

A. Resource Setting

The 11,262 acre Sayer Fire started on November 14, 2008 and was fully contained on November 21, 2008. The burn area is located in both the Santa Susana Mountains and the western end of the San Gabriel Mountains, which are part of the east-west trending transverse ranges in Southern California. Burn area elevations span from 4,003 feet at Fernando 2, to around 1,240 feet in the lower Bee Canyon area southwest of I-5 and I-210.

The Sayre Fire burned 32 separate vegetation types (Table 7) on a combination of Federal, State, County, and Private Lands in Los Angeles County. The Sayre Fire burned from the boundary of the Marek Fire from the San Gabriel Mountains at Pacoima Canyon to the east, past the I-5 and Highway 14 split, into the Santa Susanna Mountains where it merged with the boundary of the Sesnon Fire. These 32 vegetation types represent 5 major categories: shrubland-chaparral/coastal sage scrub (73% of the area within the fire perimeter), hardwood forest/woodland (13%), conifer forest/woodland (1%), grassland (4%), and Urban/Bare Rock (9%) (Appendix 13). This report will focus on impacts to vegetation and rare, threatened, and endangered plant species on State Responsibility Lands (State, County, local, and Private ownership), which account for approximately 5,594 burned acres, as well as additional areas impacted outside the fire perimeter on State Responsibility Lands (acreage unknown). Botanical values at risk from contingency dozer lines constructed outside the actual burn perimeter on State Responsibility Lands are also included in this report where data was available.

B. Survey Methods

Rare plant and natural community locations from the California Natural Diversity Data Base (CNDDB, 2008) were overlain with draft fire burn severity data and the limited dozer track line locations available to the BART team, to identify potential areas of impact from fire suppression and repair activities, as well as impacts to species/natural communities from high and moderate severity burns (the Burn Area Reflectance Classification maps available to the BART for review on this fire did not correspond to the burn severity map and were therefore not reliable for this analysis). Field visits were conducted on December 3, 4, 5, and 6, 2008 to assess potential impacts to sensitive natural communities and rare plant populations that were likely to be visible in December. All known dozer tracks were inspected, and areas that experienced moderate to high burn severity were surveyed. Included in the fire impact analysis were burned areas, unburned areas directly impacted by fire suppression activities, and downstream areas potentially affected by sediment flow and flooding. Potential impacts to rare plants that were in inconspicuous phases of their life cycle, did not have detailed location information, or were in inaccessible areas, were inferred from the map exercise and personal communications with local experts.

II. Findings of the On-The-Ground Survey (Observations)

Based on this analysis, certain plant populations/communities were identified as possibly being disturbed during the fire, subject to moderate intensity, high return frequency burn patterns, or potentially subject to disturbance by humans during post-burn treatments and after-fire effects.

A. Identify Values at Risk

Eight rare plant species and five sensitive plant communities have been reported to occur in the region of the Sayre Fire area, although two of them are not known from State Responsibility Lands (Table 8). Listed and rare plant species within the fire disturbance perimeter include Plummers' mariposa lily, San Fernando Valley spineflower, slender mariposa lily, Nevin's barberry, Greta's aster, Davidson's bush-mallow, Short-joint beavertail, and California Orcutt grass. Sensitive vegetation communities within the fire disturbance perimeter include California walnut woodland, vernal pool, southern coast live oak riparian forest, southern cottonwood willow riparian forest, and southern sycamore alder riparian woodland.

The ecological integrity of natural communities in the Sayre Fire impact area is a value at risk because disturbance can allow encroachment of invasive weeds. Weeds compete with native plants for moisture, nutrients, and sunlight; alter vegetation structure, which can create unsuitable habitat for native wildlife; and can contribute to an unnaturally high fire

frequency, that may result in type-conversion (permanent changes in vegetation type and species composition). Five vegetation types within the fire perimeter are of particular concern because they are considered rare natural communities (CNDDB, 2003): California walnut woodland, vernal pool, southern coast live oak riparian forest, southern cottonwood willow riparian forest, and southern sycamore alder riparian woodland

B. Condition of Values at Risk

Possible hazards to rare plants and sensitive natural communities from the fire itself, dozer lines, post-fire human management activity, or potential post-burn emergency treatments were identified on State Responsibility Lands in the following areas:

- Vernal pool habitat near O'Melveny park – Pool burned as well as dozer lines adjacent to pool may cause erosion to deposits in the pool.
  Species potentially at risk: slender-horned spineflower, Ca. Orcutt grass, Plummers mariposa lily, and slender mariposa lily.
- Dozer lines throughout Mountains Recreation Conservation Authority/Santa Monica Mountains Conservancy (MRCA/SMMC) land (San Fernando Road, Santa Clara Truck Trail, Elsmere Canyon).
  Species potentially at risk: slender-horned spineflower, California Orcutt grass, Plummer's mariposa lily, slender mariposa lily, southern coast live oak riparian forest, Davidson's bush-mallow.
- Recreation within burn area, especially MRCA/SMMC land and Wilson Canyon area.
  Species potentially at risk: Davidson's bush-mallow, southern coast live oak riparian forest
- Coast live oak woodlands in Elsmere Canyon and Grapevine that have been repeatedly burned.
- Dozer lines throughout north side of burn including fire suppression activities outside of fire perimeter in the Sand Canyon, Coyote Canyon, Bear Canyon and Placerita Canyon areas.
  Species potentially at risk: Davidson's bush-mallow, southern coast live oak riparian forest, southern sycamore alder riparian woodland, California walnut woodland, and short-joint beavertail.
- Pacoima Dam and related cleanout and maintenance activities.
  Species potentially at risk: Davidson's bush-mallow, slender-horned spineflower, and Greta's aster.

Much of the Sayre burn area was a low to moderate intensity burn, leaving patches of intact, unburned habitat throughout the burn area. However, this area has experienced multiple fires with very short recurrence intervals which may eventually affect the native seed bank as crown

sprouting shrubs may be repeatedly burned before they can set seed. In particular, several stands of coast live oak woodland within Elsmere Canyon have been repeatedly burned in the 1962 Newhall Fire, 1990 Sylmar Fire, the 2003 Foothill Fire, and the 2008 Sayre Fire. These trees which were just starting to recover from the 2003/2004 Foothill Fire, reburned in the Sayre Fire with a high/moderate intensity and my not fully recover. Several coast live oaks appeared to suffer mortality after the Foothill Fire as older burned out trees with no re-sprouts were evident in Elsmere Canyon.

Most of these rare plants, sensitive vegetation communities, and the chaparral community in general are adapted to wildfires. In fact, seeds of many chaparral plants require stimulation by fire or smoke before they can germinate (Keeley and Foteringham 1998). Studies have shown native vegetation recovers rapidly after fires without any further treatment (Keeley, 1977; California Native Plant Society [CNPS], 1995). Research has shown that California walnut trees, coast live oaks, and valley oaks respond favorably post fire. Coast live oak associates in riparian areas with alder, sycamore, and cottonwood, which all resprout post fire (Steinberg, 2002). Coast live oak trees less than 3 inches in diameter can be top killed by low to moderate intensity fires, whereas mature trees can survive high intensity fires with crown fire (Steinberg, 2002). Walnut trees have demonstrated good recovery post fire, even when top killed, due to the morphology of having large woody platforms at the soil surface which protect the growing tissue from fire and allow resprouting around the platforms (Esser, 1993). Valley oaks may be favored by fires that keep shrubs from encroaching, keeping the oak grassland association as botanists believe valley oak woodland historically burned on an annual basis. Valley oaks that experience basal burning are most likely to suffer mortality, and crown burning results in a higher mortality of all age classes, and larger valley oak trees (>26.4 inches) reportedly do not produce crown sprouts post fire, but seedlings and saplings that have been top killed can produce root crown sprouts. Valley oak seedlings do not respond well to competition from invasive and exotic annual grasses and forbs, as they out compete valley oaks for a limited supply of soil moisture (Howard, 1992).

The primary concern for all of the rare natural communities inside the fire impact assessment area is damage from human efforts to control debris flows, flooding, and associated hazards in the aftermath of the fire. Trees and shrubs may be cut to avoid debris dams. Native trees will take many years to become established and reach the size of the trees that are cut down, and shading for fish and other aquatic organisms will be reduced in the interim. Conversely, the invasive tree-of-heaven (*Ailanthus altissima*), which grows in floodplains, sends up multiple stump sprouts after the tree

is cut down, and Arundo (*Arundo donax*), can crowd out the young growth of native trees and shrubs.

Heavy equipment operating in stream beds, installing culverts or flood-control structures, while destroying native plants and wildlife habitat in the process, is another potential concern. In fact, the greatest threat to all natural communities from the Sayre Fire is related to human-caused disturbance. Various treatments that have been used in the past in an attempt to stabilize soil and suppress weeds have failed to achieve the desired objectives, and instead made matters worse by inhibiting the recolonization and growth of native plants. Even thin layers of mulch (such as those from hydromulch) can inhibit natural recruitment from the native seed bank, and hydromulch and hyroseeding are ineffective without high soil moisture. Moreover, various types of mulches and seed mixes may contain invasive weed seeds as contaminants (CNPS, 1995). Wood fiber is less likely than straw mulch to introduce seeds of invasive weeds but can change the soil pH and thereby, the species composition. Introduction of nonlocal "native" seed may compromise the adaptive ability of remaining native plants by hybridizing. Seeding also changes species composition within a habitat type, thereby affecting its suitability for local wildlife (Keeler-Wolf, 1995).

Dozer lines may have directly disturbed rare plant populations along the ridgeline delineated by the Santa Clara Truck Trail, and fire breaks created from this road into MRCA/SMMC land and other natural areas. (Figure 3). A second location where dozer lines may have disturbed rare plant populations is at the vernal pools in O'Melveny Park, in the City of Los Angeles (Photo 1). A third location where dozer lines may have disturbed rare plant populations include the dozer line that north of the burn area within Placerita Canyon both on the west side near I-5 (Figure 4) as well as the east side of Placerita Canyon near Sand Canyon. (Figure 5). Dozer lines may invite off-highway vehicle trespass if they cross existing roads. The ecological integrity of rare natural communities and rare plant habitats in and near the burned area may be compromised by invasive weed encroachment, particularly along dozer lines which give hikers, bikers, off-road vehicles, and livestock easy access to areas that were once inaccessible. Disturbance of the soil surface tends to favor non-native plants because their seeds typically germinate more quickly than seeds of native plants and then crowd out native species. At least 23 species of invasive weeds occur in and adjacent to the Sayre Fire impact area (Table 9). Thus, there is an existing seed source for invasive weeds to invade burned areas and dozer lines. Heavy equipment such as dozers can easily transport weed seeds that become caught in the machinery or in caked mud. Livestock, wildlife, and recreating people can also transport weed seeds and create new areas on weed infestation. The area of greatest concern for invasive weed encroachment on State Responsibility

lands is the coast live oak woodlands in Elsmere Canyon and Wilson/Sombrero Canyons which are dominated by non-native annual grasses which have been shown to inhibit natural recruitment of seedlings. Another issue along dozer lines is burial of native annual plant seed bank. Annual plants are those that die each year after setting seed. Populations of annual plants persist from year to year through seeds stored in the soil, which germinate when they are exposed to appropriate temperature and moisture. If the seeds are buried too deep, they may rot before they have an opportunity to germinate, or sprouts may not have sufficient energy to reach the sunlight. Typically, rare annuals and perennials with underground buds recover from wildfires over a period of several years if further disturbance to the burned, habitat is controlled and minimized. Thus, it is important to retain and respread, soil in habitats where native annual plants occur so they can recolonize, and care should be taken to keep soil in the same location so seed from plants that don't currently occupy an area are not introduced into a new area.

Seeding/hydroseeding of the burn area should not be conducted. Studies show that native vegetation recovers rapidly after fires without any further treatment (Keeley, 1977). Introduction of non-local "native" seed may alter or genetically dilute the phenotypes suited for the local ecotype. Seeding may change the dominance of species within a habitat type, thereby altering the density, structure, and function of habitat for local wildlife (food, breeding, cover, etc.) (Keeler-Wolf, 1995). Artificial seeding with any species is not likely to produce significantly better results than allowing natural vegetative recovery (CNPS, 1995).

III. Emergency Determination

Emergencies to botanical resources related to the Sayre Fire fall into three major categories: 1) Threats to rare plants from the fire itself and from post-fire treatments implemented to protect other values, 2) loss of natural community integrity due to invasive weeds and potential post-fire treatments inhibiting natives, and 3) spread of invasive, exotic weeds into new areas from fire fighting and suppression activities, as well as recreation and grazing.

IV. Treatments to Mitigate the Emergency

The treatments' objectives are to protect and monitor plant populations while encouraging adaptive management to promote natural vegetation recovery of the burn area and prevent type conversion to non-native weedy species post fire.

Treatment Types (Protecting Plant Populations)

- Minimizing intervention and disturbance

    - Close all burn areas to public access for a minimum of three growing seasons to facilitate recovery of native vegetation and to prevent renegade trails helping to lessen and minimize erosion.
    - Close all burn areas to grazing for a minimum of three growing seasons to allow recovery of native vegetation and prevent further spread of invasive weeds and further degradation of native habitat.
- Restoration of endangered species habitat in disturbed and high frequency return interval burn areas.
    - More complete mapping and analysis of dozer lines created or used to control this fire should be undertaken to determine more specific impacts to botanical resources as data for this rapid assessment was not complete to determine all potential impacts. In areas where dozer lines impacted known rare species occurrences, restoration and intensive weed management and monitoring should occur for a minimum of five years. In areas of moderate intensity burn severity, or in areas with a high burn frequency return interval, monitoring should be undertaken to ensure native seed banks recover in spite of moderate intensity successive fires. If native seed bank has degraded and fire occurrence outpaces native shrub recovery via crown sprouting to a point where viable seed is not being produced by the crown sprouted shrub prior to the next fire, restoration of shrublands/oak woodlands may be necessary.
- Dozer line remediation
    - Restoration of entire length of dozer line, invasive species suppression, and monitoring for a minimum of five years.
- Invasive weed detection surveys and control. Mapping the current and future extent and spread of invasive weeds is recommended as part of a long-term monitoring plan.
- Monitor vegetation recovery in burned and unburned fire disturbance impact areas (i.e. dozer lines, etc.) to assess long term health or possible decline of sensitive natural communities or rare plant populations.
- Use wash stations to prevent spread of exotic weeds.
    - Especially important for emergency vehicles, construction contractors and city/county vehicles to prevent weed seeds from spreading to new areas within the fire impact perimeter.
- Control of fill material source.
    - Fill material for permanent and emergency repairs should come from the local drainage areas as close as possible to the site. This will help to prevent/contain the spread of exotic weeds and help maintain the composition of native vegetation communities that currently exist.

- Preserve natural stream bottoms and size all culverts (bottom-less preferred) to allow for fish/amphibian/reptile/mammal and 100 year flood water movement through culverts. This measure is recommended for both temporary and permanent repairs to streams.

Treatment Cost

Costs will not be incurred if seeding, mulching, and similar measures are avoided as recommended. Biological consultants may charge $100 or more per hour to survey for rare plants and weeds. The total cost depends on the amount of ground-disturbing activities in known rare plant habitats, extent of invasive weed spread within the fire area and the weed eradication methods used.

V. Recommendations

Treatment Recommendations

Treatment recommendations are to protect rare plants and rare natural communities that were impacted by human-caused disturbances both during and/or post fire, to promote native plant re-colonization of burned areas and dozer lines, to curtail invasive weed infestations in their incipient stages, and to avoid spreading invasive weeds into currently unoccupied areas.

A. Specific Recommendations to Mitigate Direct Affects from Fire

- Restoration of the vernal pools at O'Melveny Park is an extremely high priority. The pools were directly burned, as well as a majority of the watershed that drains into the pools was impacted by dozer lines for fire suppression (Photo 1). The upland area surrounding the pool was dominated by non-native grasses and Brassica sp. as well as patches of California Buckwheat and California Sagebrush, native bunchgrasses, and black sage.
- Conduct rare plant surveys and mapping annually within the burn area to assess long term impacts from frequent fires on sensitive plant recovery, especially non-native grass impacts to shrublands and oak woodlands (type conversion).
- In Elsmere Canyon, conduct oak regeneration studies to monitor areas where coast live oak woodlands were successively crown burned, to assess post fire recruitment.
- Conduct native grassland regeneration studies to assess long term impacts from frequent fires and assess impacts from non-native grass competition. If necessary, a non-native grass removal and restoration program should be undertaken as soon as possible in vernal pool habitat within the fire impact area to help species with future recruitment.
- Conduct annual weed mapping to determine if type conversion from native habitat to weed dominated habitat is occurring. Develop an eradication program for any areas where weeds are inhibiting natural post fire native habitat recovery.

- Mulch should not be applied to open space areas within the burn area. Mulch may introduce weed seed as well as suppress germination and growth of native species.
- Open space recreation areas should be closed to the public for three (3) years to allow vegetation to recover undisturbed.
- If tree-of-heaven must be cut, treat stumps with appropriate herbicide immediately after cutting to prevent regrowth.
- If big cone Douglas fir stands along various canyons are found to be burned, monitor for regeneration.

B. General Recommendations;

- Avoid ground disturbance and herbicide use in areas where rare plant species have been reported. Ground disturbing activities include but are not limited to excavation, contour tilling, scarification, mulching, and driving heavy equipment. If these activities cannot be avoided near known rare plant occurrences, a qualified botanist should conduct pre-activity surveys.
- Propagate plants from the closest possible stands when restoring sensitive wildlife habitat.
- Avoid seeding or tilling wildlands unless necessary to protect life and property.
- Seeding/hydroseeding of the burn area should not be conducted. Hydroseed and hydromulch are discouraged.
- Mulch should not be used in the fire impact perimeter. If mulching is essential, biodegradable matting such as wood fiber is preferred. Straw is less desirable but should be weed-free if used.
- Restrict chip layers from use of hydro-axes to 1 inch deep or less to avoid inhibiting sprouting from native seeds and root crowns.
- If clearing chokepoints within channels is necessary to reduce risk to life and property, only the minimum amount of vegetation should be cleared that enables this goal to be met. Vegetation smaller than 3” diameter at breast height (dbh) should be left in the channel, and only the bankfull channel should be cleared. Channels should be surveyed for Arundo donax, caster bean, tree tobacco, tree of heaven, and cocklebur prior to any clearing and if found, should be carefully removed in a manner to prevent spread of these weedy species.
- Redistribute soil that was piled into berms or piles during creation of dozer lines to salvage native plant seeds, keeping to the same sub-watershed from where the sediment was collected.
- Block or disguise dozer line entrances with shrubs, logs, or other means to minimize trespass.
- Do not plant or seed invasive species.
- Conduct invasive weed surveys during the 2009-2010 growing seasons along dozer lines and roads used by suppression equipment.
- Promptly control weed populations upon detection, and follow up with monitoring and control for at least 5 years.

- Avoid livestock grazing in burned areas for at least three (3) years (longer if rainfall is below the long-term average in the year following the fire).
- Avoid disturbing islands of unburned vegetation, which provide wildlife habitat, refugia, and seed sources for natural revegetation.

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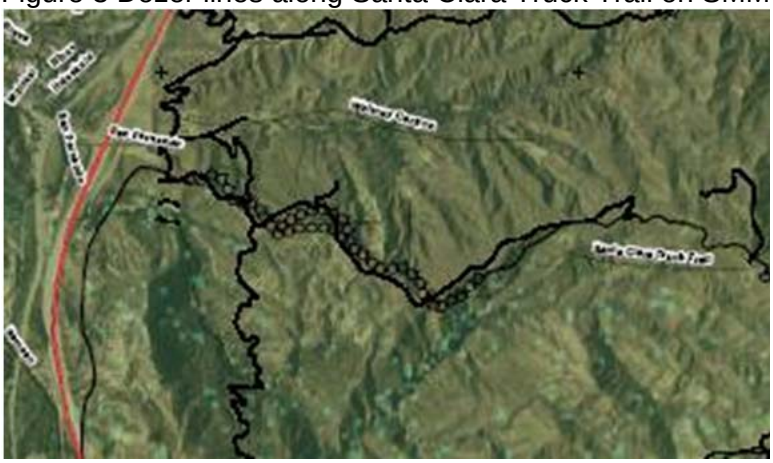
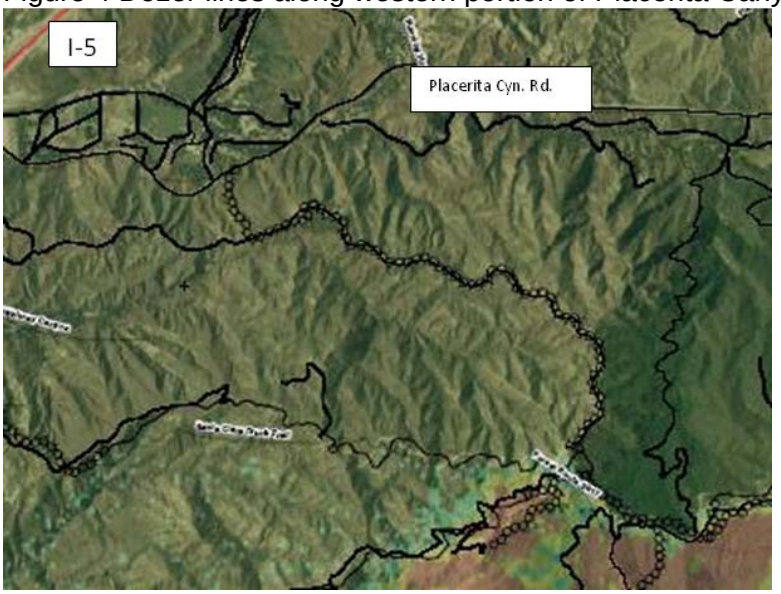
Figure 3 Dozer lines along Santa Clara Truck Trail on SMMC/MRCA Land



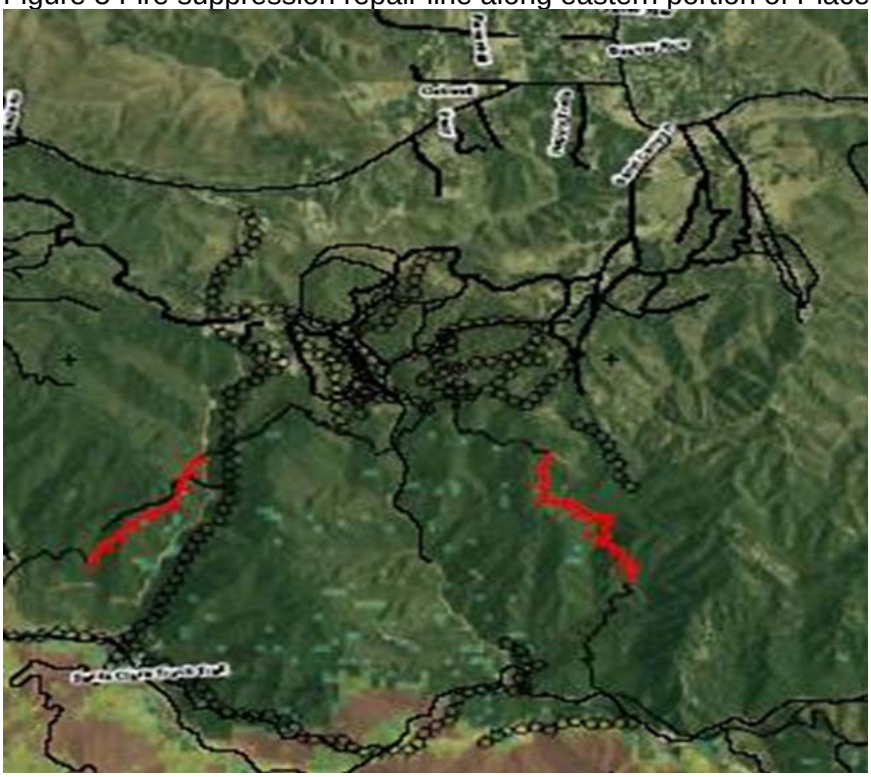
Dozer tracks appear as black chain link

Figure 4 Dozer lines along western portion of Placerita Canyon from I-5 in the upper



Dozer tracks appear as black chain link

Figure 5 Fire suppression repair line along eastern portion of Placerita Canyon around Sand Canyon



Dozer tracks appear as black chain link and red hatching

Photos of Vernal Pools in O'Melveny Park

Photo 1. Before Dozer Impact

Photo 2. After Dozer Impact

TECHNICAL SPECIALTIST'S REPORT
Burn Area Recovery Team (BART)

Resource: **Public Assistance**

Fire Name: Sayre Fire CA-LFD-1460 December 2008

Author Name: Tim Smith, Disaster Assistance Program Specialist
Governor's Office of Emergency Services
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I. Resource Condition Assessment

A. Resource Setting

The 2008 Sayre Fire (FEMA-1810-DR-CA) affected 11,262 acres in Los Angeles County. The windswept fires, which generally occurred on the slopes of hills and mountains destroyed vegetation and caused "hydrophobic" soils to form, a condition causing the soil to repel water rather than absorb it. The affected watersheds were consequently subject to conditions under which rain could cause significant erosion and runoff, leading to mudflows, debris flows, and flooding. As a result, burned watersheds generally respond to runoff faster than unburned watersheds and commonly produce flash floods, debris flows, and landslides, which can be devastating to property and human life.

B. Purpose

The purpose of this Burn Area Recovery Team (BART) survey was to identify emergency projects that may reduce or eliminate immediate threats posed by erosion and other effects of storms in burned watersheds. The items listed in this report are primarily Public Assistance (PA) items that are focused upon due to the threat of damage to improved private or public property or to lives, health, and safety as a result of the fire. These items are listed and comments are listed below:

Debris Overflow Basins and Reservoir:

1. Candlewood Basin
2. Sombrero Basin
3. Stetson Basin
4. School House Basin
5. Constable Basin
6. Wilson Canyon and Basin

7. Hog Basin
8. Yarnel Basin
9. Saddle Ridge Basin
10. Saddle Ridge Yarnell Basin
11. Freeway Basin
12. Timber Ridge Basin
13. Edwards Canyon
14. Bermax Basin
15. Pacoima Reservoir
16. Elsmere Canyon
17. May 1 and 2 Basins
18. Loop Basin
19. Timber Ridge Tract
20. Jolette Slope
21. Neon Basin

See Appendix 1 Values at Risk

The facilities listed above were not damaged by the Sayre Fire but due to the burn area possible increased debris/mudflows from future rain events that could reduce the capacity and increase the maintenance of the surface water collection and drainage system of pipes and culverts that appeared to be inadequate for flood flow conveyance, and need to be addressed by the City/County of Los Angeles. The Stafford Act provides two types of funding for hazard mitigation measures. Mitigation measures for disaster-damaged facilities under Section 406 will protect or benefit the repaired facility. There are different from mitigation measures that could be considered under the Hazard Mitigation Grant Program (HMPG of Section 404). In that program, measures are proposed that may involve facilities other than those damaged by the disaster. Until the drainage system in the canyon area and the urban areas of this fire can be upgraded to support the 100 year flood flow of the watershed above, the City/County should monitor these infrastructure facilities when large storm events are forecasted, and institute mandatory evacuation of those structures within the flood plain below.

A sediment or desilting basin is a basin formed by constructed embankment so that sediment-laden runoff is temporarily detained under quiescent conditions, allowing sediment to settle out before the runoff is discharged. Now these basins would pose a moderate risk from post fire erosion, flash flooding and massive debris accumulation at these basins. Recommend a design check and field inspection to assure these facilities will accommodate the excess flows created by additional mud and debris flow caused by the recent fire.
Clearing channel obstructions and increasing the basin capacity may help mitigate the effects of accelerated storm flows and sedimentation to property.

- Post mud slide and flood warning signs and establish evacuation plans.
- Increase awareness of the potential storms flows to the property owners.

In addition to the above listed items, lives and property are potentially at risk at sites in flood prone areas, or on roads where flash flooding causes washouts due to runoff in excess of culvert capacity. In this area, known for consistent high winds, additional hazards can be dead trees and limbs along major street corridors or hiking and equestrian trails. Regional water quality supply is potentially at risk from loss of water control on hill slopes. The Los Angeles County Public Works is currently working on these basins to remove the silt and debris that has been previously deposited, some as a result of the most recent post-fire rains.

Pacoima Dam:

Timber planks at the Los Angeles county maintenance yard's bridge (15ft x 30ft steel frame "5 ton limit") were burned. This bridge is one link between the maintenance yard and the Pacoima trail road. It serves as an alternate access bridge structure to the Pacoima dam. The bridge substructure and two abutments appeared to be in good condition.

The Hoist House is concrete masonry with a metal corrugated roof building (10ft x 12ft) that housed the engine and transmission cables located at the base of the Pacoima Dam. The house needs to be reconstructed.

Rock Retention Barrier Walls (steel piles with wood planking) need to be reconstructed. This impacts approximately 1040 linear feet of walls. The walls are located on the access road to the dam behind the dam office.

A John Deere 444E loader was also damaged or destroyed and needs to be repaired or replaced.

The operating area of the dam and its facilities need to be protected from the run-off of the steep slopes that were burned by utilizing k-rails, hay bales, etc.

Oak Ridge Mobile Home Park:

This mobile home park is full of potentially hazardous debris from the burnt mobile homes. This should be protected from any runoff escaping into the areas storm drains or streams by utilizing erosion protection measures such as; hay wattles, sand bags, straw bales and/or k-rails.

Olive View Hospital:

The hospital has several areas that are located to the West Campus of the hospital that has been assessed by the Los Angeles County Fire Department HAZ-MAT team and hospital facilities department. All issues concerning HAZ-MAT have been addressed by the hospital facilities department and protection measures have been implemented.

Comments:

The above remedial actions may be necessary if the facilities in question do not fall within the exclusive authority of another Federal agency. The occurrence of mud flows, debris flows, and flooding may have the following effects:

The debris may be deposited on public roads, preventing the use of these roads for traffic. Debris basins, spreading basins, and flood control channels, may be partially or completely filled with sediment, rock, timber, and other debris, compromising their effectiveness to provide protection during the future storms. Only measures necessary to provide protection for a flood associated with a five-year storm event are eligible.

In conclusion, the areas of interest in regards to Public Assistance are relatively confined to the debris basins, dams, mud flow measures, Olive View Hospital and the Pacoima Dam damages. Also any potential emergency protective measures that were put in place by the various city and county agencies within the 1810 DR incident period of: 11-10-08 to 11-28-08

Sayre Fire 2008

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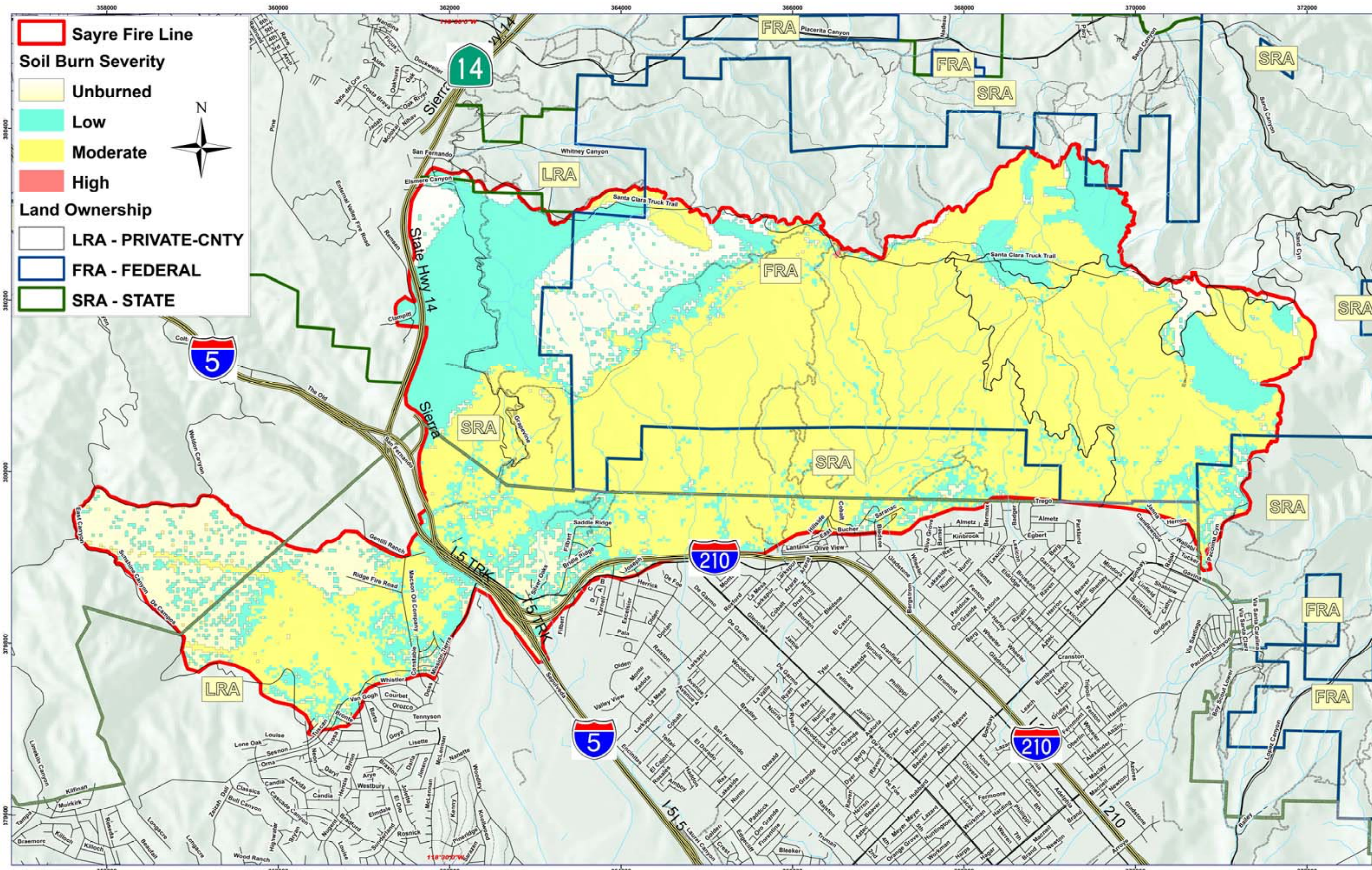
California Geological Survey Burn Site Evaluation Summary
Fire Name :
Bold where risks are high

Site number	At-risk Feature	Street address	GPS location Latitude N	GPS location Longitude W	Hazard	Likeli-hood	Risk to lives fire	Risk to lives pre-exist	Risk to property/habitat fire	Risk to property/habitat pre-exist
1	**Office Stucture**	**Dam Office**	**34.32976**	**-118.40039**	**Rock Fall**	**High**	**High**	**Mod**	**High**	**Mod**
2	**Road**	**Access Road-Pacoima Dam ***	**34.32848**	**-118.40104**	**Mudflow**	**High**	**Low**	**Low**	**High**	**Mod**
3	**Road and Stream**	**Sable Movie Ranch/SDI Site Dozer Lines**	**34.37912**	**-118.41153**	**Soil Erosion**	**High**	**Low**	**Low**	**High**	**Low**
4	**Oak Wooland**	**Wilson Canyon**	**34.33407**	**-118.44603**	**Loss of resource**	**High**	**Low**	**Low**	**High**	**Low**
5	**Numerous Rare Plants/Oak Woodlands**	**Elsmere Canyon**	**34.36171**	**-118.4959**	**Potential Direct Impact Dozer Tracts & Burn**	**High**	**Low**	**Low**	**High**	**Mod**
6	**Vernal Pools**	**O'Melveny Park**	**Sensitive Information**		**Erosion, direct mortality to endangered species**	**High**	**Low**	**Low**	**High**	**Mod**
7	**Residential**	**May 1 Basin**	**34.33064**	**-118.42927**	**Flooding/Mudflow**	**High**	**Low**	**Low**	**Mod**	**Low**
8	**Residential**	**May 2 Basin**	**34.32993**	**-118.42815**	**Flooding/Mudflow**	**High**	**Low**	**Low**	**Mod**	**Low**
9	**Hospital Facilities**	**Wilson Basin**	**34.32937**	**-118.44558**	**Flooding/Mudflow**	**High**	**Low**	**Low**	**Mod**	**Low**
10	**Residential**	**School House Basin**	**34.32570**	**-118.4587**	**Flooding/Mudflow**	**High**	**Low**	**Low**	**Mod**	**Low**
11	**Residential**	**Hog Basin**	**34.33065**	**-118.46432**	**Flooding/Mudflow**	**High**	**Low**	**Low**	**Mod**	**Low**
12	**Residential**	**Sombrero Basin**	**34.33094**	**-118.46942**	**Flooding/Mudflow**	**High**	**Low**	**Low**	**Mod**	**Low**
13	**Residential**	**Stetson Basin**	**34.32782**	**-118.47495**	**Flooding/Mudflow**	**High**	**Low**	**Low**	**Mod**	**Low**
14	**Residential**	**Loop Basin**	**34.32772**	**-118.41312**	**Flooding/Mudflow**	**High**	**Low**	**Low**	**Mod**	**Low**
15	**Hospital**	**Olive View Hospital Main**	**34.32588**	**-118.44573**	**Flooding/Mudflow**	**High**	**Low**	**Low**	**Mod**	**Low**
16	**Residential**	**Oak Ridge Mobile Home Park**	**34.32598**	**-118.4674**	**Flooding/Mudflow**	**High**	**Low**	**Low**	**Mod**	**Low**
17	**Road Damage**	**Gavina Culvert ***	**34.31980**	**-118.40175**	**Flooding/Plugging**	**Mod**	**High**	**Low**	**High**	**Low**

Site number	At-risk Feature	Street address	GPS location Latitude N	Longitude W	Hazard	Likeli-hood	Risk to lives fire	pre-exist	Risk to property/habitat fire	pre-exist
18	Safety Hazard	Bailey Bridge	34.33148	-118.39988	Missing Deck	Mod	Mod	Low	Mod	Low
19	Vehicles and Pedestrians	Bledsoe ave. Access to Wilson Debris Basin	34.32900	-188.4447	Hazard Trees	Mod	Mod	Low	Mod	Low
20	Residential	Yarnell - Saddle Ridge Tract	34.32575	-118.48073	Flooding/Mudflow	Mod	Low	Low	Mod	Low
21	Residential	Saddle Ridge Basin	34.32615	-118.48065	Flooding/Mudflow	Mod	Low	Low	Mod	Low
22	Residential	Yarnell Basin	34.32579	-118.47938	Flooding/Mudflow	Mod	Low	Low	Mod	Low
23	Residential	Almetz Condos	34.32871	-118.43988	Flooding/Mudflow	Mod	Low	Low	Mod	Low
24	Residential	Bermax Basin	34.32982	-118.43133	Flooding/Mudflow	Mod	Low	Low	Mod	Low
25	Residential	Timber Ridge Basin	34.31478	-118.50384	Flooding/Mudflow	Mod	Low	Low	Mod	Low
26	Water Quality	Park above Wilson Debris Basin	34.33410	-118.4461	Recreational damage to waterbreaks	Mod	Low	Low	Mod	Low
27	Recreational	Stetson Ranch Park	34.32376	-118.47437	Flooding/Mudflow	Mod	Low	Low	Low	Low
28	**Reservoir Outlet Works**	**Pacoima Dam**	**34.33414**	**-118.39728**	**Blockage of Inlets**	**Low**	**High**	**Low**	**High**	**Low**
29	Residential	Timber Ridge Tract - East	34.31539	-118.5028	Flooding/Mudflow	Low	Low	Low	Mod	Low
30	Residential	Constable Basin	34.31292	-118.50608	Flooding/Mudflow	Low	Low	Low	Mod	Low
31	Residential	Jolette Slope	34.30612	-118.51677	Flooding/Mudflow	Low	Low	Low	Mod	Low
32	Residential	Neon Basin	34.30430	-118.5173	Flooding/Mudflow	Low	Low	Low	Mod	Low
33	Localized Flooding	Pacoima Dam	34.32118	-118.437	Flooding	Low	Low	Low	Low	Low



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sayre_soil_burn_severity.mxd

SAYRE FIRE SOIL BURN SEVERITY MAP

The Sayre Fire Perimeter data as of 11-20-08
The Soil Burn Severity was interpreted from the Burned Area Reflectance Classification (BARC).
BARC - A satellite-derived map of positive vegetation condition.
The BARC has four classes: high, moderate, low and unburned.

BARC Map provided by Sayre BAER - David Collins
GIS Map prepared by7 State Governor's Office Of Emergency Services on December 12, 2008

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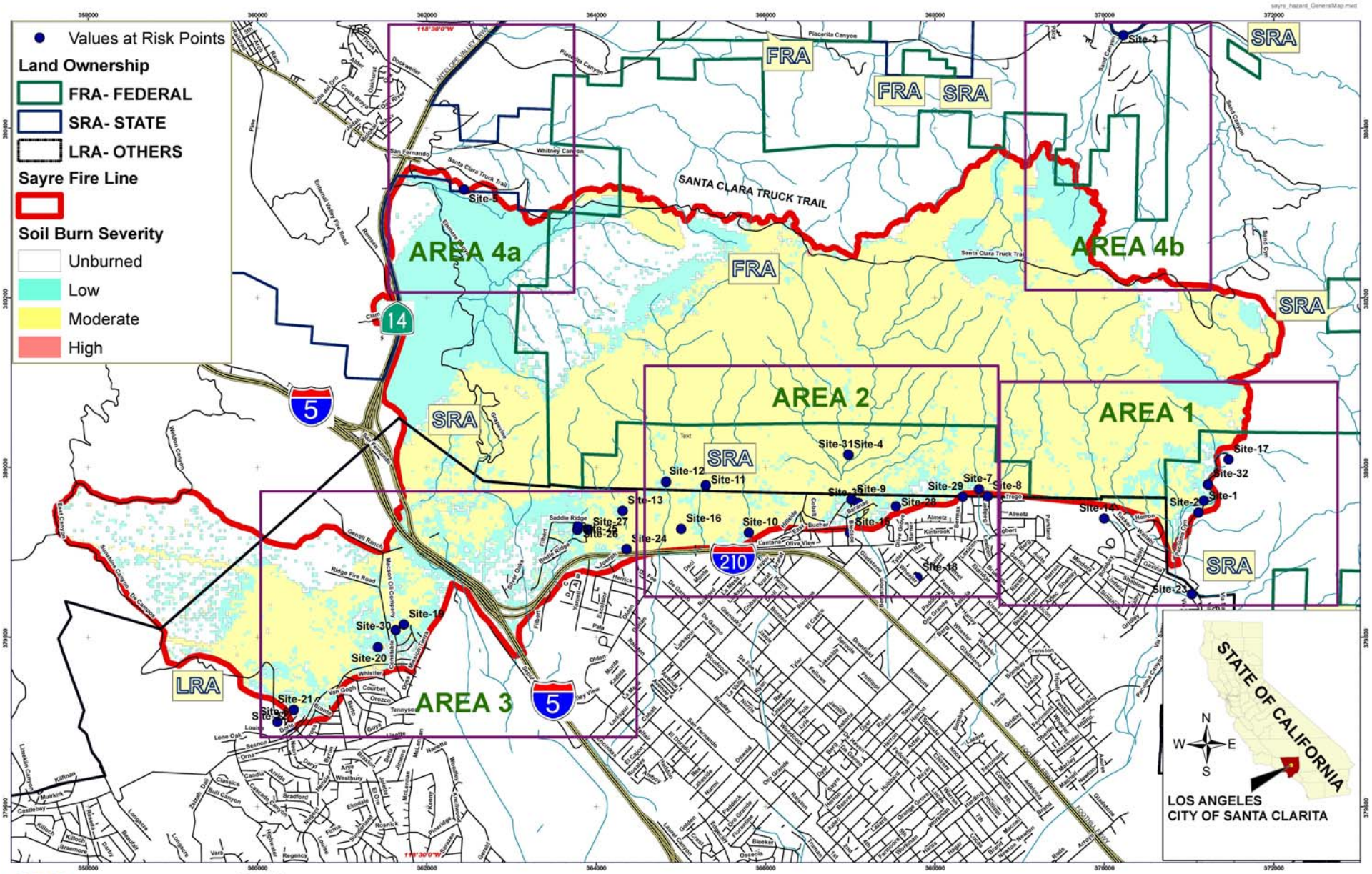

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Sayre Fire General Index Map

The Sayre Fire Perimeter data as of 11-20-08
The Soil Burn Severity was interpreted from the Burned Area Reflectance Classification (BARC).
BARC - A satellite-derived map of positive vegetation condition.
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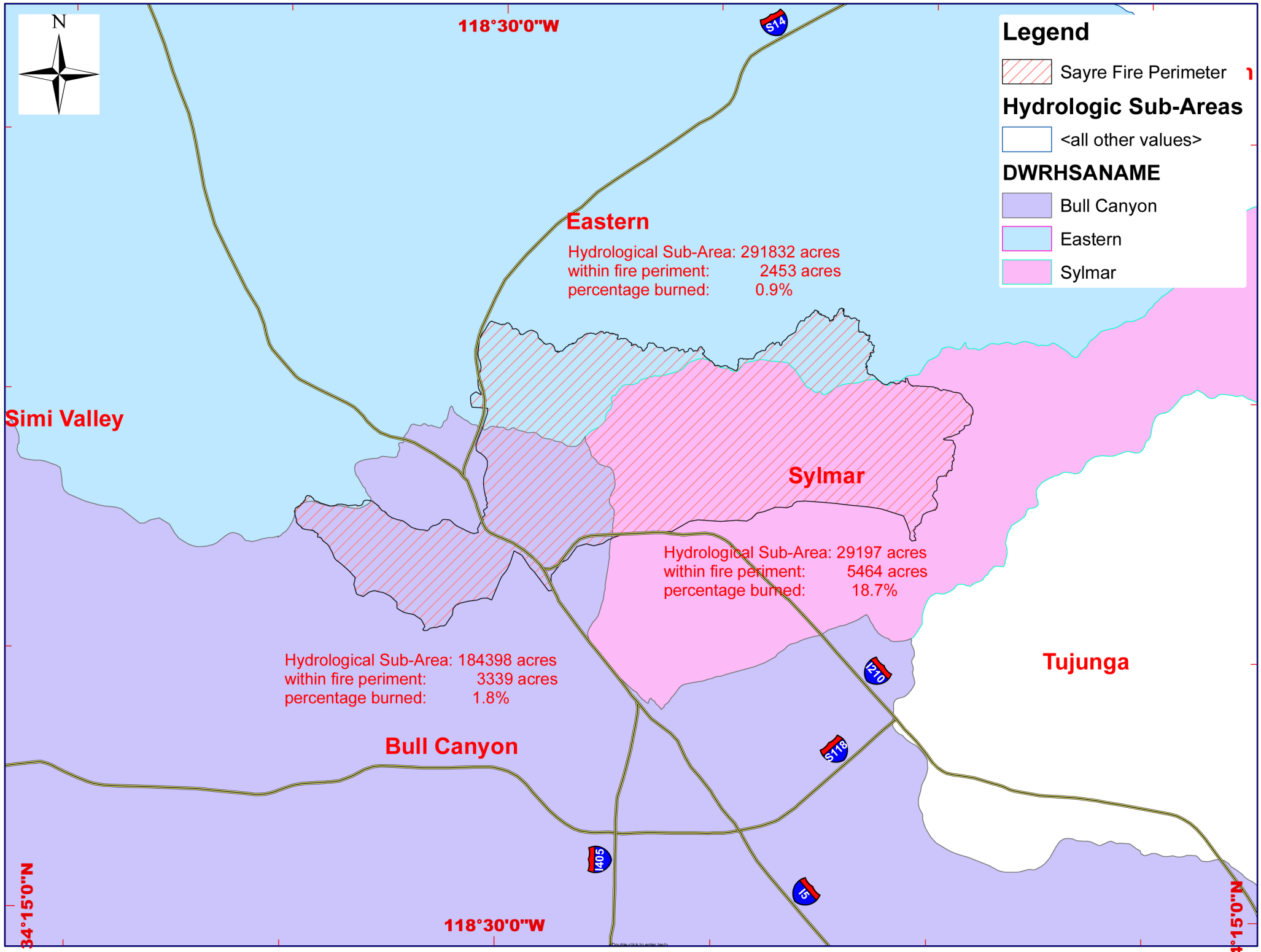

Map-2 Hydrological Sub-Areas Impacted Sayre Fire

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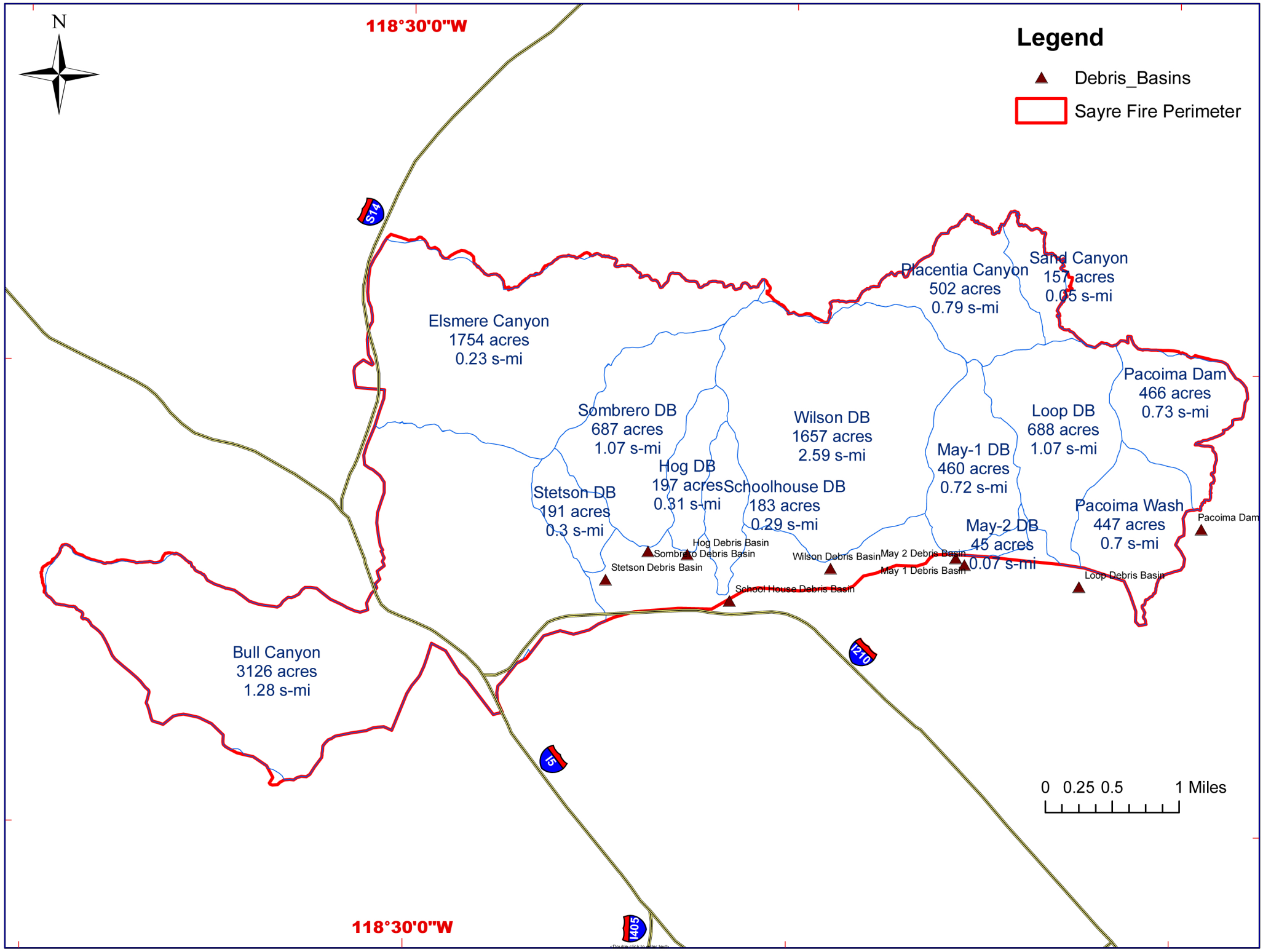
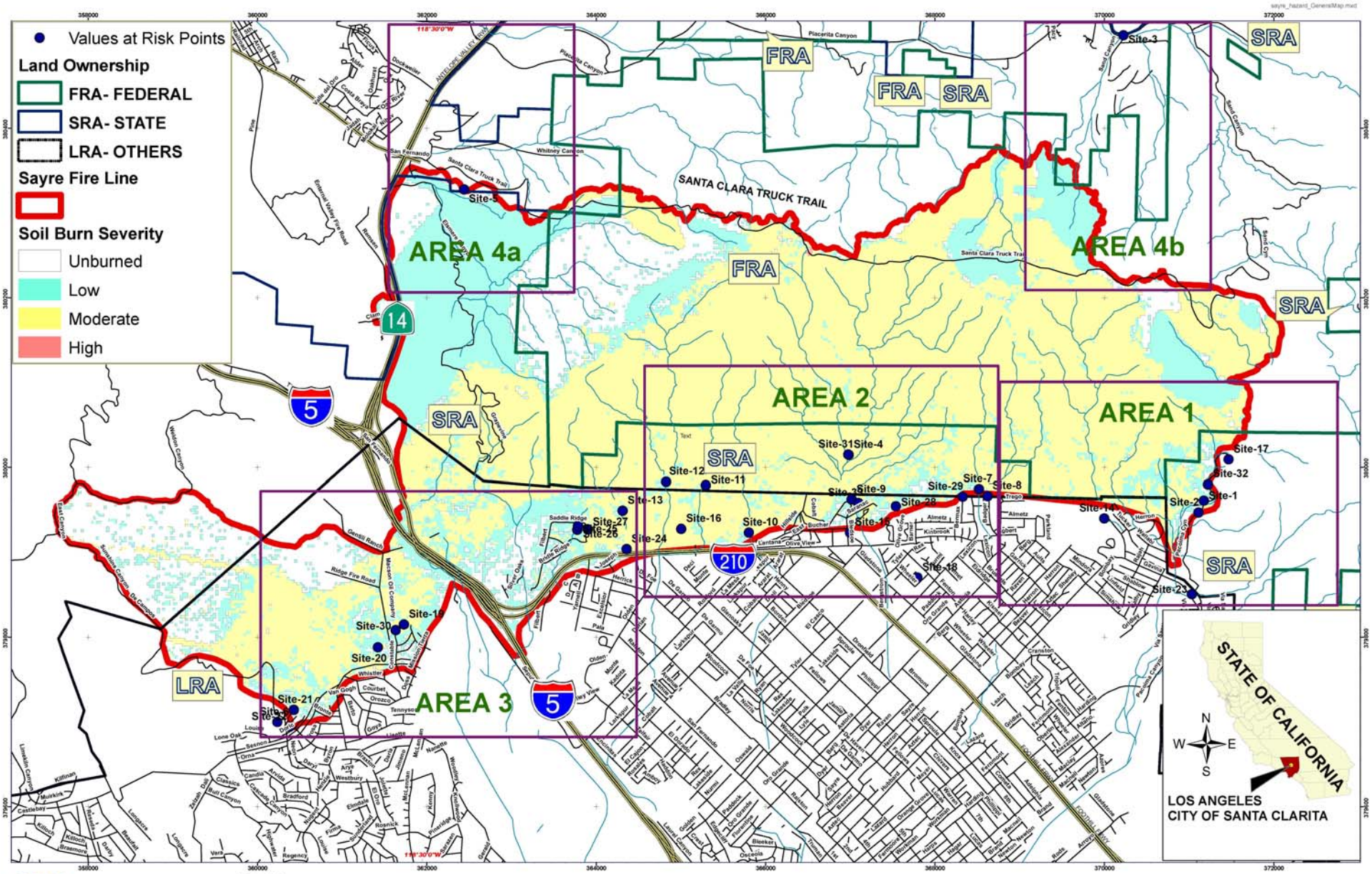


Map-3 Drainage Areas and Debris Basins in Sayre Fire Area



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Sayre Fire General Index Map

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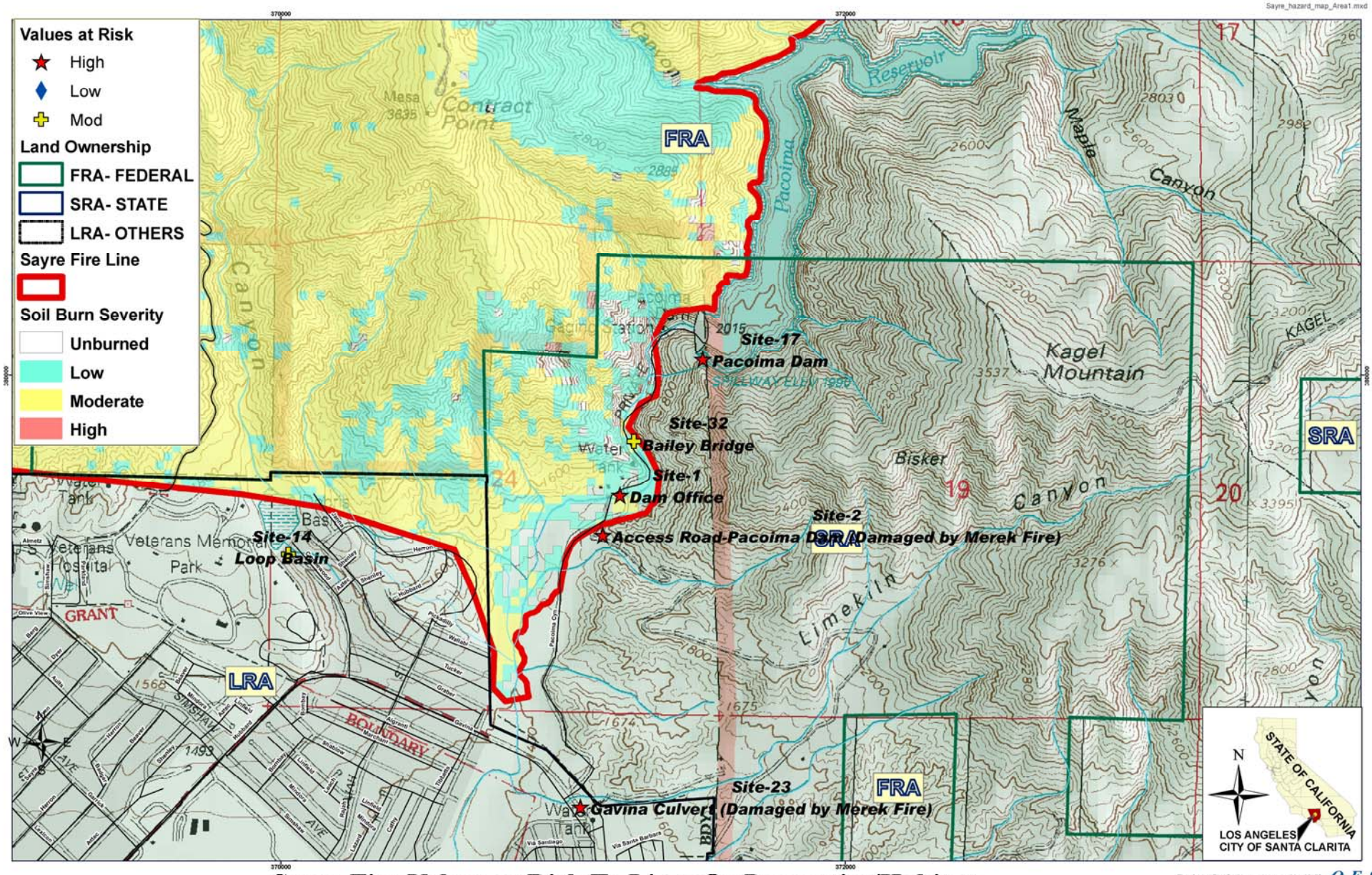

Sayre Fire Values at Risk To Lives Or Properties/Habitats
Site Area Map 1

The Sayre Fire Perimeter data as of 11-20-08
The Soil Burn Severity was interpreted from the Burned Area Reflectance Classification (BARC).
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BARC Map provided by Sayre BAER - David Collins
GIS Map prepared by7 State Governor's Office of Emergency Services on December 12, 2008.

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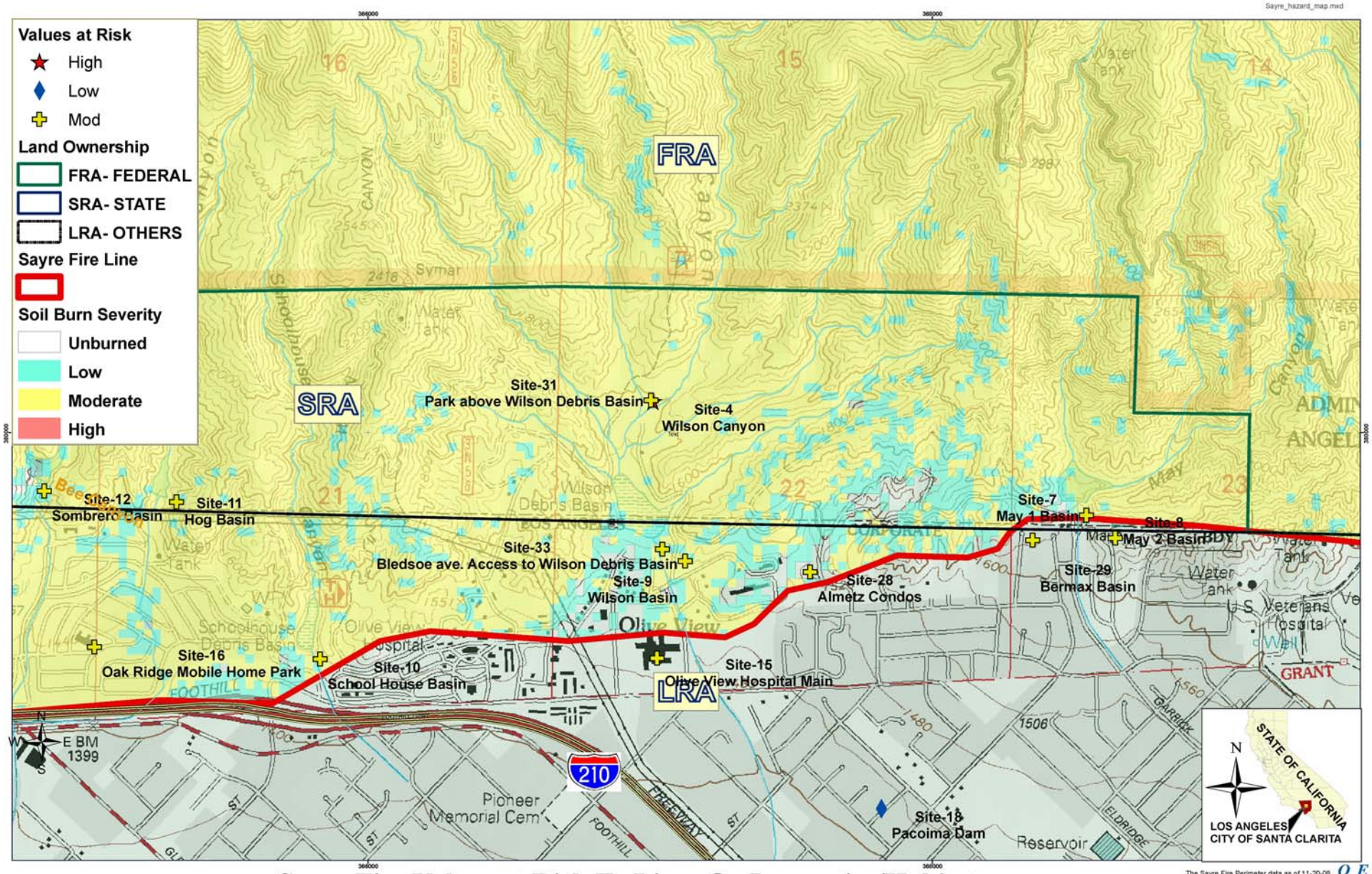

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Sayre Fire Values at Risk To Lives Or Properties/Habitats
Site Area Map 2

The Sayre Fire Perimeter data as of 11-20-08
The Soil Burn Severity was interpreted from the Burned Area Reflectance Classification (BARC).
BARC - A satellite-derived map of positive vegetation condition.
The BARC has four classes: high, moderate, low and unburned.

BARC Map provided by Sayre BAER - David Collins
GIS Map prepared by7 State Governor's Office of Emergency Services on December 12, 2008.

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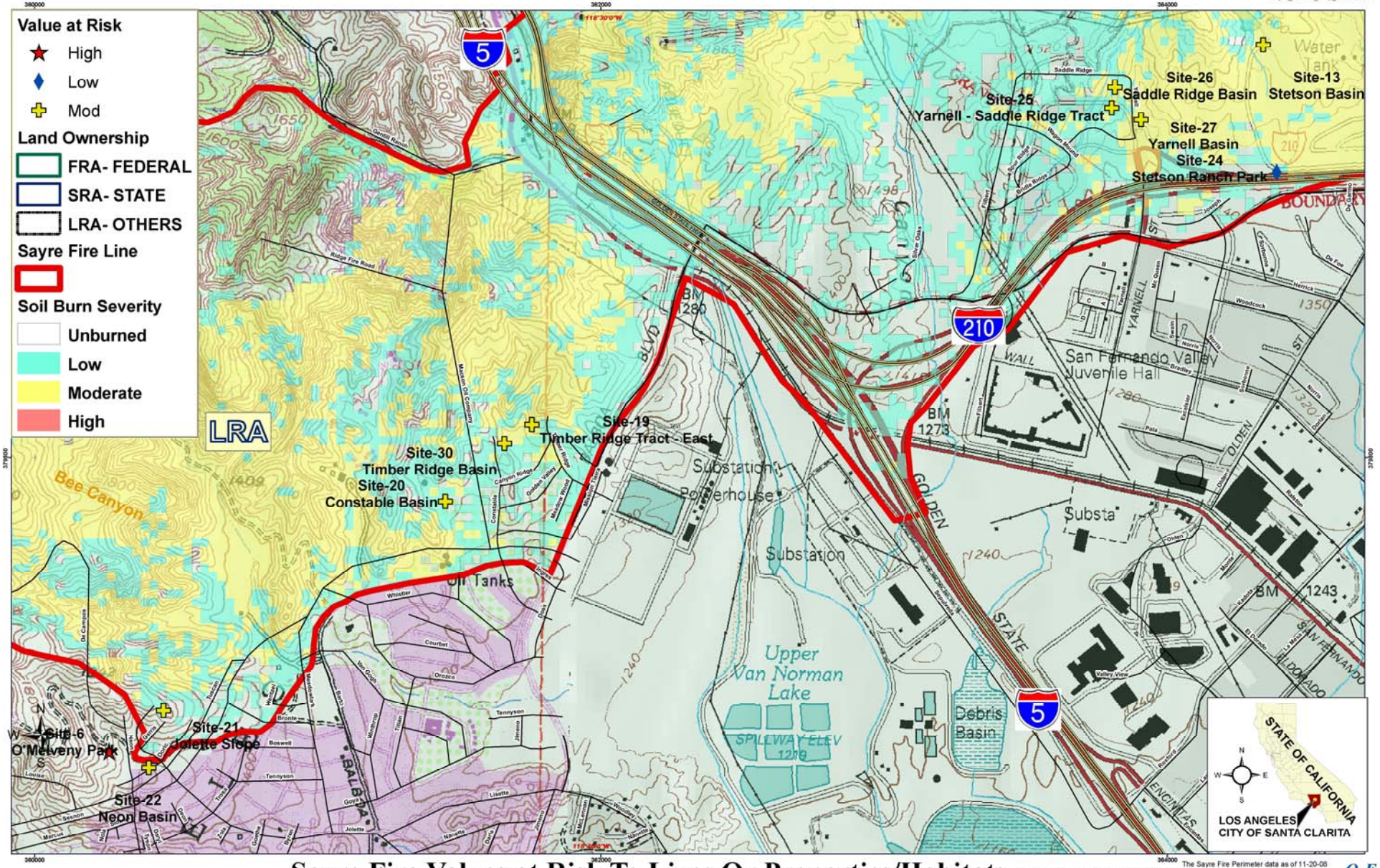

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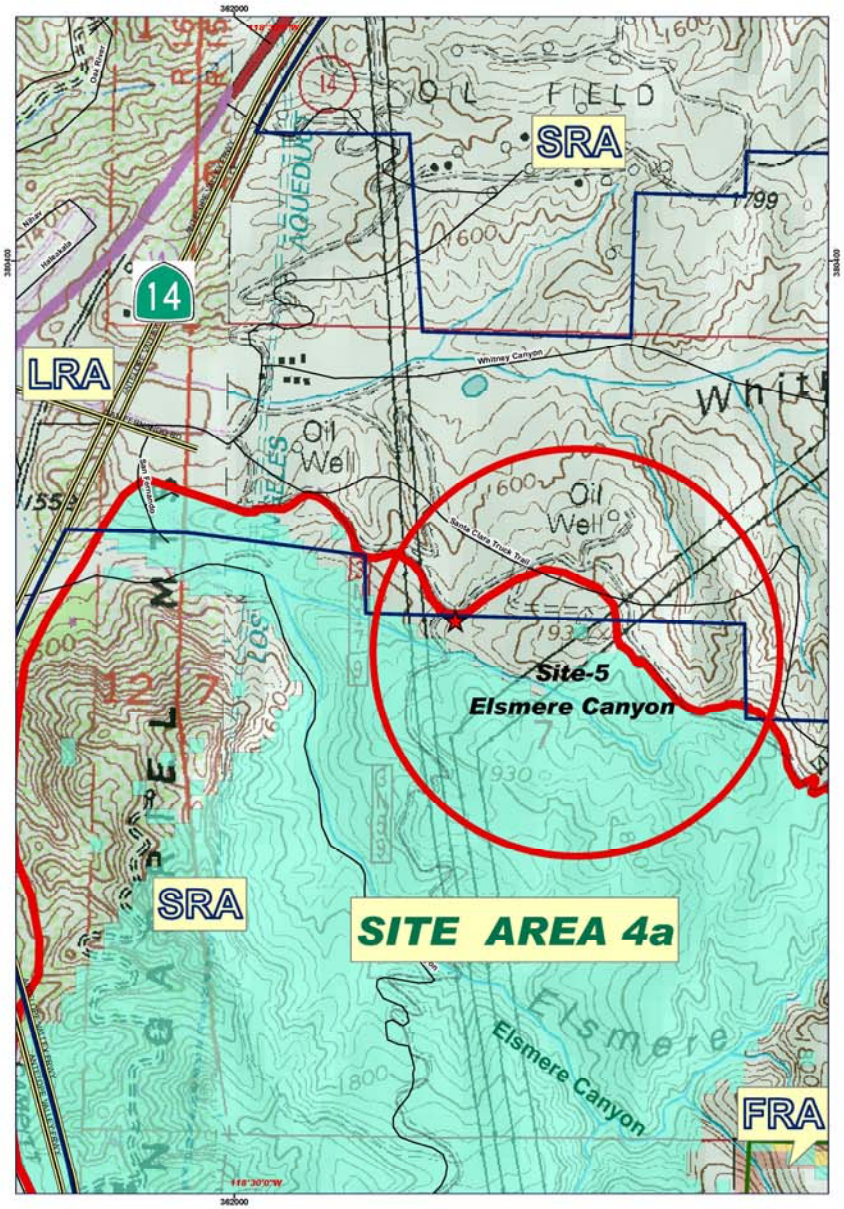
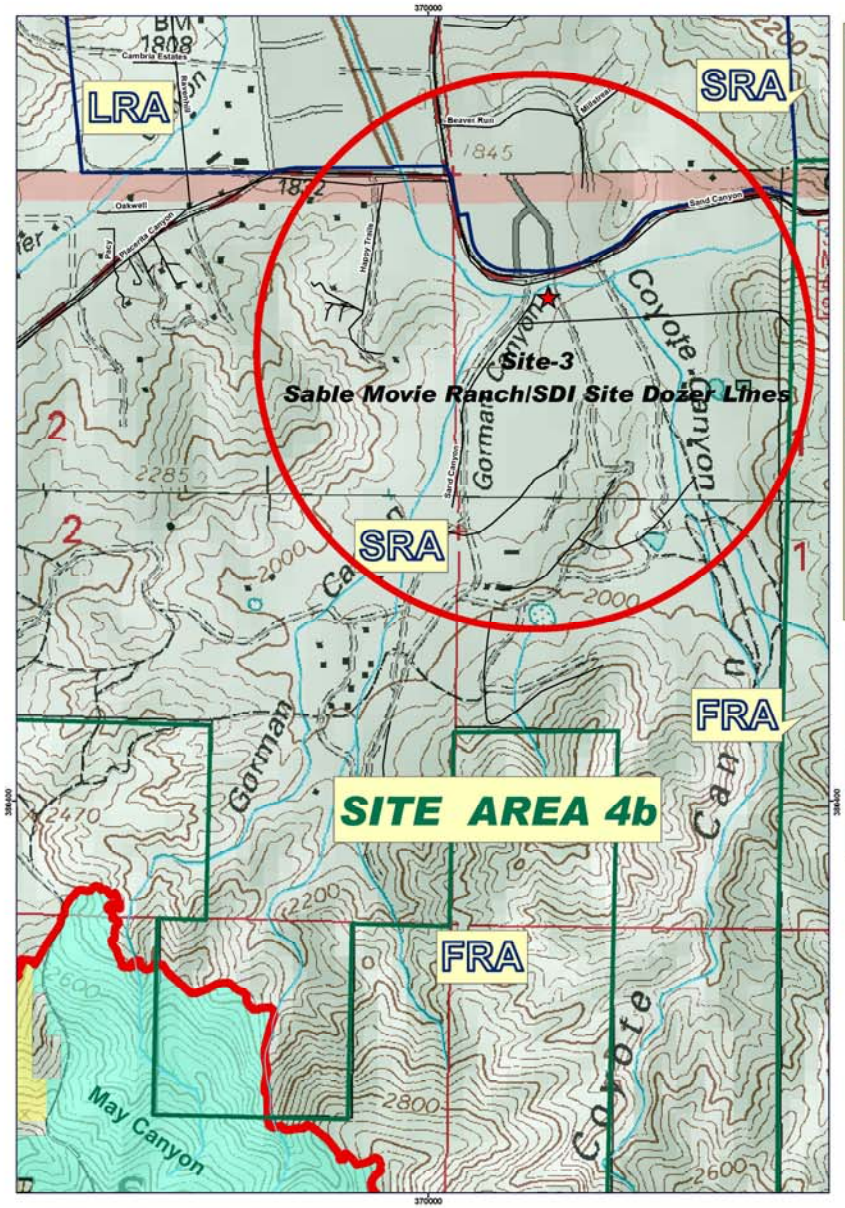
Sayre Fire Values at Risk To Lives Or Properties/Habitats
Site Area Map 3

The Sayre Fire Perimeter data as of 11-20-08
The Soil Burn Severity was interpreted from the Burned Area Reflectance Classification (BARC).
BARC - A satellite-derived map of positive vegetation condition.
The BARC has four classes: high, moderate, low and unburned.

BARC Map provided by Sayre BAER - David Collins
GIS Map prepared by7 State Governor's Office of Emergency Services on December 12, 2008.





Sayre_hazard_map_Area4.mxd

Values at Risk

- High
- Low
- Mod

Land Ownership

- FRA- FEDERAL
- SRA- STATE
- LRA- OTHERS

Sayre Fire Line

Soil Burn Severity

- Unburned
- Low
- Moderate
- High

1:5,000

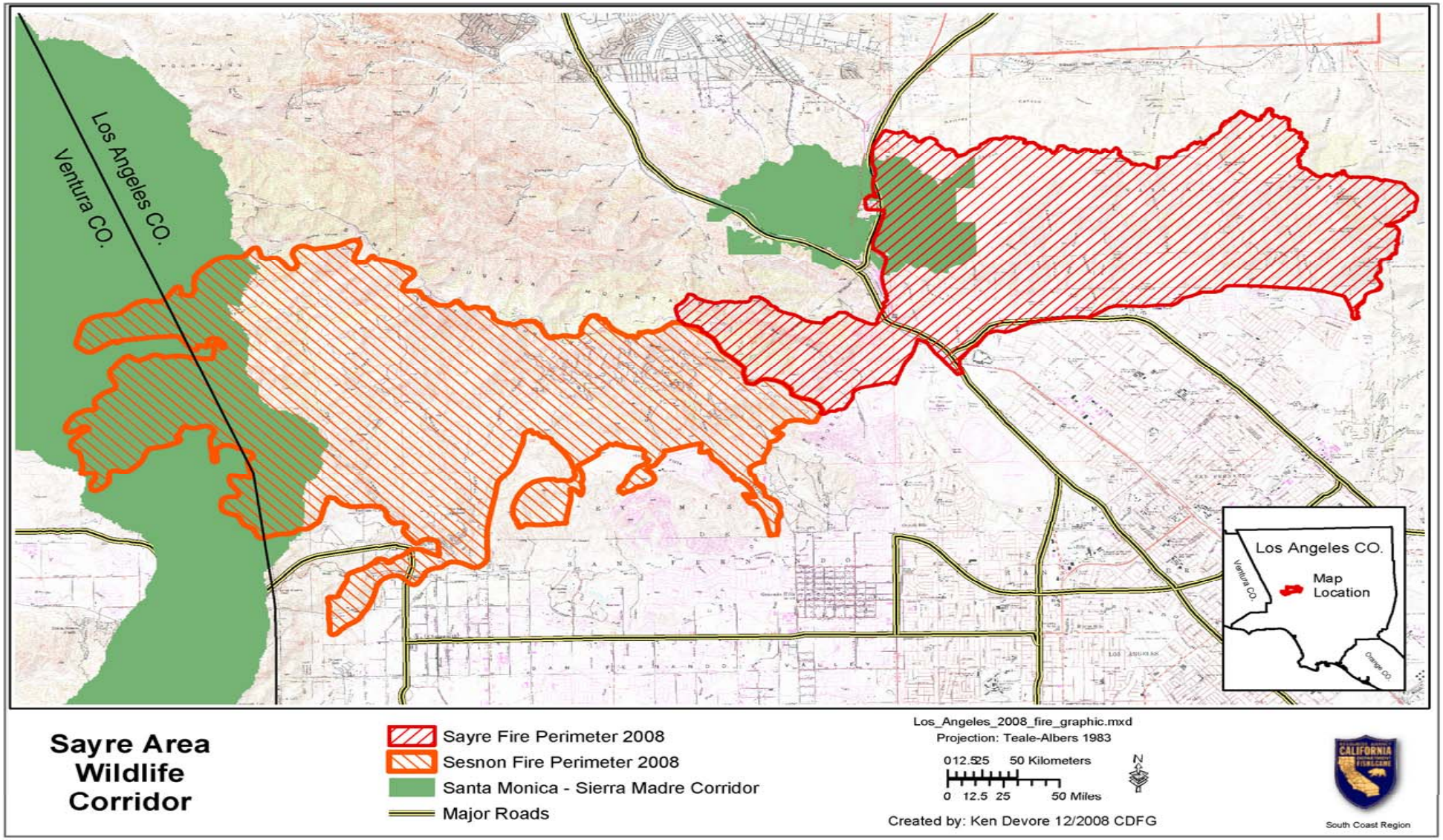
0.25 0.125 0 0.25 Miles

Sayre Fire Values at Risk To Lives Or Properties/Habitats
Site Area Map 4

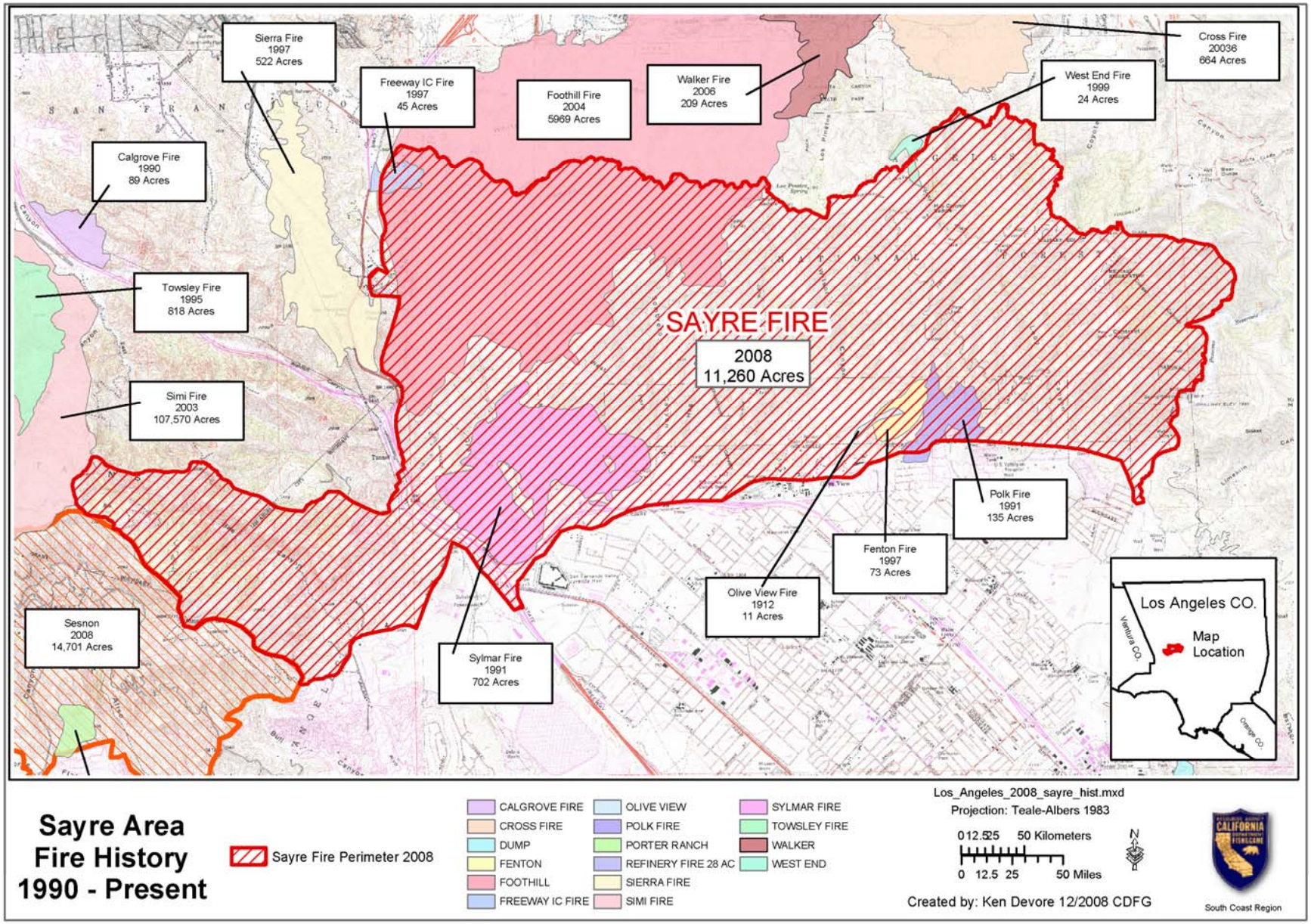
The Sayre Fire Perimeter data as of 11-20-08
The Soil Burn Severity was interpreted from the Burned Area Reflectance Classification (BARC).
BARC - A satellite-derived map of positive vegetation condition.
The BARC has four classes: high, moderate, low and unburned.

BARC Map provided by Sayre BAER - David Collins
GIS Map prepared by7 State Governor's Office of Emergency Services on December 12, 2008.

Appendix 11 Wildlife Corridor Map



Appendix 12 Fire History Map 1990 - 2008



Appendix 13. CNDDB List of California Terrestrial Natural Communities Recognized by the California Natural Diversity Database (modified where possible to conform)	Percent of Burn Area	Total Acreage
Urban/Other		
Nurseries	0.01	0.61
Urban-related Bare Soil	0.83	89
Urban	6.84	737.47
	7.68	***827.08***
Non-vegetated		
Water	0.09	9.3
Barren/Rock	1.09	117.32
	1.18	***126.62***
Shrubland		
Alluvial fan sage scrub	0.05	5.41
Buckwheat	0.47	50.82
Chamise Alliance	0.50	54.32
Scrub Oak	1.21	130.72
Soft Scrub - Mixed Chaparral	4.39	473.35
Sumac Shrub Alliance	3.16	340.11
California Sagebrush	17.16	1849.46
Lower Montane Mixed Chaparral Alliance	17.43	1878.86
Ceonothus Mixed Chaparral	28.82	3106.23
Total	***73.19***	***7889.28***
Hardwood Forest/Woodland		
Riparian Mixed Hardwoods	0.00	0.26
Riparian Mixed Shrub	0.00	0.12
Willow (Shrub)	0.03	3.6
Non-Native/Ornamental Hardwood	0.09	10.05
California Sycamore	0.12	12.67
Coastal Mixed hardwood	0.41	44.25
Eucalyptus	0.33	35.86
Black Walnut	0.29	31.42
Valley oak	0.50	53.66
Mixed hardwoods (non-productive)	1.46	157.19
Canyon live oak	1.75	188.81
Coast Live Oak	7.63	822.67
Total	***12.61***	***1360.56***
Conifer Forest/Woodland		
Coulter pine	0.13	14.27
Non-Native/Ornamental Conifer-Hardwood Mixture	0.23	25.31
Bigcone Douglas-Fir	0.94	100.95
Total	***1.30***	***140.53***
Grassland		
Non-Native/Ornamental Grass	1.08	116.1
Annual Grasses and Forbs	2.92	314.47
Total	***4.00***	***430.57***

Table–1: Burn Severity by the Hydrologic Sub Areas.

Hydrologic Sub Area Name	Bull Canyon	Sylmar	Eastern
Total Hydrologic Sub Area Acres	184398	29197	291832
Acres in Fire Perimeter	3339	5465	2453
Percentage within Fire Perimeter	1.8%	18.7%	0.9%
Acres Unburned	948	174	751
Acres Low Burn Severity	868	624	1190
Acres Moderate Burn Severity	1522	4663	508
Acres High Burn Severity	0	2	0

Table– 2: Burn Severity Summary for Drainage Areas

Drainage Name	Size		Burn Severity (in acres)			
	Acres	Square miles	Un-burned	Low	Mod	High
Pacoima Dam (total)	682	1.07	96	165	421	0
Pacoima Dam	465	0.73	59	165	241	0
Pacoima Dam (Marek)	217	0.34	37	0	180	0
Pacoima Wash	447	0.70	32	110	305	0
Loop DB	687	1.07	23	25	639	0
May-1 DB	460	0.72	1	22	437	0
May-2 DB	45	0.07	0	2	43	0
Wilson DB	1656	2.59	11	70	1575	2
Schoolhouse DB	183	0.29	0	8	175	0
Hog DB	197	0.31	0	2	195	0
Sombrero DB	687	1.07	15	89	582	0
Stetson DB	191	0.30	0	3	188	0
Bull Canyon	3126	4.88	950	861	1314	0
Sand Canyon	157	0.25	4	149	4	0
Placentia Canyon	502	0.79	27	140	335	0
Elsmere Canyon	1754	2.74	695	889	170	0

Table – 3: Peak Flows Increase for 2, 5 and 10-Years Storm Events
(in percentage of pre-fire peak flow)

Drainage Area	Q2	Q5	Q10
Pacoima Dam (total)	193%	146%	100%
Pacoima Dam	178%	139%	100%
Pacoima Dam (Marek)	224%	162%	100%
Pacoima Wash	202%	151%	100%
Loop DB	240%	170%	100%
May-1 DB	243%	172%	100%
May-2 DB	243%	171%	100%
Wilson DB	243%	171%	100%
Schoolhouse DB	243%	172%	100%
Hog DB	248%	174%	100%
Sombrero DB	227%	164%	100%
Stetson DB	248%	174%	100%
Bull Canyon	163%	132%	100%
Sand Canyon	178%	139%	100%
Placentia Canyon	224%	162%	100%
Elsmere Canyon	115%	107%	100%

Q2: The peak run-off rate after fire for a 2-year storm event (a storm event with a recurrence interval of 2 years; in this particular area – 2.7 to 3.1inches per 24 hour duration).
Q5: The peak run-off rate after fire for a 5-year storm event (a storm event with a recurrence interval of 2 years); in this particular area – 4.1 – 4.7 inches for 24 hour duration)
Q10: The peak run-off rate after fire for a 10-year storm event (a storm event with a recurrence interval of 2 years); in this particular area – 5.0 – 5.7 inches for 24 hour duration)

Table – 4: Sediment Load on Debris Basins

Debris Basin	Drain-age Area	Max Capa-city	DDE	2%	5%	10%
	Square miles	cy	cy	cy	cy	cy
May-1 DB	0.70	64,000	59,800	93,094	73,342	44,348
May-2 DB	0.09	13,000	12,500	9,107	7,174	4,338
Wilson DB	2.58	313,000	169,000	335,141	264,032	159,655
School -house DB	0.28	68,000	45,400	37,035	29,177	17,643
Hog DB	0.32	43,000	49,900	39,868	31,409	18,992
Som-brero DB	1.06	88,000	128,400	139,035	109,535	66,233
Stetso n DB	0.29	41,000	46,000	38,654	30,453	18,414

DDE: Los Angeles County Public Works Design Debris Event.

Table 5. Values potentially at risk within the fire perimeter

Common Name	Scientific Name	Status
California condor	*Gymnogyps californianus*	Federal endangered
California gnatcatcher	*Polioptila californica*	Federal threatened
western spadefoot toad	*Spea hammondii*	State Species of Concern
Sierra Madre yellow-legged frog (current nomenclature = mountain yellow legged frog)	*Rana muscosa*	Federal endangered
western mastiff bat	*Eumops perotis californicus*	State Species of Concern
San Diego fairy shrimp	*Branchinecta sandiegonensis*	Federal Endangered

Table 6. Potential values at risk immediately adjacent to fire perimeter

Common Name	Scientific Name	Status
monarch butterfly	*Danaus plexippus*	State Ranked S3
arroyo toad	*Bufo californicus*	Federal Endangered
silvery legless lizard	*Anniella pulchra pulchra*	State Species of Concern
southwestern pond turtle	*Actinemys marmorata pallida*	State Species of Concern
least Bell's vireo	*Vireo bellii pusilus*	Federal and State Endangered
Southwestern willow flycatcher	*Empidonax traillii extimus*	Federal and State Endangered
tricolored black bird	*Agelaius tricolor*	State Species of Concern
burrowing owl	*Athene cunicularia*	State Species of Concern
San Diego desert woodrat	*Neotoma lepida intermedia*	State Species of Concern
San Diego horned lizard	*Phrynosoma coronatum blainvillei*	State Species of Concern
American badger	*Taxidea taxus*	State Species of Concern; Focal Species of Santa Monica-Sierra Madre wildlife corridor

Table 7 Vegetation Communities within the Fire Impact Zone

Alias	PERCENTAGE	ACREAGE
Ceonothus Mixed Chaparral	28.82	3106.23
Lower Montane Mixed Chaparral Alliance	17.43	1878.86
California Sagebrush	17.16	1849.46
Coast Live Oak	7.63	822.67
Urban	6.84	737.47
Soft Scrub - Mixed Chaparral	4.39	473.35
Sumac Shrub Alliance	3.16	340.11
Annual Grasses and Forbs	2.92	314.47
Canyon live oak	1.75	188.81
Mixed hardwoods (non-productive)	1.46	157.19
Scrub Oak	1.21	130.72
Barren/Rock	1.09	117.32
Non-Native/Ornamental Grass	1.08	116.10
Bigcone Douglas-Fir	0.94	100.95
Urban-related Bare Soil	0.83	89.04
Chamise Alliance	0.50	54.32
Valley oak	0.50	53.66
Buckwheat	0.47	50.82
Coastal Mixed hardwood	0.41	44.25
Eucalyptus	0.33	35.86
Black Walnut	0.29	31.42
Non-Native/Ornamental Conifer-Hardwood Mixture	0.23	25.31
Coulter pine	0.13	14.27
California Sycamore	0.12	12.67
Non-Native/Ornamental Hardwood	0.09	10.05
Water	0.09	9.30
Alluvial fan sage scrub	0.05	5.41
Willow (Shrub)	0.03	3.60
Tule - Cattail	0.03	3.02
Nurseries	0.01	0.61
Riparian Mixed Hardwoods	0.00	0.26
Riparian Mixed Shrub	0.00	0.12

Table 8: Rare, Threatened, and Endangered Plants Potentially in the Sayre Fire Impact Area

Scientific Name	Common Name	Location within Fire	Status
Berberis nevinii	Nevin's barberry	Not Documented within burn impact area, however suitable habitat exists	FE, SE
Calochortus clavatus var. gracilis	slender mariposa-lily	southwest of I-5/ Hwy 14 split and in the southwest portion of the burn area, possibly O'Melveny Park	1B.2
Calochortus plummerae	Plummer's mariposa lily	CNDDB record for the southwest portion of the burn area from I-5/Hwy 14 split north through Placerita Cyn suitable habitat exists, possibly O'Melveny Park	1B.2
Dodecahema leptoceras	Slender-horned spineflower	CNDDB records exist for Pacoima Canyon Wash area below the dam and for the southwest portion of the burn area from I-5/Hwy 14 split north through Placerita Cyn suitable habitat exists	FC, SE
Symphyotrichum greatae	Greta's aster	Pacoima Canyon	1B.3
Malacothamnus davidsonii	Davidson's bush-mallow	CNDDB Record Pacoima Wash area below Dam, Loop Canyon, floodplain of Sand, Coyote, and Gorman Canyons, and from the general area of Grapevine/West Fork/Sobrero/Hog, Schoolhouse south to San Fernando Valley Juvenile Hall	1B.2
Opuntia basilaris var. brachycla	Short-joint beavertail	Suitable habitat exists on National Forest Land, no known locations	1B.2
Orcuttia californica	California Orcutt grass	CNDDB record for the southwest portion of the burn area from I-5/Hwy 14 split north through Placerita Cyn suitable habitat exists, possibly O'Melveny Park	FE, SE
California Walnut Woodland	California Walnut Woodland	Within National Forest Land along Santa Clara Truck Trail	N/A
Vernal Pool	Vernal Pool	O'Melvany Park	N/A
Southern Coast Live Oak Riparian Forest	S. Coast Live Oak Riparian Forest	Upper Grapevine Cyn, Sombrero Cyn, Wilson Cyn, Coyote Cyn, Sand Cyn, Whitney Cyn, and south of Weldon Cyn.	N/A
Southern Cottonwood Willow Riparian Forest	S. Cottonwood Willow Riparian Forest	Pacoima Canyon	N/A
Southern Sycamore Alder Riparian Woodland	S. Sycamore Alder Riparian Woodland	Sand Canyon and Placerita Canyon	N/A

FE= Federally Endangered, FC= Federal Candidate, SE= State Endangered, SR= State Rare
California Native Plant Society (2008) Lists:

1B= rare, threatened, endangered in California and elsewhere
2= rare, threatened, or endangered in California, but more common elsewhere
4= limited distribution (watch list)
0.1= seriously endangered in California
0.2= fairly endangered in California
0.3= not very endangered in California

Table 9. Invasive Weeds Observed In and Adjacent to the Sayre Fire

Scientific Name	Common Name
Centaurea solstitialis	Yellow Star Thistle
Arundo donax	Giant Reed
Centaurea melitensis	Tocalote (not a Cal-IPPC invasive)
Piptatherum miliaceum	Smilo grass
Erodium cicutarium	Red-stemmed Filaree
Eucalyptus spp.	Eucalyptus
Salsola tragus	Russian Thistle
Schinus molle	Peruvian Pepper
Nicotiana glauca	Tree Tobacco
Hirschfeldia incana	Shortpod mustard
Spartium junceum	Spanish broom
Washingtonia robusta	Mexican Fan Palm
Robinia pseudoacacia	Black locust
Ailanthus altissima	Tree of heaven
Cortaderia selloana	Pampas grass
Pennisetum spp.	Purple fountain grass
Cynara cardunculus	Artichoke Thistle
Ricinus communis	Castor Bean
Avena fatua.	Wild oat
Brassica nigra	Black Mustard
Bromus spp (3 species).	Annual Grasses