INTERAGENCY STATE
BURNED AREA EMERGENCY RESPONSE
(BAER) REPORT-Team 7

CANYON FIRE

Affecting watersheds in the
County of Los Angeles, California

NON - CONFIDENTIAL

DRAFT

November 16, 2007

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STATE INTERAGENCY
BURNED AREA EMERGENCY RESPONSE (BAER) REPORT
CANYON FIRE, BAER TEAM #7
Affecting watersheds in Los Angeles County, California
November 16, 2007

Executive Summary

In the early morning of October 21, 2007 the Canyon Fire started on Malibu Canyon Road, 1 mile south of the Malibu Canyon Road tunnel. 60 mph Santa Ana winds and low humidity drove the fire throughout the affected watersheds. Fire suppression resources were successful in protecting over 800 residences and businesses, a major university, and thousands of additional acres of public land. However, the fire did consume several residences and the majority of vegetation on over 4,300 acres in portions of 4 watersheds of the Santa Monica Mountains.

Even casual observation of this post-fire landscape would suggest that the potential for significant adverse impacts is high due to the combined effects of rugged terrain, erosive soils and frequent fire history. The purpose of the BAER post fire assessment is to provide a rapid scientific assessment in order to identify and mitigate potential hazards to life, property, or resources and supplement assessment efforts already underway in the areas impacted by the fire.

BAER Team #7 was activated on Sunday, November 4th, 2007 and dispatched to the Canyon Fire location. The team consists of the following professional technical specialists:

Alex Alimohammadi, Engineering
John Ekhoff, Botany
Larry Felton, Archaeology
Tim Hovey, Fisheries
Mike Manson, Geology
John Munn, Soils
Ruth Norman, Forestry
Wendy Snyder, Team Leader
Robert Burns, GIS (maps)
Kevin Taylor, Hydrology
Wenhau Yu, Environmental Engineering

These team members were supported by their respective employers: California Department of Forestry and Fire Protection, California Geological Survey, California State Parks, California Department of Fish and Game, California Department of Water Resources, and Los Angeles Regional Water Quality Control Board,

Team members conducted background scoping, field examinations, and made contact with local and governmental entities where ever possible over a two week period. The team was fortunate to attend a "stakeholder" meeting where many of these entities were represented and who later provided information, resources, field tours, and most importantly, their valuable time. BAER Team #7 thanks the following groups:

California Department of Transportation
California State Parks
City of Malibu Emergency Services
City of Malibu Public Works
Los Angeles County Fire
Los Angeles County Public Works
National Park Service

There were several unique elements to consider during the Canyon Fire assessment:

1. Although there appears to be consensus in the local scientific and governmental communities that future significant rain events would mobilize debris (soil, rock, vegetation), there is a broad range of opinion regarding the magnitude of the effect. Therefore, BAER Team #7 conducted their assessment under the assumption of a "reasonable" worst case scenario.
2. The pre-fire condition of the watersheds already included possible risk from landslides, debris flows and rock falls. These hazards are part of the natural processes in this environment, and were present under pre-fire conditions. This situation increases the difficulty in isolating the effects associated specifically with the fire from those pre-existing conditions.
3. Within the fire perimeter, the watersheds contain a myriad of unique and adaptive drainage systems for surface runoff and potential debris flows. It is challenging to ascertain the carrying capacity and effectiveness of those unique designs. Anecdotal comments by local residents and governmental agencies indicate that residents of the area have "learned to live with fire and flood."
4. Fire and flood are historical component of the Malibu and Canyon Fire area as evidenced by 4 fires in the past 10 years, in some cases followed by flooding. As such, local governments and private landowners have been active for many years in cooperative post fire assessments, mitigation or treatments, predictive modeling of mudflows, etc. Many of the observations and recommendations found in this report may be redundant with those already included in other efforts. Please see Appendix 8 for government contacts should further information on their assessments is needed.

The following table highlights those observations, recommendations, and mitigations from BAER Team #7 report and the individual technical specialist reports which seem most noteworthy. Please refer to those documents for more detail and additional observations and recommendations.

Public Safety and Private Residences	**Recommendation/Mitigation**
▪ Five occupied structures (four homes and an office building) identified by a CEG. Potentially one additional occupied structure identified by non-CEG team members.	▪ Site evaluation by Professional Geologists or Professional Engineers with experience in slope stability and debris flow hazard identification and mitigation ▪ The LA County Flood Control District, Department of Public Works and Fire Department, the State Parks Department and Office of Emergency Services, the NRCS and any other responsible party should be made aware of the potential hazard to lives and property in the fire area.
▪ Recreational locations	▪ Campgrounds and hiking trails should be signed and closed as needed by the responsible agencies to protect campers and hikers. ▪ Notifications
▪ Use of the drainages, including under bridges within the City limits, for unpermitted "camping" (possibly homeless individuals)	▪ Remove all debris from the inlets.
▪ Roads - Potential for water and debris on roads which may lead to vehicle	▪ Inspection of drainage pipe to determine what, if any, repair is necessary and

accidents and possible damage to the road surface. Malibu Canyon Road near the entrance to Pepperdine University.	reconstruct the basin to accommodate runoff. ▪ Existing road drainage systems should be inspected by the appropriate controlling agency to evaluate potential impacts from floods, hyperconcentrated floods debris torrents, debris flows and sedimentation resulting from winter rains.
▪ **Water Quality -** Potential for ash and fine sediment to adversely affect water quality in Malibu Creek and other watercourses.	▪ Clean existing catchment structures and construct de-silting basins in all canyons. ▪ Monitor water quality and stream habitat.
▪ **Aquatic Species** – Loss of aquatic/riparian habitat from noxious weed introduction, increased access and sedimentation. Anadromous species in Malibu Creek.	▪ Sediment deposition assessment. ▪ Monitor fisheries habitat for the protection of listed aquatic species.
▪ **Plant communities -** Long-term habitat degradation, and increase in future fire danger from exotic species.	▪ Eradication or control of non-native noxious plant species.

RESOURCE CONDITIONS ASSESSMENT

Resource Setting

The Canyon Fire burned in an area of steep, sloping, highly dissected mountains with a maximum elevation change of about 2,500 feet from ridge crest to sea level over a distance of only 2 ½ miles (see the "Shaded Relief Map"). In the upper watershed areas, rock outcrops and cliff faces are common, and slope gradient along steeply sloping canyon walls often exceeds 80 percent. Near the ocean are areas of flat and gently sloping terrain. The mountainous portion for the burn area drains into south-flowing watercourses that discharge into the Pacific Ocean at Malibu.

Highway 1, a major artery and a designated State Scenic Highway, runs along the burned area through the City of Malibu and was crossed by the fire in one location. Malibu Canyon Road (County Road N9), a major north/south route connecting Highway 1 with Highway 101, runs through the burned area for a distance of approximately three miles. The City of Malibu straddles Highway 1 and the lower portion of Malibu Canyon Road. Many homes are in the urban/wildland interface as well as scattered throughout the watersheds. Several homes were damaged or destroyed in the fire which burned well into the City limits.

There are four major watersheds within the burned area and/or areas impacted by the bulldozer fire line associated with the fire suppression efforts (see "CalWater Watersheds" map). Starting west of the fire perimeter and moving east is Corral Creek watershed which includes one of the bulldozer fire lines outside of the burn perimeter as well as Pepperdine University and Winter Canyon (the 116 acre watershed on the "Watersheds of Interest" map) within the burned area. Moving to the east is Monte Nido watershed which includes Malibu Canyon. Further east is the Carbon Canyon watershed which includes Sweetwater Canyon (the 408 acre watershed on the "Watersheds of Interest" map). Las Flores watershed is on the eastern edge of the fire impacted area and includes the other bulldozer fire line (outside of the fire perimeter).

The vegetation included mixed chaparral and coastal sage scrub on the slopes and riparian plant communities in the riparian areas. Many non-native invasive weed species are common. The watershed did not support any significant areas of forest. Southern steelhead (a species listed as federally endangered) are found in the lower portion of Malibu Creek and the introduced tidewater goby (also a species listed as federally endangered) are found in the lagoon at the mouth of Malibu Creek. Historic and prehistoric cultural resources are discussed in a confidential report. Please refer to Appendix 6 for further discussion.

The Canyon Fire area was previously burned in 1993. This was followed by a large storm in 1995 with very high stream flows and sediment production. Portions of the fire area burned again in 1998. Record rainfall in 2006 produced large stream flows (Richard Calvin, personal communication, 2007). Erosion processes at work in the fire area include rock falls, raveling of weathered rock fragments on steep slopes, sheet and rill erosion on exposed soil surfaces, gully erosion from concentrated runoff, debris flows and torrents from accumulated sediments in draws and stream channels, and landslides in areas of deeply weathered rock or on the margins of large, old slide deposits. Prior to the fire, vegetation and soil properties provided a moderating influence on flow regimes. Vegetation and ground litter intercepted rainfall slowing its delivery to soils and protecting the soil surface from splash erosion. Unburned soils soak up moisture more readily than soils in burned areas. The recent series of fires and high flows described above removed some of the sediment that would otherwise have been available for transport from draws and in stream channels, which is likely to reduce the frequency of debris flows and torrents after the Canyon Fire. However, there is still a potential for large storms to initiate new erosion that leads to debris flows or direct impacts to structures.

For more detailed descriptions of the setting see the attached reports that focus on specific resources.

Findings

The 4,329 acre Canyon Fire burned with varying severities. Within the fire perimeter 8% of the area was characterized as high burn severity, 62% moderate burn severity, 13% low burn severity, 17% was unburned.[1] See the "Soil Burn Severity Map." The areas of high burn severity will be driving many of the significant potential impacts due to loss of vegetative cover and changes in soil characteristics. Fire increases runoff by removing surface litter and plant materials that hold water on the slope. It also can vaporize waxy substances from plant materials that condense on soil particles to form water repellent conditions. These changes can lead to very large increases in stream flows that mobilize sediment accumulated on hillsides, in draws, and in stream channels. In the steep, relatively short watersheds covering most of the currently burned area, runoff is rapidly accumulated and transported, which gives little time for downstream preparation and warning once a storm begins.

It has been noted that 22 structures were damaged or destroyed in the fire, including a church and a local landmark known as "The Castle". However, most of the affected area is undeveloped steep and rocky slopes rising above the City of Malibu to the ridge. Approximately 51% of the burned area is LA County responsibility area (mostly undeveloped Conservancy land), 26% State Park land, 22% City of Malibu responsibility area with an incidental amount of National Park Service responsibility land (percentages from NRCS). In these wildland areas, much of the upland plant communities have been providing valuable soil protection and wildlife habitat. These upland plant communities were generally found in the areas that experienced high and moderate burn severity. In most areas the habitat was completely consumed by the fire. The riparian zone is the smallest plant community in the affected area, but provides the greatest habitat value for both terrestrial and aquatic species. The riparian plant communities were generally within the areas of low burn severity, however most of the understory burned.

The burned landscape has revealed many features previously obscured by vegetation. Noted during the field evaluations were existing erosional features, gullies and channels, some with unstable banks. Increased flows resulting from the removal of the vegetation and the water repellent nature of the burned soils in the high and moderate burn severity areas will accelerate erosion in these features. Near the limits of the City of Malibu structures have been built to channel the flows from the upland areas through the City and under city streets, County roads and Highway 1 to the Pacific Ocean. The capacity of these structures may be overwhelmed by increased flows. These flows may be impeded by material (vegetation and rock) swept down in high flows during major precipitation events. It has been noted that the highest rates of prefire erosion are where there have been human activities (road construction, slope modifications for buildings and driveways, etc). Removal of vegetation by the fire will increase impacts in these areas. Ash and loose material that washes from the slopes will degrade water quality to some extent. In addition, erosional features function as corridors and sources for invasive, non-native species that can disrupt ecosystems and degrade wildlife habitat. They also have the potential to damage cultural resources (historic and prehistoric archaeological sites).

Ridges to the east and west of the burned area, while not directly effected by the fire, were impacted by reopening and/or development of fire breaks. (See the "Locations of Data Collected by Specialist" map for locations of the fire breaks.) These fire breaks are bulldozed paths along ridgelines designed to stop the spread of the fire to other drainages. Due to the nature of wind-driven fires, these lines are often built but not needed, as weather changes or other factors allow containment of the fire before it reaches these lines. Aerial photography and other documentation shows these ridges have been used in the past as fire breaks. It appears that lines were widened dramatically for the Canyon Fire. Bulldozer cleared lines in some areas approached a width of 200 feet.

[1] Burn severity classes were determined using USDA Forest Service criteria (Frazier 1989). The high severity burn class is identified in the field by soils that are strongly water repellent (water does not soak into soil in less than 40 seconds), less than 20% organic material (litter duff, woody debris) remains on the soil surface and vegetation is consumed by fire (no leaves remaining on trees and shrubs, grasses and forbs burned completely). The moderate severity burn class is identified by soils that repel water for 10-40 seconds, organic material remains on 20%-50% of the soil surface, leaves on trees and shrubs are scorched and grasses and forbs mostly consumed. The low severity burn class is identified by soils that repel water for less than 10 seconds, more than 50% organic material remains on the soil surface and nearly all of the crowns of trees and shrubs remain green.

EMERGENCY DETERMINATION, TREATMENT, RECOMMENDATIONS

Threats to Life

Five occupied structures (four homes and an office building) were identified by the Certified Engineering Geologist on Team #7 as presenting a high potential for threat to life, these properties also present a high risk to property. An additional residence was identified by team members (none of whom are Certified Engineering Geologists) as likely to pose a similar concern with respect to both life and property. Email communication with a Certified Engineering Geologist lead to including the property in the list below, but it has not been visited by a geologist for the purposes of this report.

CONFIDENTIAL INFORMATION

The structures evaluated by the Certified Engineering Geologist are labeled MM 101, MM 103, MM105, MM 106 and MM 107 on the "Recommended Mitigations for Fire Related Risks" Map. The two structures on the Pacific Coast Highway are also depicted on the "Subset of Recommended Mitigations for Fire Related Risks" map as points MM 106 and MM 107. The property not evaluated by a geologist is labeled "House" on the "Recommended Mitigations for Fire Related Risks" Map.

Specific treatment recommendations for all of these structures is beyond the expertise of the team and scope of this process. The California Geological Survey has a procedure for notification of the owners/residents of those structures the Certified Engineering Geologist visited the first five properties and described their findings. It is recommended that these sites (including the one not visited by a geologist) be evaluated by Professional 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.

In addition, the team also identified use of the drainages (i.e. under bridges) within the city limits, for unpermitted camping (possibly homeless individuals) as a potential area of concern. These are summarized below and addressed in greater detail in specific reports.

- Unpermitted camping in drainages and under bridges within city limits exposes individuals to the risk of entrapment by flood water and/or debris flows in the channels.

No specific treatment is likely to prevent this usage of the drainages. Signs warning of the hazard in the drainages could be posted (it would be necessary for them to be posted in the languages of the individuals most likely to use these areas). Fencing to prevent access is not recommended as it could impede the flow of water and passage of debris. Prior to significant predicted rainfall events likely camping areas should be visited by the appropriate local agencies and campers warned to leave or be physically removed, as appropriate.

Notification of those likely to be impacted is key in all of the above situations.

Threats to Property

The six occupied structures (five homes and an office building) described above under the heading "Threat to Life" also represent a high potential for threat to property.

In addition, The team identified a location on Malibu Canyon Road (just north of where Winter Canyon crosses the road) as a threat to property.

- Potential for water and debris on the road may lead to vehicle accidents and possible damage to the road surface. The specific location of concern is on Malibu Canyon Road near the entrance to Pepperdine University, just north of where Winter Canyon crosses the road. At this location it appears a catchment basin has been filled with sediment and the drainage pipe under the road buried. Other roads may present similar problems of lesser degree.

Recommended treatment is removal of all debris from the inlet; inspection of the drainage pipe to determine what, if any, repair is necessary and reconstruction of the basin to accommodate expected flow and sediment deposition. This should be followed by maintenance as necessary to maintain capacity. Costs are likely to be significant, but can not be determined without some excavation of the existing buried pipe to assess its condition.

For roads in and downstream of the burned area, the existing road drainage systems should be inspected by the appropriate controlling agencies to evaluate potential impacts from floods, hyperconcentrated flood, debris torrents, debris flows and sedimentation resulting from winter rains.

Threats to Resources

Resource values that are threatened include; cultural resources, water quality, fisheries and watershed ecosystems.

- There is a potential threat to water quality.
- There is a need to monitor fisheries habitat for the protection of listed aquatic species.
- There is an increased potential for long-term habitat degradation due to non-native plant species. Presently there is documented, on-going vegetation type conversion caused by more frequent fire occurrence in the presence of these exotic plant species, many of which are flash fuels. Invasive non-native species also crowd out the native species changing many ecosystem functions and increasing the potential wildland fires in the future.

Impacts to water quality include increases in sediment carried by runoff (moderate to high flows), increases in turbidity (clarity of the water), and changes in chemical composition. Sedimentation and turbidity can be addressed by cleaning existing catchment structures and constructing desilting basins in all canyons. These basins should be properly designed to prevent debris and sediment delivery to downstream waters and the Pacific Ocean. There are decommissioned basins in Carbon Canyon, constructed after the 1993 fire and later breached apparently to avoid maintenance issues. Due to the burn severity in Carbon Canyon and the likely debris flows resulting from a significant precipitation event these debris basins need to be reinstalled. Any work undertaken should be monitored for effectiveness.

Monitoring of water quality and stream habitat is necessary to detect changes that could endanger the populations of listed aquatic species (southern steelhead trout and tidewater goby) in Malibu Canyon and the

lagoon. Following the first winter period, a sedimentation deposition assessment is needed to further assess the fire's impact on the habitat for these species.

Selected species of invading plants, focusing on the riparian plant community and locations associated with erosion features, needs to be treated for eradication or control of non-native noxious plant species. While these species are becoming established or resprouting the period shortly after the fire presents the best opportunity for effective control. Any eradication or control efforts should be followed by monitoring for effectiveness.

DISCUSSION, SUMMARY, RECOMMENDATIONS

This synopsis of the specialist's reports has identified 12 emergency issues of which six are associated with both life and property. There was an additional issue specific to human life and one specific to property. The remaining four issues dealt with urgent resources issues; water quality, fisheries and habitat protection. There are many additional issues contained in the individual specialist's reports, each of which should be carefully reviewed and considered.

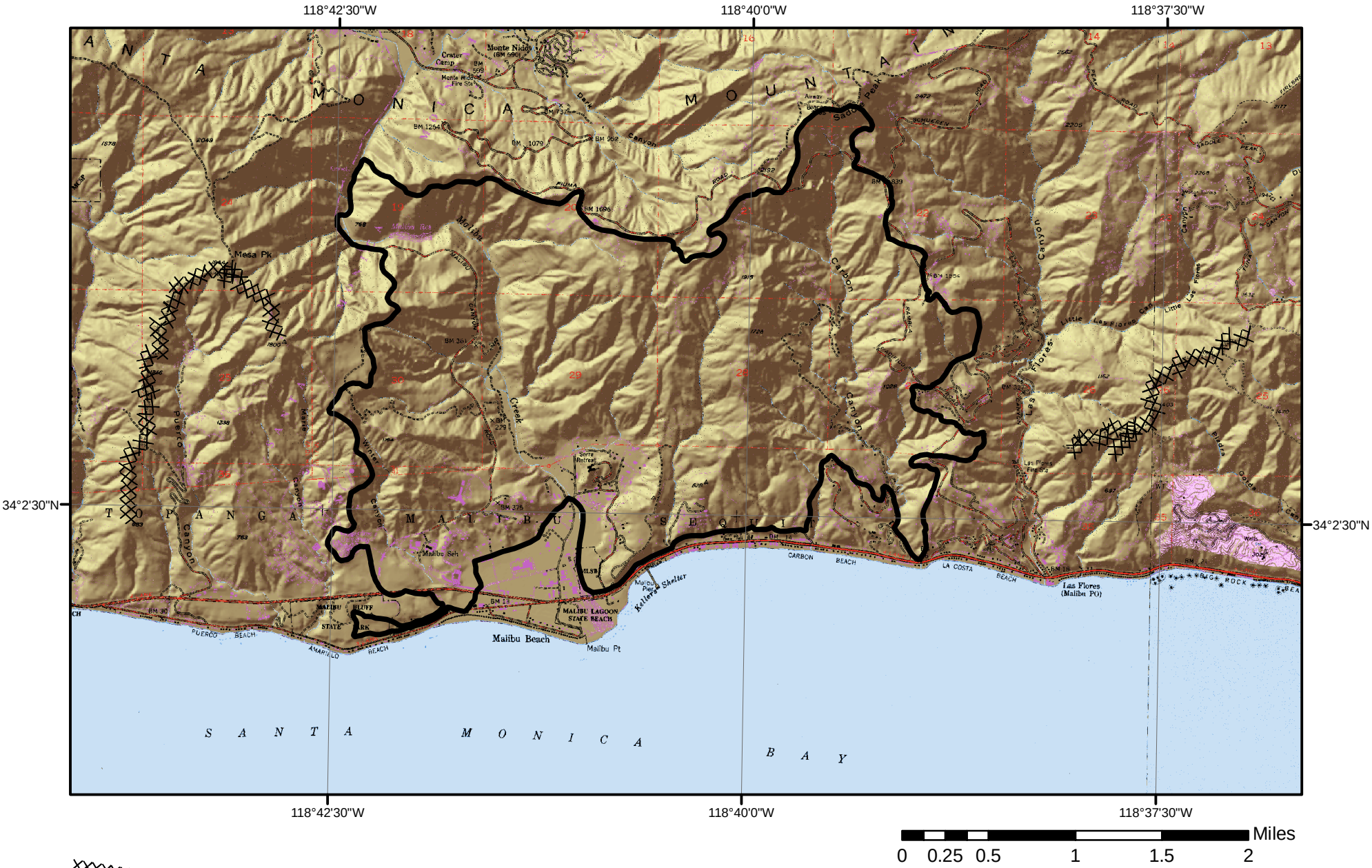
In addition there are recommendations that the team felt were important to bring forward, but may not have been covered in the individual reports, or are low or no-cost items.

- The responsible government agencies should develop and adhere to a schedule of site visits to all under-road flow passing structures during precipitation events.
- Have scheduled storm patrols during large, intense rainfall events. The patrols should be equipped to clear blockages and/or provide flood/slide warning.
- Monitoring of runoff and collection of data from discharge points would allow for verification of existing models used in local flood warning systems and could provide valuable information for building supplemental post fire hydrology models.
- Local agencies responsible for resource protection and public safety should consider public meetings, school programs and other outreach efforts to inform the local population of the results of this survey, potential hazards and the measures to be taken as a result. There may be resources to facilitate treatments available in the community that might not be considered otherwise.
- Proper disposal areas for fire debris should be established, and made known to all local residents. This is to avoid material being placed in drainages where it could move downstream and clog culverts or other drainage structures. It was noted during field evaluation that some residents are having burned brush cut from their properties and moving it with a pickup truck to undeveloped areas and dumped.
- It is suggested that an Engineering Consulting firm be hired to put on workshop(s) for landowners doing erosion control on their own to minimize the creation of new problems. It was noted during field review that at least one landowner has taken the initiative to place sandbag check dams in drainages, but the placement was not considered likely to be effective in the opinion of the civil engineer on the team.
- Notify businesses and residents in the general downstream area that flooding may occur if significant rainfall events occur during the first winter period.
- Take advantage of all material in the public domain that may address local concerns. An example brought to the team's attention is the USGS which has a warning system specific to Southern California for debris flows and flash floods. Information can be found at http://www.usgs.gov/newsroom/article.asp?ID=1817.

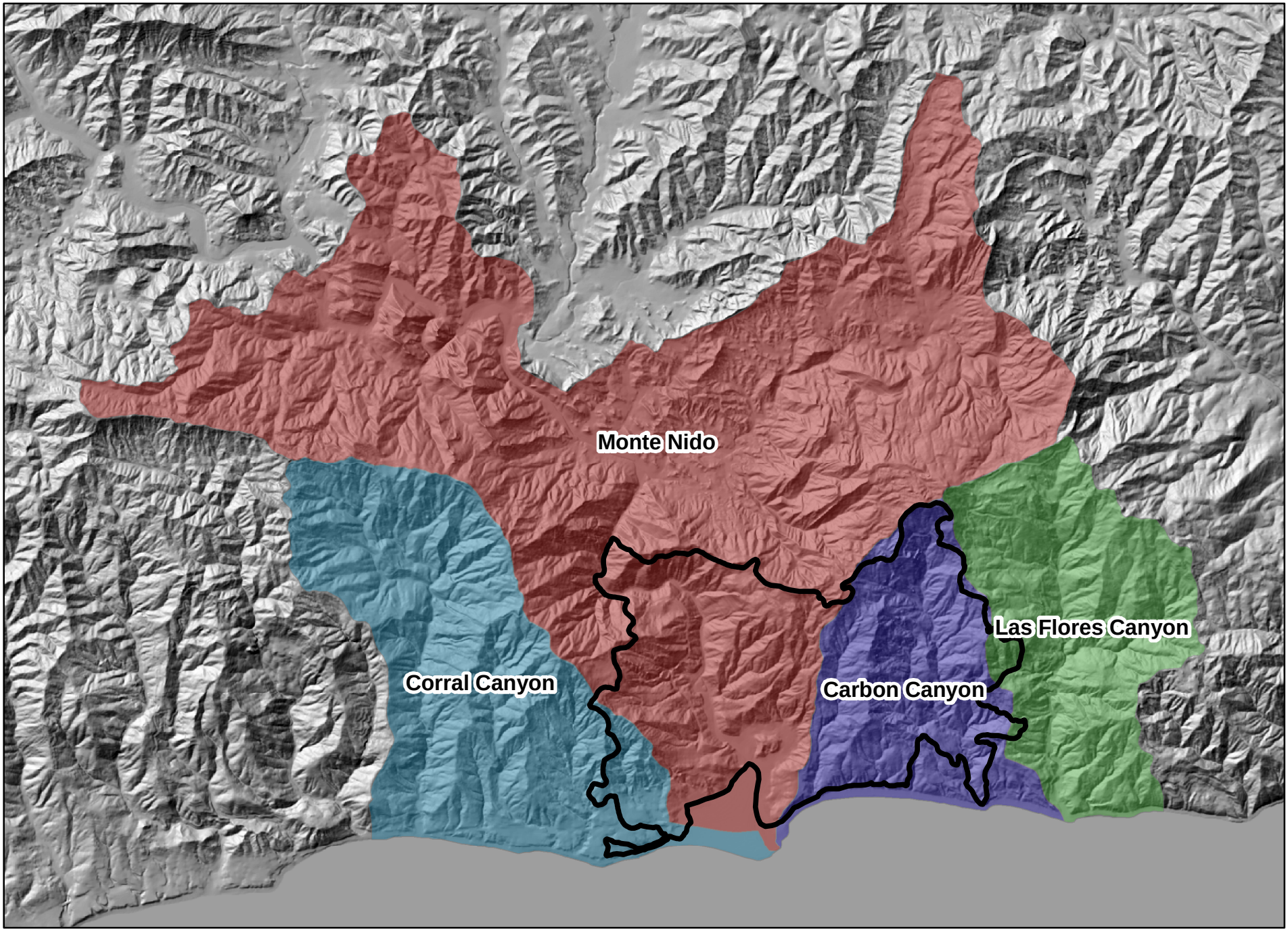
REFERENCES

Calvin, Richard. City of Malibu Public Works Superintendent, personal communication with John Munn, California Department of Forestry and Fire Protection, November 9, 2007.

Frazier, J. 1989. Burn severity criteria. USDA Forest Service – Burned Area. Unpublished USFS note. 1 p.



BAER Team #7 -- Canyon Fire - Malibu, California
Shaded Relief Map
November 15, 2007

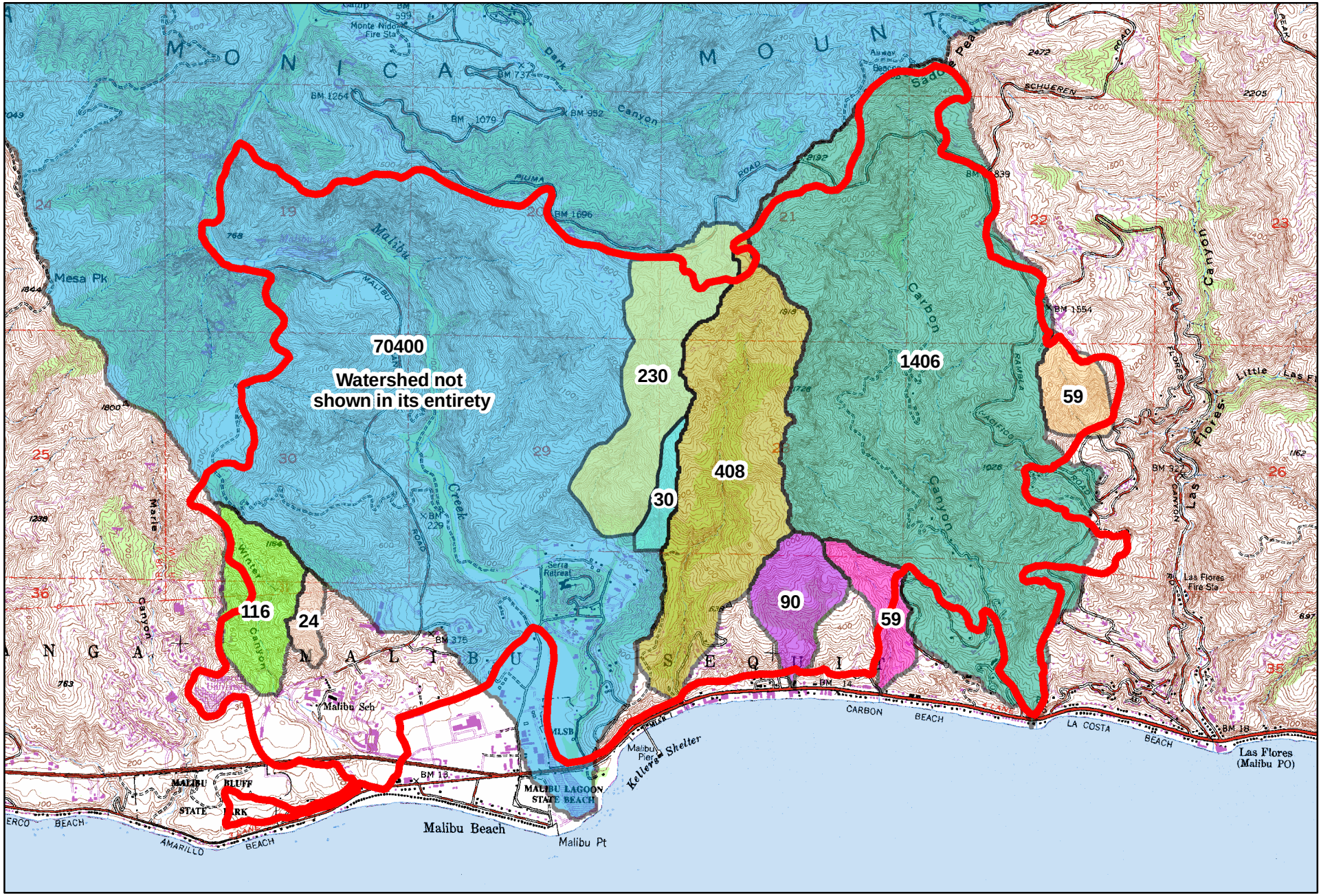


0 0.25 0.5 1 1.5 2 Miles

Fire Perimeter

Canyon Fire - Malibu, California
CalWater Watersheds

N

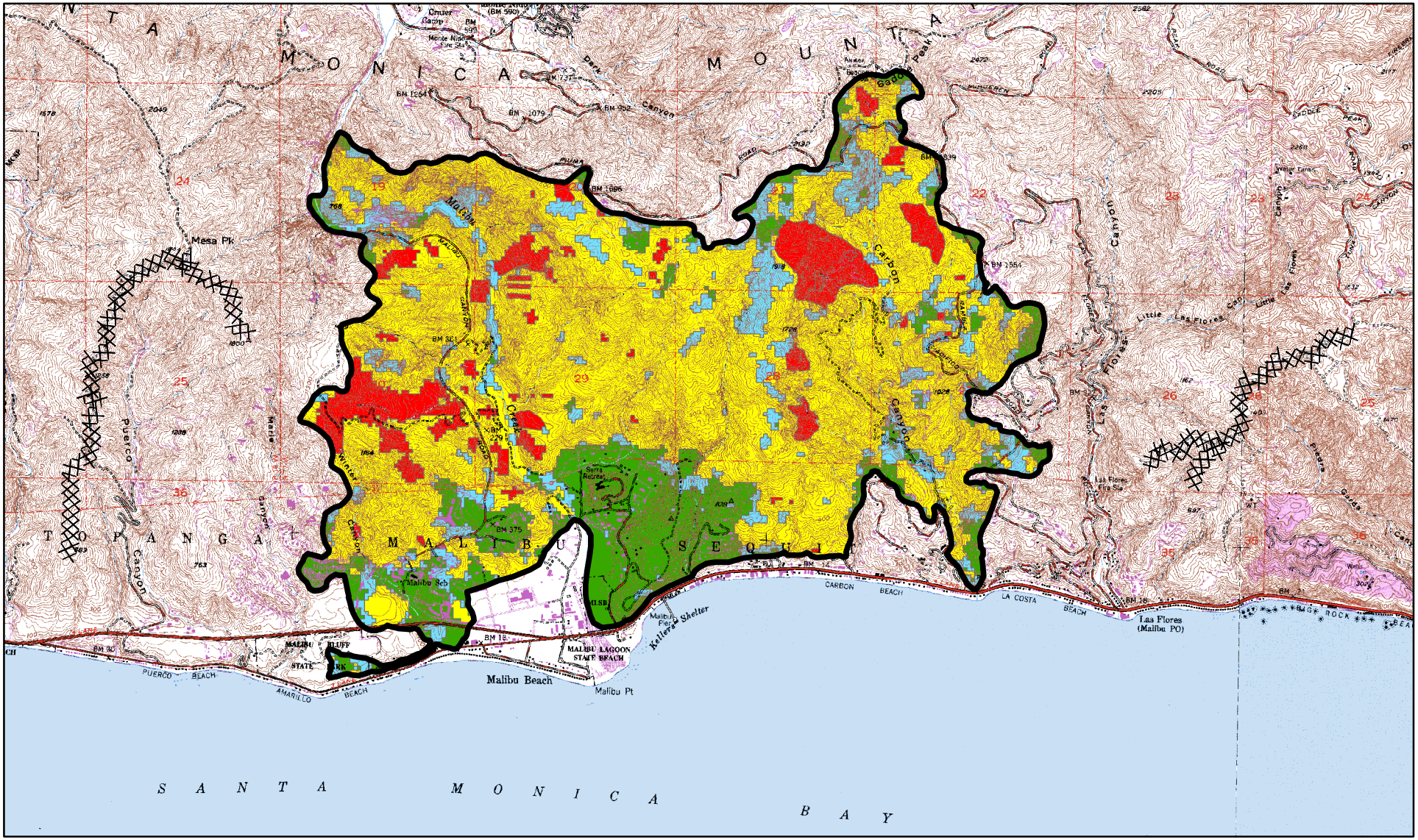


Miles

0 0.25 0.5 1 1.5 2

Fire Perimeter

BAER Team #7 -- Canyon Fire - Malibu, California
Watersheds of Interest
All Drainage Areas are in Acres

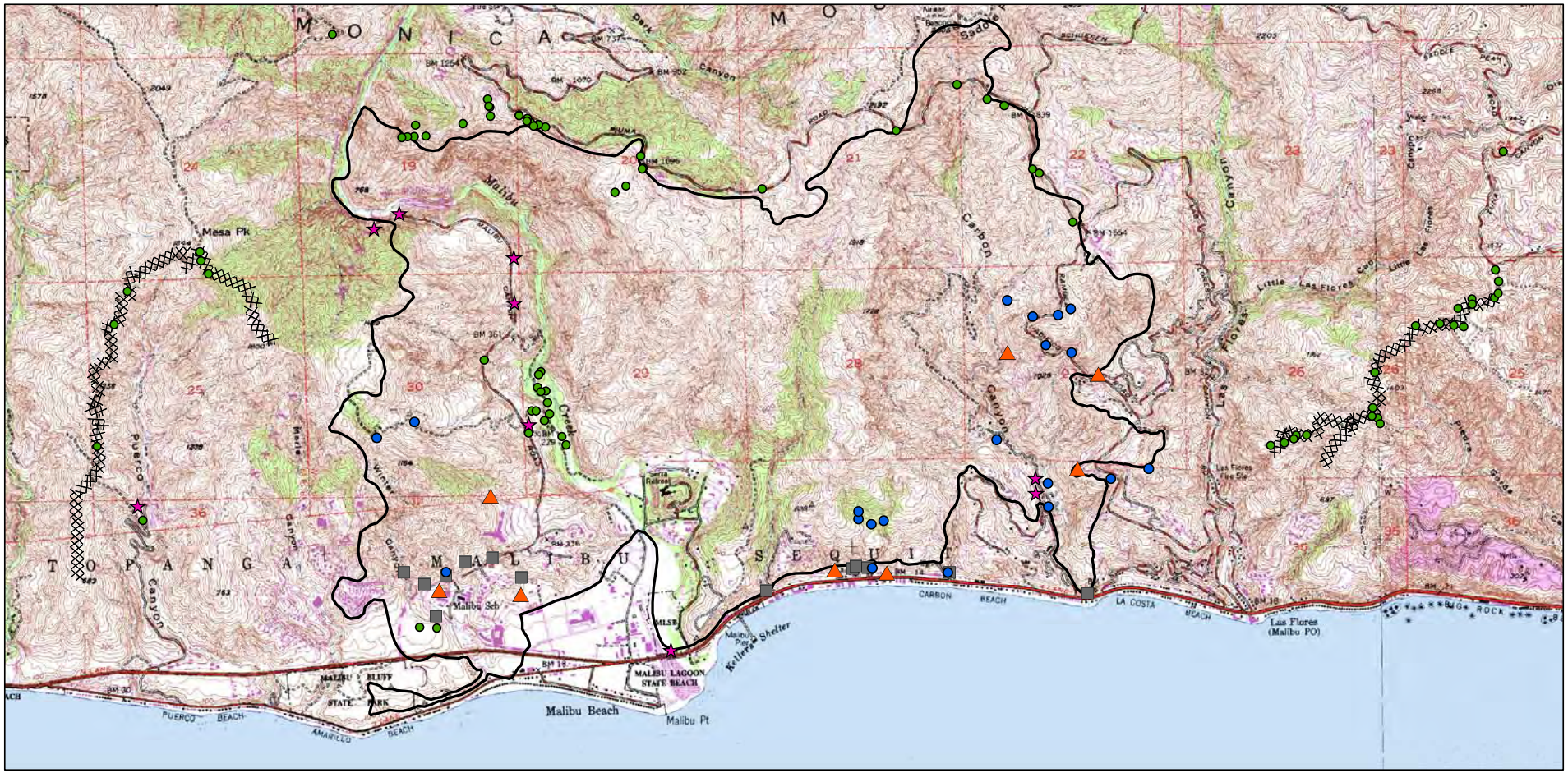


Severity

- Unburnt: 735 acres (17%)
- Low: 543 acres (13%)
- Moderate: 2686 acres (62%)
- High: 365 acres (8%)
- Total: 4329 acres (100%)
- Contingency Dozer Line

0 0.25 0.5 1 1.5 2 Miles

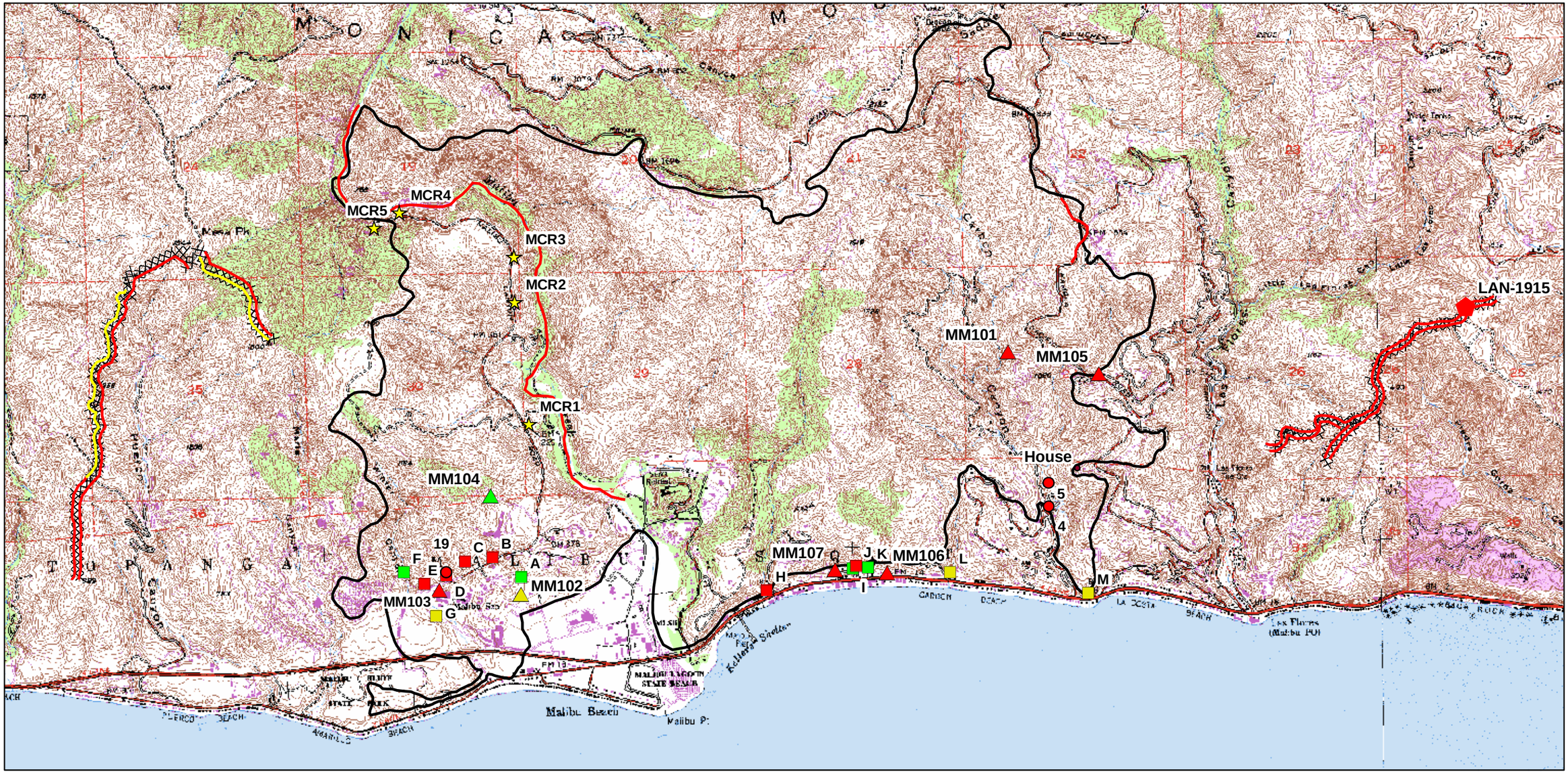
BAER Team #7 -- Canyon Fire - Malibu, California
Soil Burn Severity Map
November 11, 2007



- Geology
- Hydrology
- Engineering
- Botany
- Fisheries
- Archaeology
- Fire Perimeter
- Contingency Dozer Line

Miles
0 0.25 0.5 1 1.5 2

BAER Team #7 - Canyon Fire - Malibu, California
Locations of Data Collection by Specialist
November 15, 2007



Geology

Hydrology

Engineering

Botany

Fisheries

Archaeology

Degree of Risk

High

Moderate

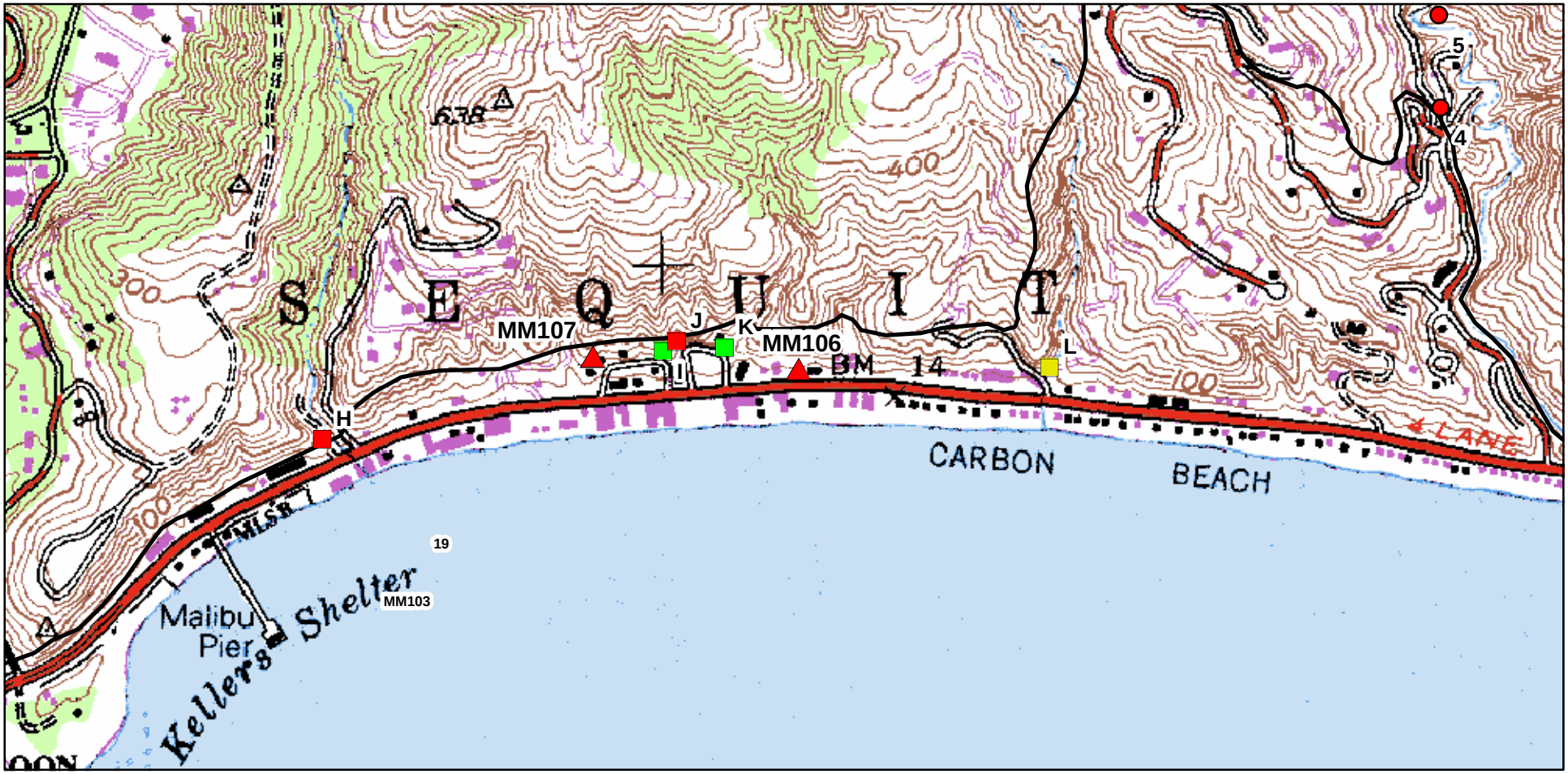
Low

Fire Perimeter

Contingency Dozer Line

0 0.25 0.5 1 1.5 2 Miles

BAER Team #7 - Canyon Fire - Malibu, California
Recommended Mitigations for Fire Related Risks
November 15, 2007



Miles

0 0.125 0.25 0.5 0.75 1

Geology

Hydrology

Engineering

Botany

Fisheries

Archaeology

Degree of Risk

High

Moderate

Low

Fire Perimeter

Contingency Dozer Line

BAER Team #7 - Canyon Fire - Malibu, California
Subset of Recommended Mitigations for Fire Related Risks
November 15, 2007

Appendix 1

Geology Assessment Report

Burned Area Emergency Report

Resource: Geology

DRAFT FINAL TECHNICAL SPECIALIST'S REPORT

Burned Area Emergency Report

Resource: Geology

Fire Name: Canyon Fire **Month/Year**: November 2007

Author Name: Michael W. Manson, Certified Engineering Geologist
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1. Resource Condition Assessment

A. Resource Setting

The 4330-acre Canyon fire burn area is underlain by Tertiary and Cretaceous sedimentary, volcanic and shallow intrusive rocks that locally are covered by Holocene and Late Pleistocene alluvium and landslides (Dibblee, 1993; Figure 1). The Tertiary and Cretaceous rocks are highly faulted and folded by tectonic forces associated with the San Andreas fault system. Appendix 1 (Geologic Map Legend) includes a description of the geologic units within the Canyon fire area.

Dibblee (1993; Figure 1) mapped landslide deposits throughout the burn area. These slope-failure deposits include chaotic mixtures of soil and rubble and displaced bedrock blocks. Landslides may or may not be active, but they may be adversely affected over the long term as a consequence of the Canyon fire removing intercepting and transpiring chaparral canopy and the loss of the reinforcing effect of roots as that may occur until the vegetative cover recovers.

Topography within the burn area ranges from gentle to very steep, with elevations ranging from mean sea level along the southern margin of the fire to a high of over 1900 feet where the fire burned near the head of Carbon Canyon. The burn area lies below the elevation generally subject to rain-on-snow events, although snow may occasionally fall near the higher peaks. The mountainous portion of the burn area drains into south-flowing watercourses that discharge into the Pacific Ocean at Malibu.

B. Survey Methods

To evaluate the risk to life and property road and foot reconnaissance inspections were conducted on November 5 and 6, 2007. All public roads within the burn area were driven to identify where high-value sites may be present that need additional on-site reviews, concentrating on developed residential areas. Areas of State Park Lands and elsewhere where no houses, businesses or other

high-value assets were identified were not surveyed on the ground. Road-related features, such as culverts and bridges, were also not surveyed.

The values at risk are possible loss of life and property due to slope-generated landslides, debris flows, rock fall, and associated slope movement.

2. Observations

A. General observations

The principal concern with the Canyon fire is an increase in the potential for inchannel floods, hyperconcentrated floods, debris torrents, and debris flows. The primary mechanisms for this are the loss of mechanical support of hillslope materials that was provided by vegetation and vegetative litter and the increase in runoff resulting from reductions in interception and infiltration, from the simplification of surficial runoff patterns, and from the loss of mechanical support along stream channels where riparian vegetation was burned. Where fires burn hot, such as in the upper portions of Malibu Creek, the reduction in interception may be affected by the development of hydrophobic soils where waxy substances released by plant materials during hot fires follow thermal gradients into the soil and congeal as continuous surfaces.
Houses and other high-value 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 storms that impact the area.

B. Specific Observations

The California Geological Survey inspected houses and other high-value sites within down slope from the burn area to evaluate potential risks from debris flow and other geologic hazards that may not be identified in the regional evaluation.

3. 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 torrents, and flooding from increased surface water runoff. In general, the risk from landslides, debris flows and rock falls are possible where roads, residences or other development are located adjacent to canyon stream channels or on alluvial fans, colluvial footslopes and 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 variable in the Canyon fire area. Risks to cultural, soils and biologic assets are covered in other specialist reports. Areas with moderate to high potential risks to

life and property from slope instabilities exist elsewhere in the vicinity of the Canyon fire, but the assessment of sites that were not affected by the fire is beyond the scope of this evaluation.

4. Recommendations

A. General Recommendations:

1. The sites identified in Appendix 2 should be evaluated by Professional 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.
2. The existing road drainage systems should be inspected by the appropriate controlling agency to evaluate potential impacts from floods, hyperconcentrated floods, debris torrents, debris flows and sedimentation resulting from winter rains.
3. The Los Angeles County Flood Control District, Department of Public Works and Fire Department, the State Parks Department and Office of Emergency Services, the Natural Resources Conservation Service, and any other responsible party should be made aware of the potential hazard to lives and property in the fire area.
4. Campgrounds and hiking trails should be signed and closed as needed by the responsible agencies to protect campers and hikers.

References

Dibblee, Thomas W., Jr., 1993, Geologic Map of the Malibu Beach Quadrangle, Los Angeles County, California: Dibblee Geological foundation Map #DF-47, 1 sheet, Scale 1:24,000.

Appendix 1: Legend to Geologic Index Map, Canyon Fire (Dibblee, 1993)

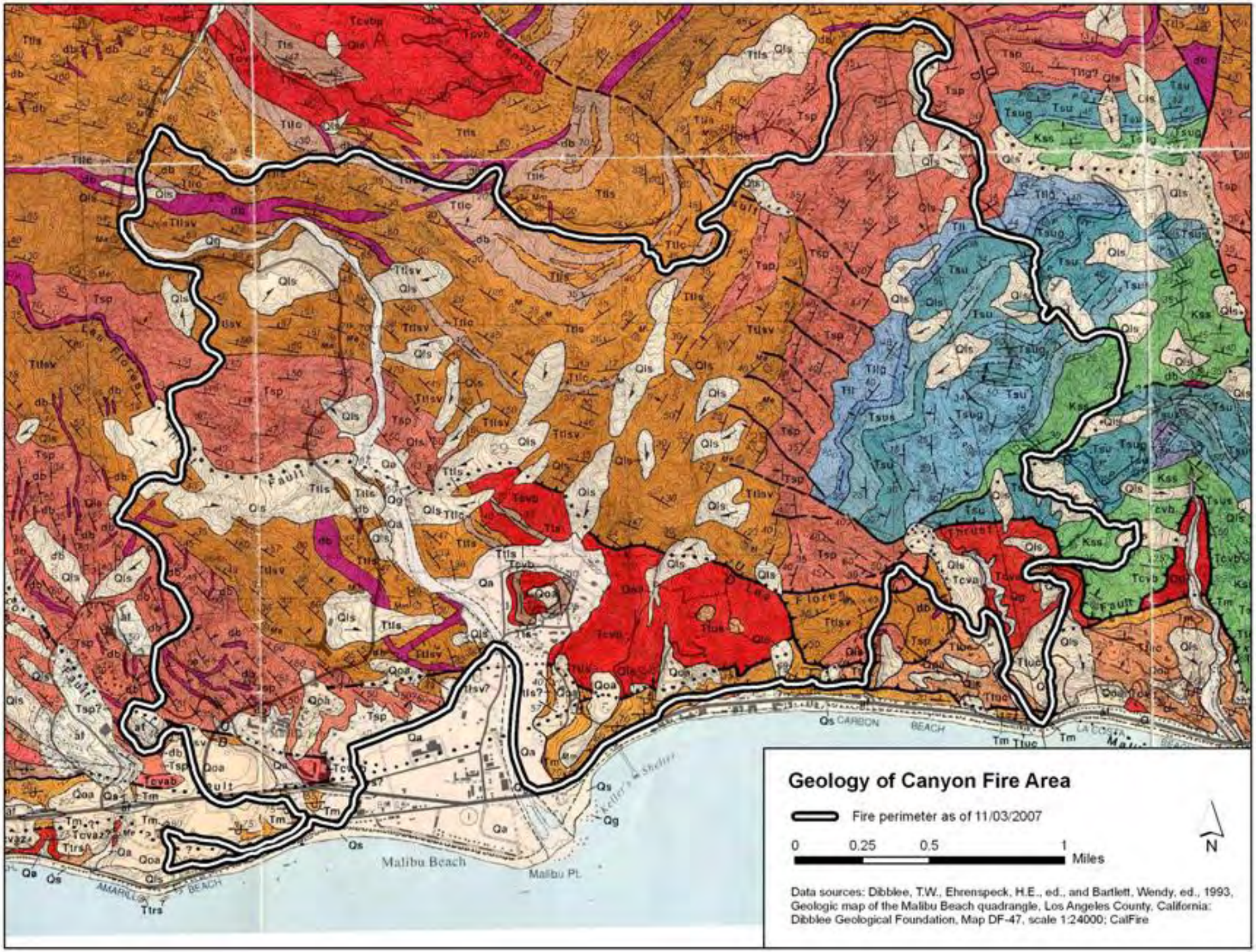
Qg	Gravel and sand	Unconsolidated sediments contained within major stream courses; Holocene.
Qs	Beach sand	Unconsolidated sediments along beaches; Holocene.
Qa	Alluvial gravel, sand and clay	Unconsolidated sediments contained on flood plains; Holocene.
Qls	Landslide deposits	Holocene and/or Late Pleistocene; unconsolidated to slightly consolidated.
Qoa	Older alluvium	Unconsolidated to weakly consolidated alluvial sediments; dissected where elevated; Late Pleistocene.
Tm	Monterey Formation (Miocene)	Thin-bedded, siliceous marine shale; dark brown when fresh, weathers white; highly fractured near coast.
Tcvab	Conejo Volcanics andesitic breccias (Miocene)	Gray to brown, weathering rusty brown.
Tcvb	Conejo Volcanics basaltic flows and breccias	Black, weathering dark olive brown.
Tcvbp	Conejo Volcanics basaltic breccias	basaltic breccias

Db	Diabase (Middle Miocene(?);	Mafic (iron- & magnesium-rich) igneous rocks; intruded as dikes and sills.
Ttus	Upper Topanga Formation Sandstone (Miocene)	Light gray to tan, semi-friable; with thin interbeds of gray clay shale.
Ttlc	Lower Topanga Formation clay shale to siltstone (Miocene)	Gray, micaceous, crumbly.
Ttls	Lower Topanga Formation sandstone, shaly siltstone, conglomerate	Light gray to tan, coherent.
Ttlsv	Lower Topanga Formation sandstone	Sandstone similar to Ttls; locally contains Turritella fossils.
Tsp	Sespe Formation (Oligocene to Eocene(?))	Fluvial, semi-friable to coherent, erosion-resistant sandstone, with claystone interbeds, locally conglomeratic.
Tll	Llajas (?) Formation (Eocene)	Crumbly, gray micaceous silty claystone.
Tllg	Llajas (?) Formation gray sandstone	Semi-friable light gray to tan sandstone.
Tsu	Santa Susana Formation (Paleocene and Eocene(?))	Gray micaceous claystone and siltstone with minor sandstone; crumbly where weathered.
Tsus	Santa Susana Formation gray sandstone	Semi-friable to coherent light gray to tan sandstone.

Tsug	Santa Susana Formation gray sandstone and conglomerate	Sandstone similar to Tsus, and gray to brown conglomerate, quartzite and (in Los Flores Canyon) basal thin red clay lenses
Tsur	Santa Susana Formation sandstone, conglomerate and red claystone	Sandstone and conglomerate that includes red claystone in Los Flores Canyon.
Kss	Unnamed Strata (Upper Cretaceous)	Light gray to light brown hard sandstone, locally with thin interbeds of gray claystone

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

Site No.		At-risk Feature	Street address	GPS Location		Hazard	Likeli-hood	Risk to lives		Risk to property	
				Latitude N	Longitude W						
MM	101	House		N34.05289	W118.65444	Debris flow	High	High	High	High	High
MM	102	House		N34.03841	W118.69366	Debris flow	Mod	Mod		Mod	
MM	103	Nuns' home		N34.03864	W118.69983	Debris flow	High	High	High	High	High
MM	104	Facilities		N34.04500	W118.69622	Debris flow	Low	Low		Low	
MM	105	House		N34.05259	W118.64796	Debris flow	High	High	High	High	High
MM	106	Office Building		N34.03993	W118.66531	Debris flow	High	High	High	High	High
MM	107	House		N34.04005	W118.66929	Debris flow	High	High	High	High	High


Geology of Canyon Fire Area
Fire perimeter as of 11/03/2007
0
0.25
0.5
1
Miles
N
Data sources: Dibblee, T.W., Ehrenspeck, H.E., ed., and Bartlett, Wendy, ed., 1993, Geologic map of the Malibu Beach quadrangle, Los Angeles County, California: Dibblee Geological Foundation, Map DF-47, scale 1:24000; CalFire
Malibu Beach
Malibu PL
CARBON BEACH
LA COSTA
AMARILLO BEACH
Keller's Shelter
Las Flores Fault
Thrust
Fault

Addendum to the Geology Report

During the hydrologic assessment of areas along Rambla Pacifico Road a home owner approached the team members asking about potential instability on either side of his home. The home perches below a small paved road above Carbon Canyon. The location is designated "House" on the "Recommended Mitigations for Fire Related Risks" map. The landowner pointed out cracks in the road, hummocky ground, and indicated personal knowledge of soil movement. Mesh which was used to stabilize areas above the road burned away in the fire. This location was not evaluated by the BAER #7 Certified Engineering Geologist at the time of his assessment. Because the team members did not include a Certified Engineering Geologist this concern was conveyed to the MASG Agency Representative from the California Geological Survey who provided the following input for the report in the form of an email:

From: Lancaster, Jeremy [mailto:Jeremy.Lancaster@conservation.ca.gov]
Sent: Wed 11/14/2007 3:13 PM
To: Snyder, Wendy
Subject: 3077 Rambla Pacifico, Malibu

Wendy,

Based on my conversations with you regarding the subject property CGS has made the following observations and conclusions:

1. Landslides shown on our draft technical report geologic map (Diblee, 1993) do not represent all of the landslides in the area of the subject site. In fact a landslide complex has been mapped by others in the area, thus the subject property is likely in close proximity to a mapped landslide. Observations by your BAER team staff appear to support this information.

2. Pre-existing risks to life and property occur at the site.

3. Given that landslides have been mapped in the surrounding area, the potential for erosion and debris flows in the area is likely to be medium to high, and conditions contributing to these hazards could be exacerbated by the fire, thus elevating risks.

Based on these observations the site should be included as a value at risk for landsliding, debris flows, and erosion. However, this conclusion is based on our expedited review of information provided and should be considered preliminary. We recommend that a site-specific study be conducted by a registered geologist or engineer, with experience in landslide studies and mitigation.

Sincerly,

Jeremy Lancaster
Certified Engineering Geologist
California Geological Survey
(213) 239-0882

Appendix 2

Hydrology Assessment Report

Burned Area Emergency Report
Resource: Hydrology
TECHNICAL SPECIALIST'S REPORT

Burned Area Emergency Report
Resource: Hydrology
Fire Name: Canyon Fire **Month/Year**: November 2007

Author Name: Kevin B. Taylor
California Department of Water Resources – Northern District
2440 Main Street
Red Bluff, CA 96080

1. Potential Values at risk

The potential values at risk are human life, property (including infrastructure) and resource quality.

2. Resource Condition Assessment

A. Resource Setting

The 4330-acre Canyon fire burn area adjacent to the city of Malibu, CA covered all or part the following watersheds; Monte Nido, Corral Canyon, Carbon Canyon and Las Flores (CalWater). These watersheds are within the South Coast flood frequency region and all flow is conveyed under Pacific Coast Highway discharging into the Pacific Ocean.

These four watersheds were subdivided into 10 uniquely named subwatersheds for reference and organization as follows: **Monte Nido:** Malibu Creek, NE Serra Retreat, and London; **Corral Canyon:** Winter Canyon Winter Canyon East; **Carbon Canyon:** Sweetwater Canyon, Carbon Canyon, Sequit, and Cal-Trans; **Las Flores:** Las Flores.

Following the discussion unique to each watershed are tables of Fire Flow Discharges 1/.

The burn area is composed of steep to very steep, divided mountains ranging from a maximum elevation of nearly 2,500 feet to a low elevation of sea level. The elevation variation occurs over a distance approaching 3 miles. Massive rock formations and cliffs dominate the upper watershed giving way to very steep slopes which exceed 60 percent.

Soils in the steep upper watershed exhibit many traits of the Malibu series; forming on steep slopes, shallow, with a subangular blocky structure, brown in color often intermixed with residuum and colluvium. Soils in the relatively gentle slopes of the lower watershed between Malibu Creek and Sweetwater Canyon are darker in color having improved structure generally associated with decomposed organics on alluvial fans. This alluvial soil trait was also observed near the relatively gentle sloping terrain where Carbon Canyon approached the Pacific Coast Highway.

Extensive evidence of past erosion development was observed throughout the burn area. Predominant erosion types were sheet and rill; this was a feature on the uppermost exposed slopes where sheet flow dominates. Further downslope, at distances of 100 to 300 feet where sheet flows begin concentrating, gully erosion was observed.

Residential structures though few in number exist throughout the range of the watershed. Many of these, especially those found on the steep slopes of the upper watershed are accessed by narrow paved driving surfaces cut into the slopes.

Primary access routes are sited below the maximum elevation of the watershed and as a result require flow passing structures under the roadway. The majority of these flow passing structures are constructed of corrugated metal pipe (CMP) of varying diameters located just beneath the road surface. The inlets consist of both concrete drop inlets and uncontrolled open pipes in small catchment basins. The latter having the inverts located at an elevation that would result in complete submergence of the inlet under significant runoff conditions.

In the lower watershed structure density increases primarily adjacent to the upslope side of Pacific Coast Highway where both naturally contoured and cut slopes approaching grades of 30 percent occur. The upslope side of this corridor is also the location of numerous catchment basins and constructed flow routing infrastructure passing runoff flows from both major and minor drainages beneath the highway eventually discharging to the Pacific Ocean.

Beginning immediately east of the mouth of Malibu Creek is a gently sloping region roughly triangular in shape upslope of the Pacific Coast Highway. It is populated with mixed residential, commercial and business structures including the Malibu City offices.

Field surveys were performed throughout the entire burn area by road and foot inspections were conducted on November 5th through 12th, 2007.

B. Findings

Monte Nido: Malibu Creek, NE Serra Retreat, and London;

The area of Malibu Creek watershed impacted by the burn is 3.5 square miles (2,259 acres) including NE Serra Retreat, and London which are tributary sub drainages. The portion of the Malibu Creek watershed impacted by the burn was contained to the lower 2.2 miles of the watershed.

Burn intensities by sub watersheds:

Malibu Creek (2001 acres): Unburned=322 acres; Low =184 acres; Moderate=1289 acres; Severe=207 acres.

The slopes of the Malibu Creek watershed vary from steep to extremely steep with slopes approaching 75 percent. The soils in this watershed have characteristics of the Malibu soil series. They have a predominantly subangular and blocky structure, slightly hard, and very friable. They have high to very high runoff characteristics with very slow permeability (NCSS). Runoff from these soils will be accelerated with resulting entrainment of burn debris in the burn areas. Malibu Creek is the only drainage in the burn area that has a mapped constructed impairment to flow. Malibu Reservoir (Rindge Dam) is inoperable and will not provide any buffer to high flows or sediment interception. It was constructed in 1927 and is currently filled to capacity with 1,250,000 cubic meters of sediment (Slagel and Griggs). Malibu Reservoir is determined to be at 100 percent capacity and can not provide any benefit to the lower watershed by buffering the burn associated impacts.

Approximately half of the severely burned acreage in this watershed is perched above an ephemeral blue line tributary upslope and west of Malibu Creek discharging into a catchment basin on Malibu Canyon Road at 34.051 N, 118.695 W.

It has been shown that watersheds with slopes affected by severe burns have hydrophobic soil characteristics resulting in shortened time of concentration resulting in increased runoff and increased velocity of flows. The impacts of these dynamics are dependent on precipitation event magnitude but will include flash flooding, accelerated erosion, and entrainment of burn debris leading to possible interruption of traffic along Malibu Canyon Road if catchment basins are overwhelmed or landslides occur. The impact to water quality is very likely to occur following a significant precipitation event. **Recommend monitoring of catchment basins and flow passing infrastructure to reduce likelihood of these facilities being overwhelmed by flow clogging debris.**

2007 Canyon Fire Flow Discharges 1/
Entire Malibu Creek Watershed (70,615 acres) Yield 0.6 cfs/acre

	2yr-burn	**5yr-burn**	**10yr-burn**	**25yr-burn**	**50yr-burn**	**100yr-burn**
Q (cfs) =	16,225	24,484	29,934	36,809	41,924	47,039

Sediment Production (Predominant DPA Zone 6) 1,985,400 cubic yards
Burned and bulked peak flowrate (based on 50-year design storm) = 64,982 cfs

2007 Canyon Fire Flow Discharges 1/
Malibu Creek Burned Area (2,001 acres) Yield 1.1 cfs/acre

	2yr-burn	**5yr-burn**	**10yr-burn**	**25yr-burn**	**50yr-burn**	**100yr-burn**
Q (cfs) =	852	1,285	1,572	1,932	2,201	2,470

Sediment Production (Predominant DPA Zone 4) 102,300 cubic yards
Burned and bulked peak flowrate (based on 50-year design storm) = 3,544 cfs

NE Serra Retreat (228 acres): Unburned=7 acres; Low=11 acres; moderate=172 acres; Severe= 6 acres.

The majority of burn intensity is Moderate with 6 acres of severely burned slope; this subdrainage of 0.36 square miles is tributary to Malibu Creek. Slopes in the burn area are very steep evolving to gentle in the immediate vicinity of residences north of Palm Canyon Road. The natural flowpath of this subdrainage has been altered routing flows overland eventually through holes cut in cyclone fences at property lines then across a low water crossing on Palm Canyon Lane through another hole in a cyclone fence onto an adjoining parcel through numerous yards eventually discharging on to Cross Creek Road above Cross Creek Lane at 34.044 N, 118.683 W where the slope directs flow to the left bank abutment for the Cross Creek bridge over Malibu Creek. The bridge washed out in 1995 and was raised about two feet when reconstructed (Richard Calvin, 11/09/07 by telephone).

It is recommended that channel capacity at site of current bridge across Malibu Creek should be evaluated for ability to carry increased post-fire flows.

Likely impacts are for localized flooding following a significant precipitation event as entrained debris collects at either cyclone fence passageways or further downslope along Cross Creek Road. Possible impacts to the left bank bridge abutment across Malibu Creek should be considered. Impacts to water quality in Malibu Creek from entrained debris from the burn area are likely. Adjacent homeowners should be contacted about flooding and sediment hazards.

2007 Canyon Fire Flow Discharges
NE of Serra Road (228 acres) Yield 2.6 cfs/acre

	2yr-burn	**5yr-burn**	**10yr-burn**	**25yr-burn**	**50yr-burn**	**100yr-burn**
Q (cfs) =	229	346	423	521	593	665

Sediment Production (Predominant DPA Zone 4) 17,280 cubic yards
Burned and bulked peak flowrate (based on 50-year design storm) = 984 cfs

London (30 acres): Unburned= 2 acres; Low= 0.1 acres; Moderate= 28 acres; Severe= 0 acres.

The London subwatershed a 0.05 square mile tributary to Malibu Creek had a burn intensity which is almost entirely Moderate. The side slopes of this subwatershed are steep and the diminishment of the vegetative canopy will result in increased flows, increased soil particle detachment leading to accelerated erosion, and entrainment of burn debris. The natural flowpath for this drainage has been obscured by residential development.

A constructed flow routing system in the form of raised soil banks armored with rocks in areas of flow acceleration was observed. The routing of flow between well defined banks is a prominent feature of the system prior to turning down grade. The gently sloping channel begins to widen as the flowpath parallels the driveway. Evidence of prior efforts to moderate channel velocity or debris containment exists in the form of partially buried sandbags approximately 50 feet upstream of where the flow discharges onto Serra Road at Palm Canyon Lane. Runoff down Serra Road is directed toward a house at a Y in the street, where low flows are diverted down Serra Road by a small berm in the roadway.

Eroded soils and entrained debris could result in localized flooding during a significant precipitation event, and water quality impacts are likely as flows are routed along Serra road toward Malibu Creek.

Capacity of the channel at residence at 3200 Serra Road should be checked against potential post-fire flows. Homeowners should be contacted about the hazard of flooding and sediment from increased post-fire flows.

2007 Canyon Fire Flow Discharges
London's House (30 acres) Yield 2.6 cfs/acre

	2yr-burn	5yr-burn	10yr-burn	25yr-burn	50yr-burn	100yr-burn
Q (cfs) =	30	46	56	68	78	88

Sediment Production (Predominant DPA Zone 4) 3,600 cubic yards
Burned and bulked peak flowrate (based on 50-year design storm) = 129 cfs

Corral Canyon: Winter Canyon, Winter Canyon East

Winter Canyon (116 acres): Unburned= 6 acres; Low= 8 acres; Moderate= 79 acres; Severe= 9 acres.

The Winter Canyon watershed is a steep compact watershed having soils associated with the Malibu series overlain with numerous small angular rocks. Burn conditions are predominantly moderate possibly owing to a lack of fuel. There are no modern cultural features in the watershed, except for a single well traveled foot path. With very minor exception this watershed may yield runoff at near pre-burn condition levels. Natural hydrology for Winter Canyon results in discharge into a well maintained debris basin on the Pepperdine University Campus. Impacts are likely entrainment and deposition of burn debris and normal colluvial transport downstream as a result of significant precipitation events.

2007 Canyon Fire Flow Discharges
Winter Canyon (116 acres) yield 2.6 cfs/acre

	2yr-burn	5yr-burn	10yr-burn	25yr-burn	50yr-burn	100yr-burn
Q (cfs) =	117	176	216	265	302	339

Sediment Production (Predominant DPA Zone 4) 10,440 cubic yards
Burned and bulked peak flowrate (based on 50-year design storm) = 501 cfs

Winter Canyon East (25.6 acres): Unburned= 0 acres, Low= 0 acre, Moderate= 25.6 acres, Severe= 0 acres.

The Winter Canyon East watershed is a neighboring steep compact watershed similar in many features to Winter Canyon except that the streambed is shorter in length and higher in elevation. Because of the compact nature and shorter flowpath length of this watershed it will concentrate runoff at a faster rate than Winter Canyon located one ridge to the west under similar precipitation events. At its point of discharge above Malibu Canyon Road, 34.040 N, 118.699 W, (map point 19) is a 12 foot tall rock face at the base of which is a chatotic mix of rocky debris covering the inlet of a concrete pipe designed to convey flow underneath Malibu Canyon Road. The area immediately downstream of the occluded inlet is flat with significant downcutting exposing the pipet. Erosion on landforms of almost zero slope are indicative of high velocity flows that likely cross the driving surface of Malibu Canyon Road. The erosion

and exposed pipe is an indication that the pipe is not passing flow. Downstream of the pipe inlet, and aligned with the exposed pipe section is significant erosion.

The pipe at the listed coordinates is considered to be non-functional and constitutes an emergency property (infrastructure) condition. It is recommended that the inlet be opened, inspected and a suitable catchment basin be constructed. Determine routing to assure that no additional problems developed during the period on non-use. The Winter Canyon East subdrainage discharges were modeled independently from all other subdrainages. 2/

2007 Canyon Fire

Winter Canyon East

	1 inch	2.5 inch	5.0 inch
peak discharge (cfs)	16	82	268
runoff (in.)	0.13	1	3.17
unit peak disch. (cfs/mi^2-in.)	693	431	469
initial abstraction (in.)	0.4	0.4	0.4
time of concentraion (min.)	7.6	7.6	7.6
sheet flow travel time (min.)	5	5	5
shallow conc.flow travel time (min.)	0.6	0.6	0.6
Channel flow travel time (min.)	2	2	2

Carbon Canyon: Sweetwater Canyon, Sequit Cal-Trans, Carbon Canyon

Sweetwater Canyon (408 acres): Unburned= 85 acres; Low= 68 acres; Moderate= 250 acres; Severe= 0.3 acres.

Ninety-eight percent of the 0.64 square mile Sweetwater Canyon watershed was 98 percent burn impacted to varying intensities. The runoff from this watershed flows from an elevation exceeding 1,800 feet in narrow well defined banks to a point of discharge into a large basin where the flow is interrupted at the point where it intersects the Pacific Coast Highway. The soils in the watershed show traits of the Malibu series. The watershed is relatively compact with slopes that vary from steep at the point of discharge at Pacific Coast Highway to very Steep in the upper watershed. The lower watershed has multiple modern cultural impacts including roads, residential structures and concrete flow routing structures.

Evidence of slope movement was observed on the right bank in the lower watershed. Expected burn impacts are increased runoff velocities, erosion, and debris flows. The watershed is crossed by a laminated wood bridge at 34.045 N, 118.674 W. This bridge appears new in condition; however there was observed significant erosion on both the upstream and downstream sides of the bridge abutments on both banks. **It is recommended that calculation of channel carrying capacity at that location be performed and the integrity of the bridge foundation inspected.**

2007 Canyon Fire Flow Discharges
Sweetwater Canyon (408 acres) Yield 2.6 cfs/acre

2yr-	5yr-	10yr-	25yr-	50yr-	100yr-

	burn	burn	burn	burn	burn	burn
Q (cfs) =	413	624	763	938	1,068	1,198

Sediment Production (Predominant DPA Zone 4) 25,830 cubic yards
Burned and bulked peak flowrate (based on 50-year design storm) = 1773 cfs

Sequit (90 acres): Unburned= 3 acres; Low= 7 acres; Moderate= 77 acres; Severe= 1 acre

The Sequit subwatershed is 0.14 square miles in extent, and the soils are typical of the Malibu series The slopes in this watershed vary from steep to very steep (approaching 50 percent) in the upper watershed which exceeds 800 feet in elevation. The watershed is disturbed with roads and numerous concrete flow routing structures some of which have induced erosional patterns likely caused by their downslope orientation and low walls at critical points. Concrete routing structures for intercepting sheet flow runoff are installed in a horizontal orientation with steep downslope aligned intercept chutes at their midpoint.

Some of these downslope oriented chutes have low walled short radius curves which are easily overtopped as flow accelerates through the curve. The result of which is a pattern of gully erosion developing immediately downslope of the curve of the routing structure The eroded soils are entrained by runoff and transported further downslope.

There are also poorly maintained catchment basins in the watershed with drop inlets (map point 14) conveying flow through buried pipe to concrete discharge structures (map point 16) close to the stream channel. Field investigation discovered the presence of hydrophobic soils on slopes adjacent to the two westernmost tributaries to this drainage (map points 14, 15). The flow from this watershed discharges into a recently constructed concrete dam catchment basin located at 34.043 N, 118.666 W (map point 21). The catchment basin shows signs of human encampment. Possible impacts are to human life and degradation of water quality. **It is recommended that the many concrete erosion control structures be inspected for erosion causing impacts and that the basins and their outlets receive maintenance prior to the next precipitation event. A warning system to prevent loss of life to people inhabiting the basin should be developed.**

2007 Canyon Fire Flow Discharges
Sequit (90 acres) Yield 2.6 cfs/acre

	2yr-burn	5yr-burn	10yr-burn	25yr-burn	50yr-burn	100yr-burn
Q (cfs) =	91	137	167	205	234	263

Sediment Production (Predominant DPA Zone 4) 8,960 cubic yards
Burned and bulked peak flowrate (based on 50-year design storm) = 388 cfs

Cal-Trans (59 acres): Unburned= 6 acres; Low= 1 acre; Moderate= 24 acres; Severe= 0 acres

This watershed is 0.09 square miles in extent. The watershed is a steep drainage with fire impacts. Soils in the watershed are typical of the Malibu series. The catchment basin has a dam of unique design composed of railroad rails driven vertically into the channel bed. (map

point 18) The rails provide anchors for retaining fill materials with fence wire. These fill materials are composed of a mix of soil, brick, and concrete debris it also has a spillway composed of larger rock. The basin likely has adequate capacity for flows prior to the Canyon fire, but may be overwhelmed by debris generated in this post fire environment. **The dam (map point 18) and the culvert passing flows under Pacific Coast Highway should be inspected for adequacy prior to expected storms.**

2007 Canyon Fire Flow Discharges
Cal-Trans (59 acres) Yield 2.6 cfs/acre

	2yr-burn	5yr-burn	10yr-burn	25yr-burn	50yr-burn	100yr-burn
Q (cfs) =	59	89	109	134	153	172

Sediment Production (Predominant DPA Zone 4) 6,480 cubic yards
Burned and bulked peak flowrate (based on 50-year design storm) = 254 cfs

Carbon Canyon (1406 acres): Unburned= 111 acres; Low= 208 acres; Moderate= 774 acres; Severe= 153 acres.

This watershed covers 2.2 square miles; it is drained by a main stem with flow supplemented by six mapped tributaries. The watershed terrain is extremely steep with slopes approaching 80 percent in the upper watershed. Soils in the watershed contain rocks and are fine grained, friable, and typical of the Malibu soil series with numerous small stones at the surface. Hydrophobicity tests performed at numerous locations indicated the presence of soils impervious to infiltration.

Evidence of past erosion events including rill, gully and mass wasting are prominent throughout the watershed. Many of the erosional features are associated with modern cultural elements including road building and residential construction.

The slopes in the upper watershed are intersected by paved driving surfaces having multiple flow passing structures just underneath the paved surface along their course. (map points 6,8,9,22) Corrugated metal pipe (CMP) was the only type of pipe observed passing underneath the numerous driving surfaces in this watershed. Some of the inlets to these flow passing structures have trash racks, however many do not. **It is recommended that every flow passing structures in the watershed have a serviceable trash/debris rack installed, and that their condition be monitored regularly during precipitation events.**

Flows from the Carbon Canyon watershed are channelized as they approach Pacific Coast Highway next to Los Angeles County Fire Station. The constructed reinforced channel on the right bank adjacent to the Los Angeles County Fire Station is armored with cured “sacked” concrete stacked from the streambed to the top of the natural bank routing flow to a large box culvert passing flows underneath The Pacific Coast Highway. The concrete culvert under the Highway appears to have a cross section similar to the channel, but has no trash rack or debris trap. **Capacity of culvert should be determined and compared to potential post-fire flows. Potential for plugging by debris should be considered.**

The absence of a debris trapping structure in lower Carbon Canyon meets emergency criteria for protection of property (infrastructure). It is recommended that the check dam debris basins constructed following the 1993 fire be re-installed.

2007 Canyon Fire Flow Discharges
Carbon Canyon Watershed (1,406 acres) Yield 2.0 cfs/acre

	2yr-burn	5yr-burn	10yr-burn	25yr-burn	50yr-burn	100yr-burn
Q (cfs) =	1,082	1,633	1,997	2,456	2,797	3,138

Sediment Production (Predominant DPA Zone 4) 74, 800 cubic yards
Burned and bulked peak flowrate (based on 50-year design storm) = 4,503 cfs

Las Flores: Las Flores

Las Flores (59 acres): Unburned= 13 acres; Low= 7 acres; Moderate= 34 acres; Severe= 0 acres

The Las Flores watershed is a large coastal drainage with steep slopes. The Los Flores watershed burn area is located near the top of the watershed low in the drainage. Soils are typical Malibu series in appearance. The burn impacts are located on a gently sloping region where sheet flow is dominant (map point 7); additionally, the burn area is above healthy dense stands of chaparral with intact root structure which should buffer the impact of runoff.

Of concern is the contingency line bladed into the ridge topping the watershed to the east. The line was bladed to expose bare soil and approaches 200 feet in width. The risk of erosion is very likely along and adjacent to the constructed contingency line. **It is recommended that appropriate erosion control structures be installed under the supervision of qualified personnel prior to the next storm event.**

2007 Canyon Fire Flow Discharges
Las Flores (59 acres) Yield 2.6 cfs/acre

	2yr-burn	5yr-burn	10yr-burn	25yr-burn	50yr-burn	100yr-burn
Q (cfs) =	16,225	24,484	29,934	36,809	41,924	47,039

Sediment Production (Predominant DPA Zone 4) 6,480 cubic yards
Burned and bulked peak flowrate (based on 50-year design storm) = 254 cfs

3. Emergency Determination

Emergency conditions exist at two locations in two watersheds. One emergency condition in Carbon Canyon (map points 4 & 5) requires the construction of two structures the other emergency condition in Winter Canyon East requires one.

The emergency Condition in Carbon Canyon is the anticipated debris flow following a significant precipitation event. The debris flow could plug the concrete culvert passing flows underneath the pacific Coast Highway which could threaten road integrity; furthermore, if debris flows impede flow through the culvert it would flood the Los Angeles County Fire Station cited immediately adjacent to the upstream culvert entrance under the highway.

Debris basins should be constructed low in the watershed at or near where they were installed previously for post burn debris flow impoundment.

The emergency condition on Winter Canyon East is at its discharge point where its flowpath intersects with Malibu Canyon Road. The emergency condition is the completely blocked entrance to the concrete culvert (map point 19) designed to pass flows under Malibu canyon Road. The emergency is to possible failure of the driving surface and possible loss of life due to that failure because of the non-functional condition of the culvert pipe. The likelihood that unimpeded debris flows following a burn event could force a vehicle off the road at this location is considerable.

The entrance to the concrete pipe should be re-opened, the integrity of the pipe assessed and a suitable debris basin constructed. Routing of flow should be determined in order to assess possible downstream issues associated with the period of non-use.

The named watersheds have been significantly impacted by the 2007 Canyon Fire. The objective of the BAER Team was to provide an emergency assessment of the watershed; however, it now becomes incumbent upon the next level of public servants to employ all of the recommendations resulting from this effort.

References:

1/ Modeled fire flow discharges (Yield Method) for Malibu Area sub-watersheds
Los Angeles County Department of Public Works – Hydrology

2/ Modeled using SCS TR – 55 Peak Discharge and Runoff Calculator

NCSS: National Cooperative Soil Survey U.S.A

Cumulative Loss of Sands to the California Coast by Dam Impoundment Slagel and Griggs 2006.

Richard Calvin by telephone November 9, 2007.

Carbon Fire - Malibu California (Watersheds of Interest)

Entire Malibu Creek Watershed (70,615 acres (Yield 0.6 cfs/acre)

	$Q_{2yr\text{-}burn}$ cfs	$Q_{5yr\text{-}burn}$ cfs	$Q_{10yr\text{-}burn}$ cfs	$Q_{25yr\text{-}burn}$ cfs	$Q_{50yr\text{-}burn}$ cfs	$Q_{100yr\text{-}burn}$ cfs
	16,225	24,484	29,934	36,809	41,924	47,039

Sediment Production (Predominant DPA Zone 6) 1,985,400 cubic yards

Burned and bulked peak flow rate (based on 50-year design storm) is 64,982 cfs

Winter Canyon (116 acres) Yield 2.6 cfs/acre

	$Q_{2yr\text{-}burn}$ cfs	$Q_{5yr\text{-}burn}$ cfs	$Q_{10yr\text{-}burn}$ cfs	$Q_{25yr\text{-}burn}$ cfs	$Q_{50yr\text{-}burn}$ cfs	$Q_{100yr\text{-}burn}$ cfs
	117	176	216	265	302	339

Sediment Production (Predominant DPA Zone 4) 10,440 cubic yards

Burned and bulked peak flow rate (based on 50-year design storm) is 501 cfs

Malibu Creek Burned Area (2,001 acres) Yield 1.1 cfs/acre

	$Q_{2yr\text{-}burn}$ cfs	$Q_{5yr\text{-}burn}$ cfs	$Q_{10yr\text{-}burn}$ cfs	$Q_{25yr\text{-}burn}$ cfs	$Q_{50yr\text{-}burn}$ cfs	$Q_{100yr\text{-}burn}$ cfs
	852	1,285	1,572	1,932	2,201	2,470

Sediment Production (Predominant DPA Zone 4) 102,300 cubic yards

Burned and bulked peak flow rate (based on 50-year design storm) is 3,544 cfs

NE of Serra Rd (228 acres) Yield 2.6 cfs/acre

	$Q_{2yr\text{-}burn}$ cfs	$Q_{5yr\text{-}burn}$ cfs	$Q_{10yr\text{-}burn}$ cfs	$Q_{25yr\text{-}burn}$ cfs	$Q_{50yr\text{-}burn}$ cfs	$Q_{100yr\text{-}burn}$ cfs
	229	346	423	521	593	665

Sediment Production (Predominant DPA Zone 4) 17,280 cubic yards

Burned and bulked peak flow rate (based on 50-year design storm) is 984 cfs

[redacted] (30 acres) Yield 2.6 cfs/acre

	$Q_{2yr\text{-}burn}$ cfs	$Q_{5yr\text{-}burn}$ cfs	$Q_{10yr\text{-}burn}$ cfs	$Q_{25yr\text{-}burn}$ cfs	$Q_{50yr\text{-}burn}$ cfs	$Q_{100yr\text{-}burn}$ cfs
	30	46	56	68	78	88

Sediment Production (Predominant DPA Zone 4) 3,600 cubic yards

Burned and bulked peak flow rate (based on 50-year design storm) is 129 cfs

Sediment Production calculations for the burned areas are based on the 50-year design storm.

Carbon Fire - Malibu California (Watersheds of Interest)

Sweetwater Canyon (408 acres) Yield 2.6 cfs/acre

	$Q_{2yr\text{-}burn}$ cfs	$Q_{5yr\text{-}burn}$ cfs	$Q_{10yr\text{-}burn}$ cfs	$Q_{25yr\text{-}burn}$ cfs	$Q_{50yr\text{-}burn}$ cfs	$Q_{100yr\text{-}burn}$ cfs
	413	624	763	938	1,068	1,198

Sediment Production (Predominant DPA Zone 4) 25,830 cubic yards

Burned and bulked peak flow rate (based on 50-year design storm) is 1,773 cfs

Sequit (90 acres) Yield 2.6 cfs/acre

	$Q_{2yr\text{-}burn}$ cfs	$Q_{5yr\text{-}burn}$ cfs	$Q_{10yr\text{-}burn}$ cfs	$Q_{25yr\text{-}burn}$ cfs	$Q_{50yr\text{-}burn}$ cfs	$Q_{100yr\text{-}burn}$ cfs
	91	137	167	205	234	263

Sediment Production (Predominant DPA Zone 4) 8,960 cubic yards

Burned and bulked peak flow rate (based on 50-year design storm) is 388 cfs

Cal-Trans (59 acres) Yield 2.6 cfs/acre

	$Q_{2yr\text{-}burn}$ cfs	$Q_{5yr\text{-}burn}$ cfs	$Q_{10yr\text{-}burn}$ cfs	$Q_{25yr\text{-}burn}$ cfs	$Q_{50yr\text{-}burn}$ cfs	$Q_{100yr\text{-}burn}$ cfs
	59	89	109	134	153	172

Sediment Production (Predominant DPA Zone 4) 6,480 cubic yards

Burned and bulked peak flow rate (based on 50-year design storm) is 254 cfs

Carbon Canyon Watershed (1,406 acres) Yield 2.0 cfs/acre

	$Q_{2yr\text{-}burn}$ cfs	$Q_{5yr\text{-}burn}$ cfs	$Q_{10yr\text{-}burn}$ cfs	$Q_{25yr\text{-}burn}$ cfs	$Q_{50yr\text{-}burn}$ cfs	$Q_{100yr\text{-}burn}$ cfs
	1,082	1,633	1,997	2,456	2,797	3,138

Sediment Production (Predominant DPA Zone 4) 74,800 cubic yards

Burned and bulked peak flow rate (based on 50-year design storm) is 4,503 cfs

Las Flores (59 acres) Yield 2.6 cfs/acre

	$Q_{2yr\text{-}burn}$ cfs	$Q_{5yr\text{-}burn}$ cfs	$Q_{10yr\text{-}burn}$ cfs	$Q_{25yr\text{-}burn}$ cfs	$Q_{50yr\text{-}burn}$ cfs	$Q_{100yr\text{-}burn}$ cfs
	59	89	109	134	153	172

Sediment Production (Predominant DPA Zone 4) 6,480 cubic yards

Burned and bulked peak flow rate (based on 50-year design storm) is 254 cfs

Sediment Production calculations for the burned areas are based on the 50-year design storm.

SCS TR-55 Peak Discharge and Runoff Calculator

Hydrologic calculations for Peak Discharge, Runoff Depth, Runoff Curve Number, Time of Concentration, and Travel Times

Based on the USA Soil Conservation Service publication TR-55 (1986): Urban Hydrology for Small Watersheds

To: Precipitation maps for 24-hr duration storms in USA
Detention Basin Volume Calculation Other Time of Concentration Equations
Rational Equation for Peak Discharge Unit Conversions
LMNO Engineering home page Trouble printing? Register

Topics on this page: Introduction Equations Runoff Curve Numbers
Error Messages References

Register to enable "Calculate" button

Reset Inputs to 0.0	All features enabled	**Click to Calculate**
OUTPUTS	Peak Discharge, Qp (cfs or ft³/s):	16.484502602334707
Peak Discharge in cfs or ft³/s	Runoff, Q (inch):	0.1320900038510204
© 1999 LMNO Engineering,	Unit Peak Disch., Qu (cfs/mi²-inch):	693.3194590278084
Research, and Software, Ltd.	Pond and Swamp Factor, Fp:	1.0
http://www.LMNOeng.com	Initial Abstraction, Ia (inch):	0.4096385542168676
		Most accurate if Q>0.5 inch
INPUTS OR OUTPUTS	☐ Enter these three quantities:	
Select Units:	Total Watershed Area, A (mi²):	0.18
Area in mile²	Overall Curve Number, CN:	83.0
Time of Conc., Travel Times in m	Time of Concentration, Tc (min):	7.650254358223673
INPUTS		
Rainfall Distribution Type II	Precipitation, P (inch)	1
Precipitation (and Runoff) in inch	Ponds, Swamps (% of Total Area):	0.0
Curve Number Information		
Region 1:	Area of Region 1, A1 (mi²):	0.18
	Curve Number for Region 1, CN1:	83
Region 2:	Area of Region 2, A2 (mi²):	0
	Curve Number for Region 2, CN2:	0
Region 3:	Area of Region 3, A3 (mi²):	0.0
	Curve Number for Region 3, CN3:	0.0
Region 4:	Area of Region 4, A4 (mi²):	0.0
	Curve Number for Region 4, CN4:	0.0
Region 5:	Area of Region 5, A5 (mi²):	0.0
	Curve Number for Region 5, CN5:	0.0
Travel Time Information	Flow (and Channel) Lengths in f	
Sheet Flow:	Flow Length, L (ft):	69
Select Ground Cover	2-yr, 24-hr Rainfall, P2 (inch):	3.38
Other: User enters n	Manning n for Sheet Flow:	0.4
	Surface Slope, S (ft/ft):	.328
	Travel Time, Tt (min):	5.071876482228679
Shallow Concentrated Flow:	Flow Length, L (ft)	326.0
Select Paved or Unpaved	Surface Slope, S (ft/ft):	0.368
Unpaved	Travel Time, Tt (min):	0.5551200696412102
Channel Flow:	Side Slope, z (Horiz/Vert in decimal):	3.0
Select Geometry, Material, Units	Channel Top Width, T (ft):	6.0
Trapezoidal Open Channel	Channel Depth, y (ft):	0.5
Excavated Channel: Stones, cob	Manning n for Channel Flow:	0.035
Channel Dimensions in ft	Channel Length, L (ft)	1512.0
	Water Surface Slope, S (ft/ft):	0.328
	Travel Time, Tt (min):	2.0232578063537856

Reset Inputs to 0.0	All features enabled	Click to Calculate
OUTPUTS	Peak Discharge, Qp (cfs or ft³/s):	82.04559657670282
Peak Discharge in cfs or ft³/s	Runoff, Q (inch):	1.0558303081320912
© 1999 LMNO Engineering,	Unit Peak Disch., Qu (cfs/mi²-inch):	431.706559624112
Research, and Software, Ltd.	Pond and Swamp Factor, Fp:	1.0
http://www.LMNOeng.com	Initial Abstraction, Ia (inch):	0.4096385542168676
INPUTS OR OUTPUTS	☐ Enter these three quantities:	
Select Units:	Total Watershed Area, A (mi²):	0.18
Area in mile²	Overall Curve Number, CN:	83.0
Time of Conc., Travel Times in m	Time of Concentration, Tc (min):	7.650254358223673
INPUTS		
Rainfall Distribution Type I	Precipitation, P (inch)	2.5
Precipitation (and Runoff) in inch	Ponds, Swamps (% of Total Area):	0.0
Curve Number Information		
Region 1:	Area of Region 1, A1 (mi²):	0.18
	Curve Number for Region 1, CN1:	83
Region 2:	Area of Region 2, A2 (mi²):	0
	Curve Number for Region 2, CN2:	0
Region 3:	Area of Region 3, A3 (mi²):	0.0
	Curve Number for Region 3, CN3:	0.0
Region 4:	Area of Region 4, A4 (mi²):	0.0
	Curve Number for Region 4, CN4:	0.0
Region 5:	Area of Region 5, A5 (mi²):	0.0
	Curve Number for Region 5, CN5:	0.0
Travel Time Information	Flow (and Channel) Lengths in f	
Sheet Flow:	Flow Length, L (ft):	69
Select Ground Cover	2-yr, 24-hr Rainfall, P2 (inch):	3.38
Other: User enters n	Manning n for Sheet Flow:	0.4
	Surface Slope, S (ft/ft):	.328
	Travel Time, Tt (min):	5.071876482228679
Shallow Concentrated Flow:	Flow Length, L (ft)	326.0
Select Paved or Unpaved	Surface Slope, S (ft/ft):	0.368
Unpaved	Travel Time, Tt (min):	0.5551200696412102
Channel Flow:	Side Slope, z (Horiz/Vert in decimal):	3.0
Select Geometry, Material, Units	Channel Top Width, T (ft):	6.0
Trapezoidal Open Channel	Channel Depth, y (ft):	0.5
Excavated Channel: Stones, cob	Manning n for Channel Flow:	0.035
Channel Dimensions in ft	Channel Length, L (ft)	1512.0
	Water Surface Slope, S (ft/ft):	0.328
	Travel Time, Tt (min):	2.0232578063537856

Reset Inputs to 0.0	All features enabled	Click to Calculate
OUTPUTS	Peak Discharge, Qp (cfs or ft³/s):	268.16517494711593
Peak Discharge in cfs or ft³/s	Runoff, Q (inch):	3.1740974788445984
© 1999 LMNO Engineering,	Unit Peak Disch., Qu (cfs/mi²-inch):	469.36382307523877
Research, and Software, Ltd.	Pond and Swamp Factor, Fp:	1.0
http://www.LMNOeng.com	Initial Abstraction, Ia (inch):	0.4096385542168676
INPUTS OR OUTPUTS	☐ Enter these three quantities:	
Select Units:	Total Watershed Area, A (mi²):	0.18
Area in mile²	Overall Curve Number, CN:	83.0
Time of Conc., Travel Times in m	Time of Concentration, Tc (min):	7.650254358223673
INPUTS		
Rainfall Distribution Type I	Precipitation, P (inch)	5.0
Precipitation (and Runoff) in inch	Ponds, Swamps (% of Total Area):	0.0
Curve Number Information		
Region 1:	Area of Region 1, A1 (mi²):	0.18
	Curve Number for Region 1, CN1:	83
Region 2:	Area of Region 2, A2 (mi²):	0
	Curve Number for Region 2, CN2:	0
Region 3:	Area of Region 3, A3 (mi²):	0.0
	Curve Number for Region 3, CN3:	0.0
Region 4:	Area of Region 4, A4 (mi²):	0.0
	Curve Number for Region 4, CN4:	0.0
Region 5:	Area of Region 5, A5 (mi²):	0.0
	Curve Number for Region 5, CN5:	0.0
Travel Time Information	Flow (and Channel) Lengths in f	
Sheet Flow:	Flow Length, L (ft):	69
Select Ground Cover	2-yr, 24-hr Rainfall, P2 (inch):	3.38
Other: User enters n	Manning n for Sheet Flow:	0.4
	Surface Slope, S (ft/ft):	.328
	Travel Time, Tt (min):	5.071876482228679
Shallow Concentrated Flow:	Flow Length, L (ft)	326.0
Select Paved or Unpaved	Surface Slope, S (ft/ft):	0.368
Unpaved	Travel Time, Tt (min):	0.5551200696412102
Channel Flow:	Side Slope, z (Horiz/Vert in decimal):	3.0
Select Geometry, Material, Units	Channel Top Width, T (ft):	6.0
Trapezoidal Open Channel	Channel Depth, y (ft):	0.5
Excavated Channel: Stones, cob	Manning n for Channel Flow:	0.035
Channel Dimensions in ft	Channel Length, L (ft)	1512.0
	Water Surface Slope, S (ft/ft):	0.328
	Travel Time, Tt (min):	2.0232578063537856

LOCATION MALIBU CA

Established Series
Rev. LCL/RWK/ARW/KP
10/2001

MALIBU SERIES

The Malibu series consists of moderately deep to soft bedrock, moderately well drained soils that formed in residuum and colluvium derived from inter-bedded shale and sandstone. Malibu soils are on hills and mountains. Slopes are 4 to 75 percent. The mean annual precipitation is about 16 inches and the mean annual air temperature is about 62 degrees F.

TAXONOMIC CLASS: Fine, vermiculitic, thermic Typic Palexerolls

TYPICAL PEDON: Malibu loam, on the side of a mountain at an elevation of 680 feet. (Colors are for dry soil unless otherwise noted).

A--0 to 19 inches (0 to 48 centimeters); brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots; common very fine through medium tubular pores; 10 percent fine and medium subangular gravel; 10 percent fine subangular pararock fragments; slightly acid (pH 6.4); abrupt smooth boundary. (10 to 20 inches thick).

2Bt--19 to 27 inches (48 to 68 centimeters); reddish brown (5YR 4/4) clay; dark reddish brown (5YR 3/4) moist; strong very coarse angular blocky structure; extremely hard, extremely firm, very sticky and very plastic; few very fine roots; 5 percent fine and medium subangular gravel; 5 percent fine subangular pararock fragments; slightly acid (pH 6.4); abrupt smooth boundary. (10 to 20 inches thick).

2Cr--27 to 60 inches (68 to 150 centimeters); highly fractured, bedded, weathered shale and sandstone with about 10 to 15 percent soil in fractures with common very fine roots.

TYPE LOCATION: Ventura County, California; about 1/2 mile northwest of Laguna Peak in an unsectionalized area; Latitude 34 degrees, 6 minutes, 43 seconds north and Longitude 119 degrees, 4 minutes, 16 seconds west; Point Mugu Quadrangle.

RANGE IN CHARACTERISTICS:

Mean annual soil temperature: 62 to 66 degrees F.
Soil moisture: Soil is moist from middle to late November to July.

Depth to soft rock: 20 to 40 inches.
Reaction: Neutral or slightly acid.

A horizon--10YR 5/3, 5/2 and 10YR 3/3, 3/2 moist.
Clay percentage--18 to 27 percent.

Coarse fragments--10 to 15 percent.

Bt horizon-5YR 4/4, 4/6 or 7.5YR 4/4, 5/4 and 5YR 3/4, 4/4, 4/6 or 7.5YR 4/4 moist.
Clay percentage--40 to 55 percent.
Coarse fragments--0 to 10 percent.

COMPETING SERIES: There are no competing series in this family.

GEOGRAPHIC SETTING: Malibu soils are on side slopes of hills and mountains. These soils formed in residuum and colluvium derived from inter-bedded shale and sandstone. Slopes are 4 to 75 percent. Elevations are 10 to 1570 feet. The climate is characterized by warm, dry summers and cool, moist winters. The mean annual precipitation is 14 to 18 inches, the mean annual temperature is 60 to 64 degrees F., and the frost free season is to 290 to 350 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Chumash (T) and Boades (T) soils. Both these soils have bedrock within 20 inches of the soil surface and are on the side slopes of hills and mountains.

DRAINAGE AND PERMEABILITY: Moderately well drained; high to very high runoff; very slow permeability.

USE AND VEGETATION: Wildlife habitat, recreation, cattle production and building site development. Vegetation is California sagebrush, purple sage, white sage, black sage, buckwheat, golden bush and deerweed.

DISTRIBUTION AND EXTENT: Ventura County and Los Angeles County, California. The soil is moderately extensive. MLRA 20.

MLRA OFFICE RESPONSIBLE: Davis, California.

SERIES ESTABLISHED: Los Angeles County, California, Malibu Area, 1973.

REMARKS: The series name is from the city of Malibu. Type location was changed to another location in 1999 and classification was changed from Ultic to Typic (see additional data). Diagnostic horizons and features recognized in this pedon:

Mollic epipedon--The zone from the soil surface to a depth of about 19 inches (A horizon).

Argillic horizon--The zone from a depth of 19 inches to about 27 inches (2Bt horizon).

Paralithic material--The zone from a depth of 27 inches to about 60 inches (2Cr horizon)

ADDITIONAL DATA: National Soil Survey Laboratory Characterization S99CA-111-002.

National Cooperative Soil Survey
U.S.A.

Cumulative Losses of Sand to the California Coast by Dam Impoundment

Final Report to the
California Coastal Sediment Management Workgroup
and the
California Department of Boating and Waterways

Matthew Slagel and Gary Griggs

Institute of Marine Sciences
University of California, Santa Cruz

December 2006

Table 3 continued.

Streams	Pre-Dam Sand & Gravel Flux[a] (m^3/yr)	Post-Dam Sand & Gravel Flux (m^3/yr)	Reduced Sand & Gravel Flux (m^3/yr)	Dams	Age (yrs)	Current Sediment Contributing Area (km^2)	Current % of Controlled Basin	Estimated Current Sand Sed. Rate (m^3/yr)	Estimated Cumulative Sand Behind Dam (m^3)	Estimated Cumulative Silt and Clay Behind Dam (m^3)	Estimated Total Sediment Behind Dam (m^3)	Original Capacity (m^3)	Estimated % Full
10. Santa Ynez	545,000	244,000	301,000	Gibraltar	85	518	48	144,000	17,000,000	42,000,000	59,000,000	28,000,000	100
				Juncal	75	36	3	10,000	970,000	2,400,000	3,370,000	7,600,000	44
				Bradbury	52	526	49	147,000	7,600,000	19,000,000	26,600,000	253,000,000	11
								TOTAL:	25,570,000	63,400,000	88,970,000		
11. Ventura	165,000	93,000	72,000	Matilija	56	142	57	41,000	2,600,000	6,500,000	9,100,000	4,685,400[d]	100
				Casitas	46	106	43	31,000	1,400,000	3,500,000	4,900,000	314,000,000	2
								TOTAL:	4,000,000	10,000,000	14,000,000		
12. Santa Clara	1,249,000	924,000	325,000	Santa Felicia	50	334	22	73,000	8,200,000	20,000,000	28,200,000	124,000,000	23
				Pyramid	32	759	51	165,000	5,300,000	13,000,000	18,300,000	222,000,000	8
				Castaic	32	399	27	87,000	2,800,000	6,900,000	9,700,000	400,000,000	2
								TOTAL:	16,300,000	39,900,000	56,200,000		
13. Malibu	41,000	26,000	15,000	Lake Sherwood	101	41	10	1,500	310,000	780,000	1,090,000	3,320,000	33
				Century	92	10	2	500	160,000	400,000	560,000	650,000	86
				Malibu Lake	82	166	42	6,000	590,000	1,500,000	2,090,000	933,000	100
				Rindge[e]	79	106	27	4,000	350,000	900,000	1,250,000	708,019	100
				Potrero	38	75	19	3,000	110,000	270,000	380,000	976,000	39
								TOTAL:	1,520,000	3,850,000	5,370,000		
14. Los Angeles	178,000	59,014[f]	119,000	Devil's Gate	85	78	3	3,500	1,600,000	1,600,000	3,200,000	3,200,000	100
				Sawpit	78	8	0.5	500	78,000	78,000	156,000	501,000	31
				Pacoima	76	73	3	3,000	520,000	520,000	1,040,000	4,700,000	22
				Big Tujunga	74	212	8	9,500	1,200,000	1,200,000	2,400,000	7,100,000	34
				Eaton Wash	69	26	1	1,000	110,000	110,000	220,000	890,000	25
				Hansen[g]	65	1,808	67	80,000	5,300,000	5,300,000	10,600,000	33,000,000	32
				Sepulveda[g]	64	394	14.5	17,500	1,100,000	1,100,000	2,200,000	22,000,000	10
				Lopez[g]	51	88	3	4,000	200,000	200,000	400,000	550,000	73
								TOTAL:	10,108,000	10,108,000	20,216,000		

Table 3 continued.

Streams	Pre-Dam Sand & Gravel Flux[a] (m^3/yr)	Post-Dam Sand & Gravel Flux (m^3/yr)	Reduced Sand & Gravel Flux (m^3/yr)	Dams	Age (yrs)	Current Sediment Contributing Area (km^2)	Current % of Controlled Basin	Estimated Current Sand Sed. Rate (m^3/yr)	Estimated Cumulative Sand Behind Dam (m^3)	Estimated Cumulative Silt and Clay Behind Dam (m^3)	Estimated Total Sediment Behind Dam (m^3)	Original Capacity (m^3)	Estimated % Full
20. San Diego	55,000	5,000	50,000	Cuyamaca	118	31	4	2,000	2,300,000	3,200,000	5,500,000	15,000,000	37
				Murray	87	10	1.5	500	250,000	340,000	590,000	8,000,000	7
				El Capitan	71	492	67.5	34,000	2,500,000	3,500,000	6,000,000	140,000,000	4
				San Vicente	62	192	26	13,000	820,000	1,100,000	1,920,000	112,000,000	2
				Chet Harrit	43	5	1	500	14,000	19,000	33,000	12,000,000	1
								TOTAL:	5,884,000	8,159,000	14,043,000		
21. Tijuana	64,000	32,188[f]	32,000	Morena	93	295	9.25	3,000	730,000	770,000	1,500,000	62,000,000	2
				Barrett	83	358	11.25	4,000	490,000	530,000	1,020,000	56,000,000	2
				Rodriguez (Mexico)[h]	69	2,530	79.5	25,000	1,800,000	1,900,000	3,700,000	134,000,000	3
								TOTAL:	3,020,000	3,200,000	6,220,000		
							TOTALS:	**2,299,000**	**151,944,000**	**277,179,000**	**429,123,000**		

[a] Pre-dam sand & gravel flux values from WILLIS and GRIGGS, 2003

[b] Value from GRIGGS and HEIN, 1980 to account for Trinity River discharge.

[c] Dam characteristics from the Oregon Water Resources Department, Dam Safety Program, 2006.

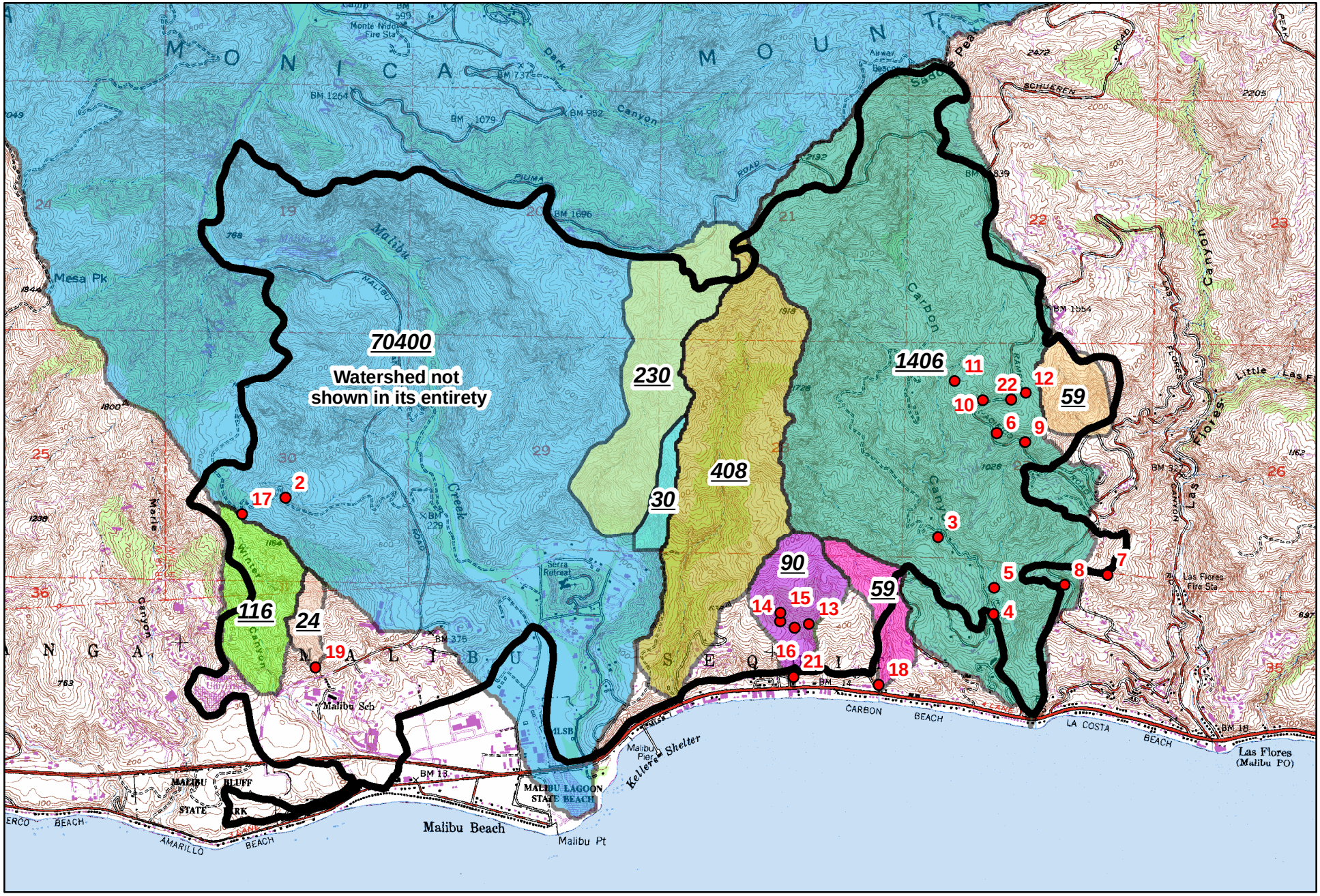
[d] Matilija Dam was notched in 1965 and 1978 to reduce the original capacity from 9,000,000 m^3 to 4,685,400 m^3.

[e] Rindge Dam filled with sediment after only 34 years.

[f] Post-dam sand flux from WILLIS and GRIGGS, 2003 because rating curves did not have sufficient data points.

[g] Dam characteristics from the U.S. Army Corps of Engineers, Los Angeles District, Reservoir Regulation Section, 2006.

[h] Dam characteristics from MALINOWSKI, 2004.



Fire Perimeter

Hydrologist Waypoints

N Drainage Area in ACRES

0 0.25 0.5 1 1.5 2 Miles

Canyon Fire - Malibu, California
Watersheds of Interest

Appendix 3

Engineering Assessment Report

BURN AREA EMERGENCY RESPONSE TEAM # 7 (BAER 7)
SPECIALIST REPORT

Resources Specialty: Slope stability, erosion control, sediment control, storm water run off pollution preservation, and water quality control.

File Name: Malibu Canyon Fire

Date: November, 2007

Author: Alex Alimohammadi, Water Resources Control Engineer (Civil Engineer)

Home Unit: Regional Water Quality Control Board

I. Potential Values at Risk:

There are three main canyons and several smaller drainage areas that direct the storm water runoff toward the ocean. The three main drainage canyons are: (1) Winter Canyon- on the far west side of the burnt perimeter; (2) Malibu Canyon-on the west side of the burnt area; and (3) Carbon Canyon on the east side of the burned area. All of the storm water runoff drains into about 13 private or public catch basins prior to discharge into the ocean. During a Storm Event (intense rainfall), some of these catch basins will be compromised and will fail to prevent sediment and debris release into the Pacific Ocean. Additionally, Malibu Canyon Road will encounter closure near Pacific Coast Highway 1 if effective mitigation measures are not implemented

II. Introduction

I was relocated from the San Diego BAER #10 to Topanga BAER #7 on Thursday, November 8, 2007. I met with some of the BAER 7 team members (appendix A). I accompanied Ruth Norman, and Kevin Taylor on an assessment of a portion of the burned areas.

On Friday, November 9, 2007, BAER 7 team members Kevin Taylor, Wenhua Yu, and I assessed the burned areas starting at Winter Canyon and went easterly towards Carbon Canyon. Our observation and further investigation by other team members indicated that burned areas were about 8% of high intensity, about 62% moderately intensity, about 13% low intensity. About 17% of assessed area was not burned. From Winter Canyon to Carbon Canyon slopes of the hills were greatly variable. In some areas slopes were relative flat (about 1.5% to 3%), where as on the hill sides, slopes were highly steep (ranging approximately from 10% to 85%). Due to this variation, the storm water runoff velocity on the burned areas will vary from low to high for the flat to steep slope areas, respectively. During a storm event (intense rainfall), the hills erode causing sediment and derbris from the fire to migrate into the drainage courses, into the catch basins, and into the ocean.

On Saturday, November 9, 2007, Arthur Aladjadjian (City of Malibu-public Works Inspector), Joe Aubery (Contractor's superintendent with the City of Malibu), and I spent part of the day inspecting the drainage areas and the catch basins. There are 13 catch basins showing in the City of Malibu's "As Built Drawings". The storm water runoff from the entire burned areas will end up in these catch basins. Please see "Drainage and Catch Basin" section of this report for a more for a more detail evolution of these catch basins.

On Sunday, November 10, 2007, BAER 7 team members John Ekhoff, Wenhua Yu, and I assessed the East and West contingency zones outside the burned area perimeter. Fire fighters had cleared the weeds and brushes from the ridge tops to prevent any spread of the fire. This clearing has caused the soil to be exposed causing erosion and sediment runoff onto the hill sides. However, hill sides were heavily vegetated decreasing the amount of sediment received down gradient at the drainage areas. Also, Wenhua Yu and I spent the afternoon inspecting the catch basins for further evaluation.

III. Drainage and Catch Basins Evaluations:

Drainage A

Location A: N 32º 02´ 23.77˝; W 118º 41´ 37.47˝ a catch basin in private property
(see pictures- "Location A")

Impact to:

- Life-- None
- Property -- None
- Resources:

  The catch basin is immediately down gradient from two moderately burned hills. The soil texture in drainage corridor appeared to be very fine. The catch basin is not contracted to effectively contain sediment and debris discharged from the burned areas. Due to the two openings at the storm drain inlet berm, sediment and debris will not be contained. Part of the runoff would directly enter the storm drain leading to the ocean carrying ashes, derbis, and sediment from the burned areas.

Mitigation:

1. Clean up the area by removing ashes and half burned wood sticks.
2. Construct a catch/desilting basin with a riser to contain the storm water runoff and to prevent sediment and derbis from impacting the ocean.

Drainages B, C, D, and E

Location B: N 34º 02´ 28.41˝; W 118º 41´ 45.65˝ a catch basin

Location C: N 34º 02´ 27.61˝; W 118º 41´ 53.40˝ a catch basin

Location D: N 34º 02´ 24.24˝; W 118º 41´ 58.95˝ a catch basin

Location E: N 34º 02´ 22.35˝; W 118º 42´ 05.10˝ a catch basin

All of these drainage areas and catch basins are next to the Malibu Canyon Road.

Impact to:

- Life, Property, and Resources--

  Due to the close approximate of these drainage areas and ineffective catch basins to Malibu Canyon Road, a large amount of sediment will be discharge onto Malibu Canyon Road during a storm event. The sediment discharge may disrupt traffic, creating road hazard and possibly damaging the road.

Mitigation:

1. Clean up the area by removing burned material.

2. Immediate attention should be paid to protecting the Malibu Canyon Road.

3. Containments should be constructed to effectively divert storm water away from the Malibu Canyon Road.

4. The drainage areas need to be cleaned up and cleared of ashes and derbis. All catch basins (B through E) need to be cleaned up by removing debris. Catch basins B, C, and D may be re-constructed each with a riser to contain the storm water runoff that is comingled with sediment and derbies and prevent them from impacting the ocean.

Drainages F

Location F: N 34º 02´ 25.22˝; W 118º 42´ 10.89˝ a catch basin (no pictures were taken)

This catch basin was part of property inside the Pepperdine University boundary.

Impact to:

- Life-- None

- Property--None

- Resources – The catch basin appeared to be well maintained. No immediate water quality concerns were noted.

Mitigation: Minor drainage area clean up is needed.

Drainages G

Location G: N 34º 02´ 14.77˝; W 118º 42´ 01.81˝ a couple acres of spermatic burned area

Impact to:

- Life –None

- Property, and Resources--

This small area (about an acre) is next to the Civic Center Way. The road connects Malibu Canyon Road to Pacific Coast Highway 1. During a storm event (intense rainfall), sediment from this area may disrupt traffic on Civic Center Road.

Mitigation:

1. Clean up the area by removing ashes and half burned wood sticks.

2. The boundary next to Civic Center Road should be protected to avoid sediment runoff from this small burned area.

<u>Drainages H</u>

Location H: N 34º 02´ 19.74˝; W 118º 40´ 27.87˝ a catch basin

Impact to:

- Life--None

- Property--None

- Resources--

These drainage areas and catch basins are adjacent to Sweetwater Canyon Drive. The catch basin included a riser and a 24-inch discharge pipe. The runoff water was being discharged into the storm drain through a 24-inch pipe. During a storm event (intense rainfall), this catch basin will be overwhelmed by additional discharges from upgradient burned areas. It will not effectively prevent sediment and debris release into the storm drain and into the ocean.

Mitigation:

1. Clean up the upgradient areas by removing ashes and half burned wood sticks.

2. Construct velocity dams along the drainage corridor.

3. Cleanup the catch basin as much as possible.

<u>Drainages I</u>

Location I: N 34º 02´ 25.22˝; W 118º 42´ 10.89˝ a catch basin in private property

Impact to:

- Life-- None

- Property--None

- Resources –None

The catch basin with the riser was clean and appeared to be able to handle storm water runoff from small upgradient burned area. Additionally, closely knitted vegetation was observed down gradient from the flow.

Mitigation: None.

Drainages J

Location J: N 34º 02´ 25.26˝; W 118º 40´ 02.31˝ a catch basin

Impact to:

- Life--None

- Property, and Resources--

The drainage area and the catch basin were behind a private ambulance service building. The drainage area mainly consisted of two moderately burned hill sides. The soil was very fine and very loose. There was no barrier or constructed catch basin to contain the sediment runoff. A 24-inch was constructed to carry the storm water from the catch basin to behind a retaining wall next to the Ambulance service building. The runoff from this area would end up in the Pacific Coast Highway 1.

Mitigation:

4. Clean up the area by removing ashes and half burned wood sticks.

5. Construct a catch basin to effectively prevent run off onto PCH.

Drainages K

Location K: N 34º 02´ 24.85˝; W 118º 42´ 58.85˝ a catch basin

Impact to:

- Life—Signs of homeless people living in this catch basin was observed.

- Property--None

- Resources –The catch basin was dry. It appeared that a basin with a riser was constructed a large volume of storm water flow. This indicated that flow rate during a storm event would be of high magnitude. Water Quality may be impacted.

Mitigation:

1. Clean up the upgradient areas by removing ashes and half burned wood sticks.

2. Construct velocity dams along the drainage corridor.

3. Cleanup the catch basin as much as possible.

Drainages L

Location L: N 34º 02´ 23.42˝; W 118º 39´ 35.57˝ a catch basin

Impact to:

- Life-- None
- Property--None
- Resources-- The basin was dry. It services a large volume of discharge from adjacent burned hills. Water quality discharged into the ocean may be impacted.

Mitigation:

1. Clean up the area by removing ashes and half burned wood sticks.

2. Construct velocity dams along the drainage corridor.

2. Construct a catch basin to effectively prevent sediment and debris runoff into the ocean.

Drainages M

Location M: N 34º 02´ 18.10˝; W 118º 39´ 56.39˝ Carbon Canyon Catch Basin

Impact to:

- Life-- None
- Property--None
- Resources-- This is the catch basin for most of the Carbon Canyon storm water runoff. The drainage area encompasses several hills. A massive runoff from the burned areas may compromise the water quality.

Mitigation:

3. Clean up the area by removing ashes and half burned wood sticks.

2. Construct velocity dams along the drainage corridor.

4. Construct a catch basin to effectively prevent sediment and debris runoff into the ocean.

IV Conclusion and Recommendations:

Runoff from the burned areas will impact the water quality with different degrees of severity. The storm water runoff will be impacted highly with ashes and other burned debris discharged from burned areas. Since the water runoff from all drainage areas ends up at ocean, mitigation measures outlined in this report need to be implemented to prevent sediment and debris discharge into the ocean. Polluted ocean water will harm the fish and human beings using the beaches for recreational purposes. Estimating the cost of mitigation measures may be highly inaccurate since a more detailed assessment is warranted.

Location A: N 32º 02´ 23.77´´; W 118º 41´ 37.47´´ a catch basin in private property 11/10/07
North side of the Malibu City Hall

(1)

Burned hill side

(2)

(3)

Pictures 2, 3, and 4- Drainage corredor

(4)

(5)

(6)

Pictures 5 and 6 – Catch basin and the storm water drain.

Due to the two openings in the berm, the catch basin will not prevent sediment and debris from entering the storm drain.

Location B: N 34º 02´ 28.41˝; W 118º 41´ 45.65˝ a catch basin
West of Malibu Canyon Road 11/10/07

(1)

(2)

(3)

Most of the runoff from this area goes to a 36 inch drainage pipe. It goes under the Malibu Canyon Road, and discharges into drainage area shown in “Location A”.

Malibu Canyon Road

Drainage pipe (about 2-3 feet below the road elevation)

Location C: N 34º 02´ 27.61˝; W 118º 41´ 53.40˝ a catch basin

Not shown. Most of the runoff from this location is diverted to “Location D”, but there is some discharge into Malibu Canyon Road

Location D: N 34º 02´ 24.24˝; W 118º 41´ 58.95˝ a catch basin

West of Malibu Canyon Road 11/10/07

(1)

(2)

(3)

(4)

(5)

(6)

(7)

(8)

(9)

Pictures 1 through 9 – Show a flow pattern from the hills towards the Malibu Canyon Road. Part of the runoff ends up at Malibu Canyon Road and part of it enters a drainage pipe (not shown). The runoff in the drainage pipe goes under the Malibu Canyon Road comes out on the other side of it. From there it travels in a drainage ditch next to a burned glass company, into Winter Canyon Road, and into the ocean.

Location E: N 34º 02´ 22.35˝; W 118º 42´ 05.10˝ a catch basin

This drainage/catch basin area is the NE Corner of Malibu Canyon Road and Seaver Drive.

West of Malibu Canyon Road 11/10/07

(1)

(2)

(3)

(4)

(5)

(6)

Most of the runoff ends up at the unprotected storm drain. Some storm water may be discharged onto the Malibu Canyon Road.

Location G: N 34º 02´ 14.77˝; W 118º 42´ 01.81˝
Next to the Civic Center Way- East of Malibu Canyon Road 11/10/07

(1)

(2)

(3)

Civic Center Way

Minor burned area. Some of the runoff from this area will enter the Civic Center Road. Then some of runoff will sheet flow and some will enter the ocean.

Location H: N 34º 02´ 19.74˝; W 118º 40´ 27.87˝ a catch basin
Next to sweet water Canyon Drive 11/11/07

(1)

(2)

(3)

(4)

(5)

(6)

(7)

(8)

(9)

The entire match basin needs to be cleaned up to contain storm water runoff from the drainage corridor upgradient.

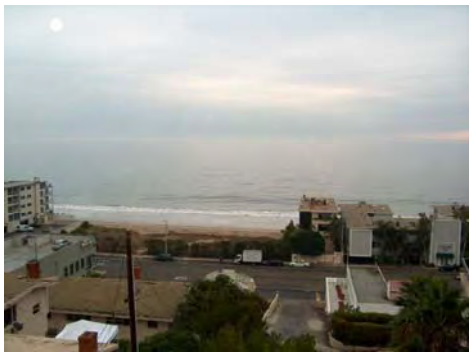
Location I: N 34º 02´ 25.22˝; W 118º 42´ 10.89˝ a catch basin in private property
North of PCH, West of Pacific Coast Green Supper Market 11/11/07

(1)

(2)

(3)

Low intensity burned



(4)

(5)

(6)

A well maintained catch basin with a riser in a private property. No issues were observed.

Location J: N 34º 02´ 25.26˝; W 118º 40´ 02.31˝ a catch basin
North of PCH, West of Pacific Coast Green Supper Market 11/11/07

(1)

(2)

(3)

(4)

(5)

(6)

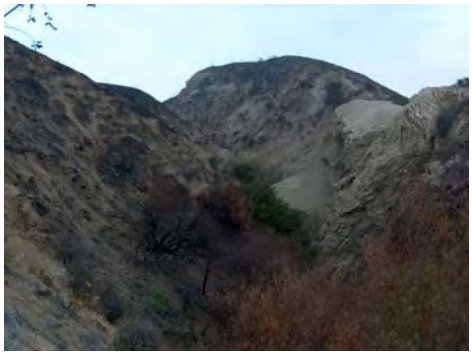
(7)

Pacific Coast Green Super Market

Alley way next to the super Market

The storm water runoff from minor intensity burned area will be discharged on the alley way next to the Super Market and end up on the PCH.

Location K: N 34º 02´ 24.85˝; W 118º 42´ 58.85˝ a catch basin
North of PCH, East of Pacific Coast Green Supper Market 11/11/07



(1)

(2)

(3)

(4)

(5)

(6)

(7)

(8)

Storm water runoff will flow from the area in picture No.1, go through the catch basin with a riser (pictures 3, 4, and 5), enter the storm drain in picture No.8, and end up in the ocean. The catch with the riser basin was dry. There were signs of people living in the basin. The debris from upgradient burned areas needs to picked up and basin need to cleared of debris and personal properties.

Location L: N 34º 02´ 23.42˝; W 118º 39´ 35.57˝ a catch basin- appears to be a Caltran project.
North of PCH 11/11/07

(1)

(2)

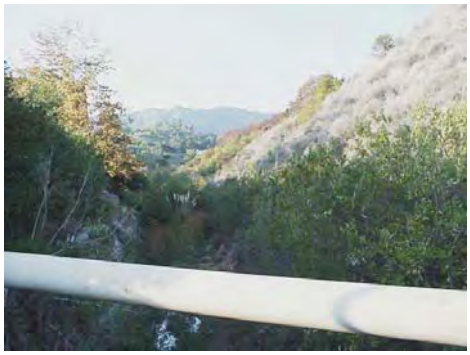
The entire match basin needs to re constructed. It appears not to effectively contain debris and sediment.

Location M: N 34º 02´ 18.10˝; W 118º 39´ 56.39˝ Carbon Canyon Catch Basin
North of PCH 11/11/07

(1)

(2)

(3)

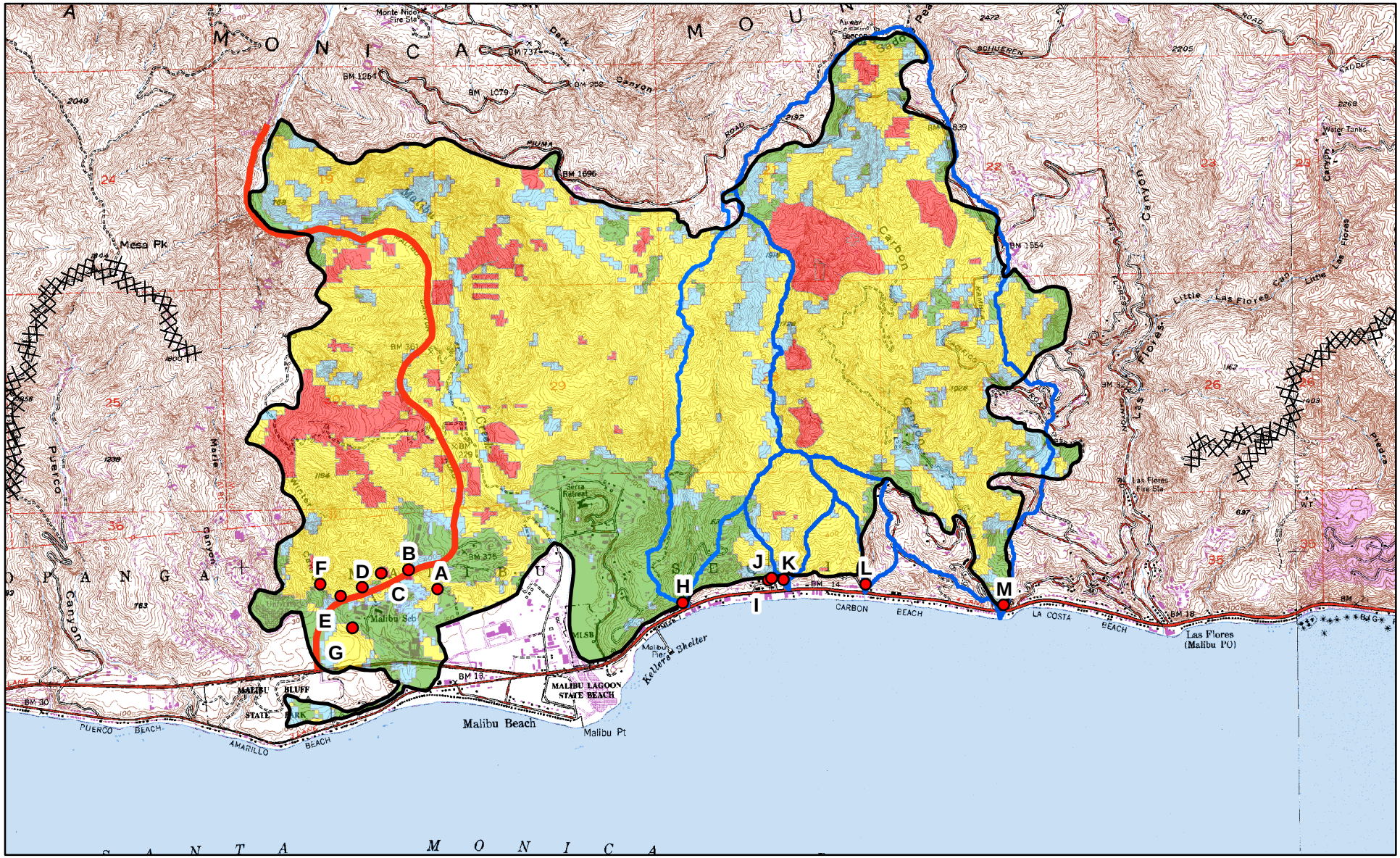


(4)

(5)

(6)

One of the larger discharge Canyons in the Malibu hills.
Picture 1 – A house on the steep slope near the ridge-upgradient from the basin
Picture 2 – A burned structure- upgradient
Picture 3 – Storm water discharge corridor
Picture 4 – Looking north from the catch basin
Picture 5 – Looking south onto the catch basin
Picture 6 – inside the storm water channel that goes under the PCH
This catch basin was not effectively protected with containment area and a riser.
Additionally, high velocity flows need to subsided upgradient using velocity dissipaters.



Fire Perimeter

Watershed

Malibu Canyon Road

Soil Burn Severity
(Unburnt, Low, Moderate, High)

Dozer Contingency Line

Canyon Fire - Malibu, California
Map of Catch Basins and Drainage Points
November 13, 2007

Miles
0 0.2 0.4 0.8 1.2 1.6

Appendix 4

Botany Assessment Report

Burned Area Emergency Report

Resource: Botany

DRAFT FINAL SPECIALIST'S REPORT
Burned Area Emergency Report

Resource: Botany

Fire Name: Canyon Fire **Month/Year:** November 2007

Author Name: John R. Ekhoff, Associate Biologist/Botanist
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1. Resource Condition Assessment

A. Resource Setting

The Canyon Fire Burn Area of 4,330 acres burned mostly wildlands populated by plant mixtures that can be described as belonging to three general community types: Mixed Northern Chaparral, Coastal Sage Scrub and Riparian. These plant communities intergrade with each other in zones commonly referred to as ecotones. The chaparral is the community that dominated the burned area. Plants that characterize this community are woody shrubs that partly developed in the past by fire and many species are stump-sprouters. Common plants of the chaparral are laural sumac, chamise, lilacs, mountain mahogany and shrubby oaks. This community is higher and more inland than the coastal sage scrub which is composed of half-woody shrubs existing in nearly frost-free coastal environments. Common species of the coastal sage scrub are the buckwheats, sages (Salvia), California coastal sage (Artemisia) and goldenbushes (Ericameria being most common). The riparian community being associated with water is a very important wildlife supporting community. Willows, sycamore, alders and oaks are common in riparian areas.

B. Survey Methods

To evaluate the effects to the wildlands and the adjoining areas from the Canyon Fire and activities associated with it, public roads were utilized. Field surveys were conducted on November 6, 8, 10 and 11, 2007. From roadside locations survey walks were made to accessible areas of concern, points were recorded on maps, and field notes were taken. Most of the recorded points (total=70) were locations from which photographs were taken (216). These photo points were locations from which the issue of concern was photographed either at that site or from a distance. Several panoramas were taken at different points. Team #7 members were instructed to help ground truth the Soil Burn Severity Map and periodically perform soil hydrophobic tests when convenient. Points were record by a GPS unit (Garmin Map76) or recorded onto a topographic map directly. Team members worked in pairs according to field safety regulations. For accuracy, team members often were consulted regarding field/map/resource issues as they presented themselves on the landscape.

Local resource agencies and stakeholding organizations were contacted in order to gain access to the areas of concern where there were no public roads. Telephone calls and office visits were made to those stakeholders in order to gather additional information.

C. General Observations

The Burned Area Reflectance Classification (BARC) map provided to the team members had a perimeter that was accurate to a high degree. Field truthing revealed some areas on the perimeter that burned that were not recorded but on the whole they were all small and therefore regarded as too insignificant to make any changes on the map provided.

Nearly all the wildlands, outside of the more protected urban areas, burned. Much of the unburned vegetation recorded on the BARC map are in areas where fire suppression activities took place. Observations showed that the unburned mosaics represented on the BA map appeared to be accurate were vegetation remained. It appears that the mosaic of unburned areas not affected by fire suppression is likely a result of localized micro-environments and air conditions at the time of the fire. Most of the riparian areas burned as did the surrounding chaparral and SSC communities, but the severity in the riparian areas was less. There were locations in the drainages where one could see living green canopies. None-the-less, most of the riparian understory was burned.

Most of the wildland area unburned mosaics were of the chaparral. The chapparal, being the most dominant and flammable plant community, was also the community where most, if not all, the high severity of burn was recorded.

Erosion associated with human activity was noted. Such erosion is usually located adjacent to development and infrastructure. Typically, increased concentrated flows off these structures (roads, paved areas, etc.) focus speeding water onto natural slopes. This concentrated flow erodes away the natural landscape containing the important limited nutrients and soil structures important in the support of the ecosystem. Loss of the native topography and soil reduces the area where ecologically important plant communities can survive thus reducing the health of the associated ecosystem.

Exotic species of plants typically follow areas of human disturbance. These plants become wildland weeds and interfere with the local native ecosystem to various degrees depending upon the species' attributes, population size, and location. These weed species have much influence on the long-term health of the local natural heritage. As with the loss of soil noted above, it is important to note those locations where erosion associated with human activities and structures is taking place or will take place. Most of the photos taken were of areas of human disturbance where erosion issues are important.

There was evidence in the field, despite the destruction caused by the fire, providing information on what species of wildland weeds are present. The recent burn destroyed most of the vegetation but in some areas weed seedlings were just emerging and were identified. Adjacent unburned areas had dried standing stems and fruits indicating the presence of these weeds and were so noted.

Outside of the burned area in different watersheds two fire break contingency lines were refreshed, expanded and/or extended during the fire. Most of these fire break lines have been present since the 1940's. Aerial photos show that they have gotten significantly wider over time. They were once two blades wide, probably over older dirt roads. One of these lines exists on the western ridge over Puerco Canyon about three miles to the west of Malibu. The other contingency line is about 6 miles east of Malibu on the ridge east of Las Flores Canyon. Both lines are conduits for weeds known to invade wildlands. Both lines have the highly invasive and ecologically disruptive euphorb, Euphoria terracina

As a team member of the Burn Area Emergency Report observations of burn/post burn issues related to other team members specialties were also noted, recorded and reported to team members at staff meetings. This was done for it was recognized no team specialist could possibly visit all the burn sites in the allotted time frame of a rapid assessment.

D. Specific Observations

1) Fire Contingency Lines outside of Burn Area

Western Contingency Line (Appendix 1)

Site visits of Nov. 6, 10 and 11, 2007 and GIS information provided by the Fire GIS Specialist at Nat'l. Pk. Ser. suggest that the 0.4 mile long 35 foot wide line from Mesa Peak SW to the peak marked 1800 feet on topo map is newly created on a former dirt track road. Additionally, there is a new fire break ~.5 mile long from the southern tip of the former contingency at the peak marked 885 feet down the ridge to the east to Pacific Coast Hwy. The ridges along the main pre-existing contingency line dozed over an area that had not been cleared for many years for it had recovered to a large degree. The refreshed lines were deeply cut and were 50 to 60 feet wide. The highly invasive weed and ecological damaging, Euphorbia terrecina, was found along this line along with 22 other non-native species, several that are problematic. This line is believed to be all on private lands.

Eastern Contingency Line (Appendix 2 and 3)

Site visits of Nov. 8, 10 and 11, 2007, GIS information and post-fire aerial photography and video provided by the NPS Fire Management Officer for the Santa Monica Nat'l Rec. Area show that this line has been present since the 1940. It has been significantly widened for this fire. The dozer lines are nearly 2 miles in length, over 25 acres of habitat has been removed. This land is held in trust for the protection of habitat by the state agencies of the Santa Monica Mts. Conservancy and Malibu Recreation Conservation Authority. Entrance signs state "SMMC Parkland". There is an agreement that dozer lines will be re-contoured. The newly re-dozed line removed a significant amount of surface, sub-soil to the bedrock surface. The bladed lines were no less than 100 feet wide, in some areas it was 200 feet and in others 150 feet with some variations. Ground estimates are that the average is ~120 feet for the whole distance. Post-fire imagery will give a more accurate account at a later time. Within the bladed areas it is estimated that on average ~10% original soil scraped but intact enough to have damaged plant stems with living crowns and roots; ~20% of the surface is bare bed rock exposed; ~30% subsoil; ~40% a mix of dozer loosened subsoil, rock and topsoil. Of this 40% ~85% is in the perimeter and ~15% is on the dozed area as skips, blade edges and a few water bar type structures. The perimeter berm of this mix has buried to various degrees, several feet in most areas, the adjacent native vegetation. Only the southeast leg has large dozer water bars. The other, longer line (~1.5miles) has no such bars on its sections. The highly invasive weed and ecological damaging, Euphorbia terrecina, exists along this line and dosers have moved the plant and its seed to a large degree. Several other invasive weeds were noted (~20), most notable were the Yellow Starthistle, Maltese Starthistle, African Veldtgrass, and African fountain grass.

Erosion and wildland weed population enhancement and spread are the two important, highly negative resource issues on this land. A major concern on all dozed lands is the transport to other locations of highly ecologically damaging seeds of invasive wildland weeds many of which help increase the likelihood of more fires(appendix X).

2) Malibu Creek State Park

Approximately 1,000 acres (~8,000 total) of the State Park is within the BA. It's park status makes it a high priority for protection relative to much of the other land with the BA. African fountain grass, a highly invasive weed, is encroaching onto the park from the city of Malibu were it has spread far from landscaping plantings. A large manufactured slope (**Appendix 4**) adjacent to Malibu Canyon Road has, in its landscape, the most

damaging and invasive plant in coastal Southern California, Euphoria terracina. There are several other wildland invasive plants in this landscaping project. This project site also has significant rill erosion caused by having all the straw wattle erosion controls installed incorrectly. Adjacent and upgrade from this project site is an access road to the creek that is highly eroded with gully erosion more than 3 feet deep(**Appendix 6**). There was no sign of vehicle used on this ill-constructed, through-cut dirt road. It is not a serviceable road.

Another erosion problem exists ~.5 mile north on Malibu Canyon Road at mile marker 2.51. A native rock and mortar shunt directing flow from culvert is broken and increased flows are heavily eroding the slope bringing excess debris into the parkland has well as roadside weed seeds.

The creek's riparian area has mostly burned, including the understory. There are a few small mosaic areas in the rocky portions that did not burn which revealed some of the invasive plants that exist there. Euphorbia terecina is present. Some Arundo can be seen resprouting from previous control efforts as well as some that never have been treated. Spanish broom, smilo grass, fennel, castor bean and non-native thistles were some of the most noteable wildland weeds in the riparian zone.

The slopes surrounding the riparian area appear to be in good condition outside of some minor unnatural erosion situations. However, decreased fire intervals are type-changing much of the hillsides away from a natural, native plant community to one dominated by laurel sumac and non-native annual grasses.

In the far northwest corner in the BA near Piuma Rd. there is a grove of about 6 medium sized Eucalyptus trees (**Appendix 7**) along the ridgeline trail. The invasive African veldtgrass and Maltese starthistle are also in the area along with several other common weed species.

3) Wildlands in private areas.
The private lands along the top of the watershed along the ridgeline over Carbon, Sweetwater and Malibu Canyon were visited via Piuma Road. Erosion sites and weed species, most notable being African fountain grass and Spanish broom were noted and recorded. Erosion at one site on Piuma Rd. .1 mile from the junction with Schueren Rd. (**Appendix 5**) was noted because the top edge of a gully erosion site is one foot away from the road's edge. These lands are of low priority for resource assessment presently because of the ownership situation.

4) Santa Monica Mountains Conservancy land.
The northwest corner of the BA has some SMMC land near Piuma Rd. There is a mesa with two park benches (one burnt) located at either end of the mesa. At the mid-way point there is a significant erosion gully (**Appendix 7**) that has started at the mesa top. In this northwest area several wildland weed species were noted. The most troublesome were African veldtgrass and Maltese starthistle.

D. Recommendations and rating of natural resource emergencies

THERE ARE NO LIFE OR PROPERTY EMERGENIES IN THIS REPORT

Resource Emergency Ratings: High = **H** , Medium = **M** , Low = **L**

1) Fire Contingency Lines Outside of Burn Area
Fire break construction is spreading invasive wildland weeds leading to a pathway for the invasion of new territories. Appropriate weed control practices should be part of the fire/fuel break construction and

maintenance. Theses practices ought to include: cleaning equipment before and after entering fuel/fire breaks, planting native species of low flammability as ground cover to complete with more flammable non-natives in breaks, and mowing breaks in late spring after weedy annuals have stopped growing but have not yet produced viable seed.

H: The dozers that have done the work on these fire breaks should be located and their activities traced back to locations done after the work on these two dozer lines for they have certainly carried the seeds of Euphoria terracina to those locations. Those locations should be monitored for this plant and the plants treated and locations monitored post treatment.

Western Contingency Line

M: Dozer lines to be treated by pulling outside berms back into the control line, re-contouring or out-sloping the surface to allow for drainage, and where necessary, placing water-bars in the control line. Water bar specifications to be of good standard practice monitored by an appropriate local fire agency knowledgeable in these rehabilitions.

H: Adequate monitoring and weed abatement for a single species, Euphoria terracina for three years. No seeding to be done on site.

Eastern Contingency Line

H: Dozer lines to be treated by pulling the outside berms back onto the control line until the living, adjacent vegetation is completely uncovered. The edges of the control line will be contoured back onto the control line. Straw wattles, jute and /or coir products to be installed in appropriate areas. Hydromulch to be applied and may include seed of giant wild rye and/or telegraph plant. Natural drainage locations associated with this control lines need special attention in order to stop loss of topsoil and nutrients from going down these drainages. Application of these low tech biotechnical products/techniques must be done correctly and monitored by a third and knowledgeable party as the track record for such work is poor. Weed control, especially for Euphoria terracina, yellow starthistle African fountain grass and African veldtgrass must start early this coming season and continue for three to five years along with adequate monitoring that will assure that the seeds will not mature.

2) Malibu Creek State Park

H: The Canyon Fire is most damaging as it is yet another in a series of ever increasing fires to hit the area in short interval time periods. None-the-less, the fire presents an excellent rare time to address the problem of invading wildland weeds now that so much of the biomass is gone thus exposing the weeds for identification and treatment. Highest priority is the control of wildland weed species in the creek's drainage. Highest priority of species to address are, in order, Euphorbia terracina, Arundo, Spanish broom, castor bean and African fountaingrass. State and National Park scientists can identify the appropriate other species to abate in the watershed.

H: The slopes that are type-converting into a laurel sumac/exotic annual grass association ought to be addressed. The University of California Co-operative Extension (UCCE) has expressed an interest in helping to develop a treatment plan to investigate the possibilities of reversing this process. It is recommended that the UCCE be contacted regarding this issue at this most appropriate time.

H The manufactured slope needs to have the rill erosion stopped by installing correctly, rice straw wattles. The slope's rills should have rice straw punched into them and the sloped needs to be mulched to stop rain-splash erosion. Hydromulch is good. No seeds are necessary but if any are to be used Park plant ecologists need to be consulted. Arrangements should be made that the work is properly monitored. This survey found the first known plants of Euphorbia terracina along the Malibu Canyon Road and it was on this site. The plants have not yet gone into flowering, so it is important that they be treated before they do so. If not, this site will become a seed source for introduction hampering abatement work done in the creek area.

M: The eroding old road close (entrance about thirty feet up the road from the above manufactured slope) that wraps around the bottom of the manufactured slope ought to be closed and the erosion gullies treated using low tech check dam structures that allow water to filter past but withhold sediment. Correctly installed rice strawbale dams could accomplish this goal if the road had other erosion control techniques applied. The best solution, but more expensive, would be to re-contour the slope as it is a through-cut road in one small section. To install a manufactured slope similar to the one adjacent to it would be more destructive than the above recommendations. Whatever the solution, the State Park must be consulted first.

L: The northwest section of the BA along the ridgeline near Piuma Road needs spot treatments of the most invasive weeds there such as fennel, Maltese starthistle. The Eucalyptus grove should be treated, dropped and its biomass left on site. Trunk and large limb sections should be used to build erosion control structures in the gully on the mesa edge near the border with the SMMC where the two picnic benches are located.

3) Wildlands in private areas.

L: Fountain grass and Spanish broom needs to be eradicated from the roadsides along Piuma and Rambla Pacifico road as this flammable weeds will continue to spread and degrade not only adjacent land but be carried by vehicles, wind and rain far distances.

L: Erosion gully one foot from Piuma Rd. asphalt edge 0.1 mile west of the intersection with Schueren Rd. ought to be addressed by the appropriate agency before it needs costly repair. This site is where the “2 mile winding” road sign is located.

4) Santa Monica Mountains Conservancy land

L: The wildland weeds in the northeast corner of the BA need to be treated and monitored. The erosion gully on the mesa where the picnic benches are located needs an appropriate application of check dams. This gully is at the top western edge of the mesa mid-way between the two bench locations or at the mesa’s mid-point. Such dams could be constructed from local material. Nearby near the border with the Malibu Creek State Park is a small grove of Eucalyptus trees whose trunks and branches could be cut, sized and installed with jute as check dams.

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MacDonald, Lee H. and Robichaud, Peter R., July 23, 2007, JFSP Final Report: Postfire Erosion and the Effectiveness of Emergency Rehabilitation Treatments over Time, BLM agreement/task order number: 1422RAH03-0014, JFSP project number: 03-2-3-22

Appendix 1: Western Contingency Line

Western Contingency Fire Line Over Puerco/Corral Canyons

Terminal berming near Mesa Pk along ridge to 1800 foot peak to SW (photo #008)

Ridge line fire break along road south towards PCH (photo #202)

Appendix 2: Eastern Contingency Line

Eastern Contingency Fire Line Over Las Flores/Piedra Gorge Canyons

Near mid point of the line (photo#151)

Typical edge of berm along the line(Photo#187)

Appendix 3: Eastern Contingency Lines – Post-Fire Aerial Photos

Eastern contingency lines. Photos from Nat'l Park Service

Terminal end of the eastern contingency line, Note erosion.

Appendix 4: Manufactured Slope along Malibu Canyon Rd.

Incorrectly Installed straw wattles. The weed Euphorbia terracina is present

The slope as viewed from the east side of Malibu Canyon Road

Appendix 5: Erosion gully near asphalt road edge on Piuma Road

Location of erosion on Piuma Road near Schueren Rd. junction(photo #172)

Very near asphalt edge, very steep slope (photo #173)

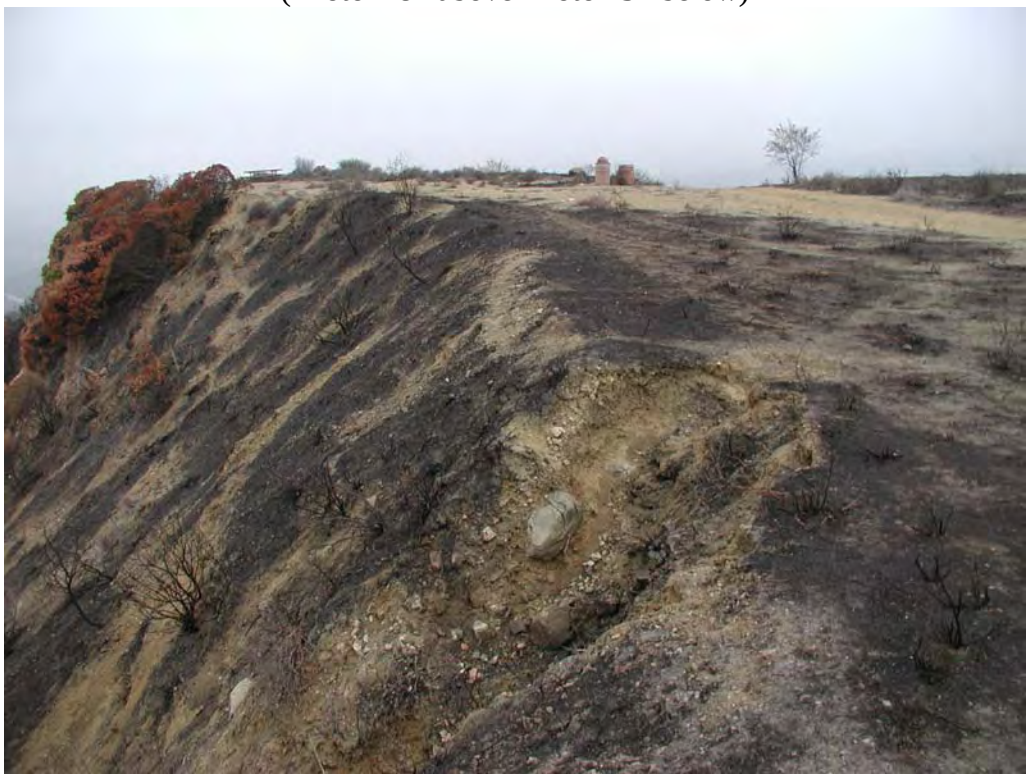
Appendix 6: Gully erosion in old road near Malibu Cyn Rd. (see pg. 4)

Eroded old road near manufactured slope (photo #215)

Eroded old road near manufactured slope (photo #216)

Appendix 7: Eucalyptus grove on ridge near Piuma Road

(Photo # 81 above Photo #51 below)



Erosion on Mesa top on west facing slope near Piuma Road and Eucalyptus grove

Appendix 8:

Invasive Plants and Wildfires in Southern California

Carl E. Bell[1], Joseph M. DiTomaso[2] and Matthew L. Brooks[3]

[1]University of California Cooperative Extension, San Diego;

[2] University of California Davis; and

[3] U.S. Geological Survey, Henderson, NV

Wildfires are a regular and natural occurrence in most of southern California. Some of the common native vegetation types, especially chaparral, coastal sage scrub, and valley grassland habitats, which occur from near the coast to elevations of 3000 ft, are well adapted to fires and will return to their natural state within a few years of a fire under normal conditions. Conifer forests and oak woodlands can tolerate low intensity fires that burn through the undergrowth, but are severely damaged by intense fires like those occurring in southern California in 2003. Riparian (river and creek) vegetation often re-sprout vigorously following fire, possibly as an adaptation to historical fires that occurred during drought years or due to frequent flooding events that usually top-kill plants. The deserts, of all native ecosystems in southern California, have the least history of wildfires, because of the sparse and discontinuous vegetation and are the least adapted to fire.

In all of these different areas or habitats, the presence of weedy non-native invasive plants creates an abnormal situation that can influence wildfires. Invasive plants often increase the frequency of fires by providing more continuous fuels that are easier to ignite. After fires, these weedy invaders typically re-establish more rapidly than native plants, suppressing the recovery of the natives and allowing the weeds to expand their range. In addition, if fires occur too frequently, some of the native vegetation loses the ability to recover at all, effectively converting high diversity native plant communities into low diversity non-native communities.

Invasive plants can increase the window of opportunity for burning and increase the intensity of fires in riparian areas. Fires in native riparian vegetation tend to occur only during periods of extreme drought. They typically remain in the surface vegetation and are of relatively low to moderate intensity. In contrast, fires that are supplemented by invasive vegetation can occur under a broader range of environmental conditions and climates, often spread into the canopies of riparian woodlands and forest, and can reach very high intensities. Native river trees, such as sycamores, cottonwoods, and willows, do not generally recover well from high intensity fires that reach into their canopies, whereas non-natives plants such as saltcedar (*Tamarix spp.*) and giant reed (*Arundo donax*) recover quickly from even the highest intensity fires.

This photo was taken two months after the Otay fire in San Diego County, 2003. Notice the first plants emerging from a recent rain are non-native grasses.

Wildfires can directly affect animals as well, especially species that are small or with limited mobility. However, the habitat changes caused by fires can exert an even greater influence on animal communities. For example, when shrubland is converted to grassland, shrubland animals are replaced by grassland animals. This is not always negative, especially if the shrublands and grasslands exist in a patchwork distribution across the landscape, allowing regional coexistence of both shrubland and grassland animals. In addition, under a natural fire regime grasslands may persist for only a few decades before they are replaced by shrublands. This allows for different animal species to coexist in the same space, but during different post-fire time periods. When the fire regime is changed by invasive plants, either by allowing fires to become larger and thus reducing the spatial patchwork of vegetation type, or by changing the frequency of fire and possibly preventing later successional vegetation types such as shrublands to re-establish, the overall diversity of animal communities declines.

THE INVASIVE PLANTS OF GREATEST CONCERN ARE:

Annual Grasses

This photo was taken 15 months later in March 2005. The lighter green is all invasive annual grasses

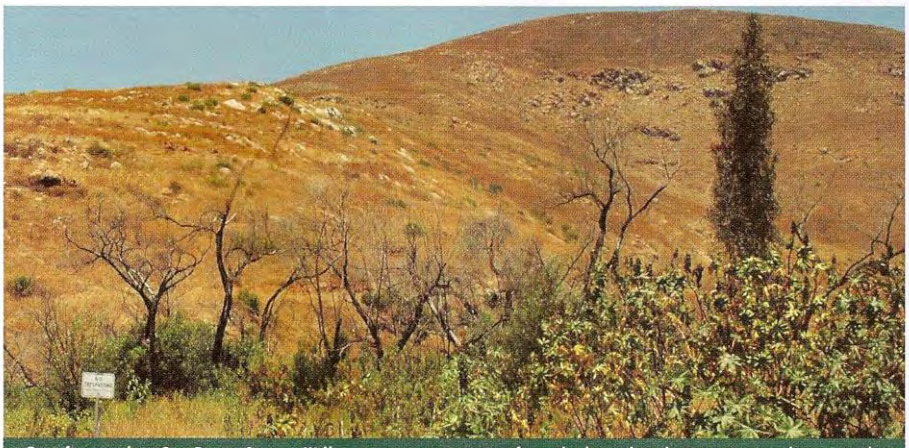
Almost all of the grasses common in southern California today are non-native species from the Old World. These include wild oats (*Avena* spp.), bromes (*Bromus* spp.), ryegrasses (*Lolium* spp.), and a few others. These grasses germinate in the winter and complete their life cycle before summer. Their dried tissues can provide fuel throughout the summer and fall fire season. Mature grass seeds that fall to the ground in early summer will escape damage from high fire temperatures. In the desert, red brome (*Bromus rubens*) and mediterraneangrasses (*Schismus* spp.) helped fuel large fires that have repeatedly burned some areas and converted them from native perennial desert scrub to non-native annual grassland.

Perennial Grasses

Giant reed (*Arundo donax*) is the most common invasive plant in riparian areas of southern California. Because it grows in dense masses to 20-30 ft tall, it creates a large amount of biomass that becomes dry and flammable in the fall. Fires in these areas are expansive and intense, and flames spread easily from the surface into the canopies of

the tallest native trees. Soon after a fire, giant reed re-sprouts quickly from the large rhizome system. By comparison, natives recover very slowly. Gaps left on the river banks provide invasion points for other weedy plants, such as castorbean (*Ricinus communis*) and poison hemlock (*Conium maculatum*).

Pampasgrass (*Cortaderia selloana*) is a large clumping grass, about 6 to 8 feet tall. It is a weed of coastal sage scrub and the upland areas of riparian zones. Although it remains green year round, it can readily burn because its old leaf litter and dead flower plumes provide ample flammable fuel. The large clumps can become massive torches and hinder fire fighter access to burns. Fountaingrass (*Pennisetum setaceum*) is a smaller clumping grass that can establish in wide range of sites in southern California. After the San Diego wildfires of 2003, it was often the first plant to re-sprout along streets and highways. Like pampasgrass, it stays green year round, but the leaf litter and old shoots easily burn.



Post-fire creek in San Diego County. Willow trees are recovering from the base, but the invasive eucalyptus on the right is re-sprouting along the trunk.

Herbaceous Broadleaf Plants

Like the non-native grasses, southern California has numerous Mediterranean forbs (herbaceous broadleaf plants) introduced by European immigrants. These winter annuals grow readily during the rainy season, then die or go dormant by the beginning of the summer fire season. Examples include various mustard species (*Brassica* spp.), filarees (*Erodium* spp.), fennel (*Foeniculum vulgare*), and thistles (*Cirsium* spp.). These species do not usually produce as much fine fuels as do the grasses, but their dried seed stalks burn and the seed within the soil are not damaged or killed by fire. Since they are early germinators like the annual grasses, they can out compete the natives. In the desert, Saharan mustard (*Brassica tournefortii*) produces large amounts of fuel that, when combined with an understory of annual grasses, can be an important contributor to the wildfire problem.

Woody Trees and Shrubs

Several woody invaders, such as saltcedar (*Tamarix* spp), acacias (*Acacia* spp.), and eucalyptus (*Eucalyptus* spp.), readily burn and recover soon afterwards. Like giant reed, these are often invasive in riparian habitats where they increase the frequency and intensity of fires. Saltcedar, in particular, is responsible for intense summer fires along desert rivers. In some cases, fires associated with saltcedar have eliminated stands of native mesquite, cottonwood, and willow along the Colorado River.

WHAT CAN BE DONE ABOUT THIS PROBLEM?

The first defense is to prevent the establishment or remove invasive plants from natural habitats. This can be accomplished by supporting the efforts of private and public organizations working to eliminate or manage invasive plants. It is especially important to read and follow posted materials at the entrance of parks, forests, and preserves that warn against introducing or spreading invasive plants. It is also important to incorporate invasive plant control into wildfire planning and management. The following are some suggestions:

The creation of fire and fuel breaks is often an essential part of fighting, or being prepared to fight, a wildfire. However, fuel breaks can also be a pathway for non-native plants to invade new territory. Appropriate weed control practices should be part of the fire/fuel break construction and maintenance. These practices might include; cleaning equipment before and after entering fuel/fire breaks, planting native species of low flammability as ground cover to compete with more flammable non-native species in breaks, and mowing breaks in late spring after weedy annuals have stopped growing but have not yet produced viable seed.

After a fire, there is often a desire to facilitate recovery of the vegetation within the burned areas, especially on slopes that might erode during the winter rainy period. In the past, it was common to seed areas with quick growing annual plants, typically non-native annual ryegrass or collections of native and non-native forbs. This practice is no longer recommended because the results are not usually successful. In some cases, it rains too much and the seed washes away, or perhaps it does not rain enough for good seed germination. In addition, some of plants used for re-seeding can persist in the site and became invasive. These non-natives can compete with the

native vegetation and prevent recovery. Long-term slope stabilization is better achieved by promoting the recovery of deep-rooted perennial shrubs compared to shallow-rooted annuals. Recovery of native shrubs can be hindered by the seeding of non-native annuals.

A fire the previous year, fueled by non-native grasses, burnt through this stand of Joshua trees leaving scarred trunks. The Joshua trees died a few years later. *This area will probably take 50 to 100 years to fully recover, providing there are no more fires.*

Mulches, straw bales, and straw wattles are sometimes used to temporarily hold soil in place until the native vegetation can re-establish. Care should be taken to select and inspect these materials so they are not a source of invasive plants. The use of certified weed-free hay is good policy.

FIRE FOR INVASIVE PLANT CONTROL:

Fire is also a tool used to manage ecosystems by removing vegetation. In some grassland areas, controlled burns at the right stage of native and non-native plant growth can reduce the weedy plants and increase native bunchgrasses. In other cases, burning damages natives and creates gaps for establishment of invasive plants. Like all other weed control practices such as herbicides, mowing, or tilling the soil, burning has to be utilized properly and should be integrated with other methods. In some cases intentional fires can be incorporated with re-vegetation of native plants. Burning is also a good way to remove dead biomass and expose target plants to a follow-up herbicide treatments.

After a fire, the majority of plant material is consumed, so access to the areas can be much easier. This can provide an opportunity to employ weed control for much less cost and effort.

Wildfire Zone is a new education and outreach program at Cooperative Extension in San Diego County created to increase awareness of wildfire risks and hazards and to offer tips on how they can be reduced.

Go to www.wildfirezone.org *for more regional wildfire information.*

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Recovery Photo (front cover), by Ty Berlanga, DPW-Cartographic Services
All other photo's courtesy of Carl E. Bell, Regional Advisor-Invasive Plants

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University of California, County of San Diego, and the United States Department of Agriculture cooperating.

Insert PDF Botany Waypoints Map

Appendix 5

Fisheries Assessment Report

Resource Specialty: Fisheries
Fire Name: Canyon Fire (Malibu)
November 2007

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I. Potential Resources at Risk:

Malibu Creek is twenty-five miles in length and is the principal water course of the Santa Monica Mountains. It stretches from Boney Mountain to the Malibu Lagoon where it enters the Pacific Ocean. The lower portion of the creek, below the Rindge Dam supports a small population of endangered southern steelhead trout. A transplanted population of endangered tidewater gobies occupies Malibu Lagoon. The Canyon Fire severely impacted both banks of Malibu Creek from approximately ½ mile from the lagoon to about 2 ½ miles up stream, just below the Rindge Dam.

Southern Steelhead Trout (federally endangered)
Prior to the construction of Rindge Dam, Malibu Creek was considered a healthy steelhead creek and routine seasonal runs numbered in the hundreds, if not thousands. After the construction of the dam in the 1920's, essentially blocking the returning steelhead from prime spawning habitat above the dam, numbers of steelhead trout began to decline. The declining numbers in southern California forced the steelhead into federally endangered status in 1997 and the once thriving population, has been reduced to only thirty resident individuals tallied during a stream survey by The Resource Conservation District of the Santa Monica Mountains during a summer survey in 2007. **The occupied steelhead habitat in Malibu Creek was directly impacted by the Canyon Fire.**

Tidewater Goby (federally endangered)
A trans-located population of tidewater gobies were introduce into Malibu Lagoon in 1991. This population persists today. The goby occurs in isolated coastal wetlands in California and has been heavily impacted by non-native species. The goby was listed as endangered in 1994. Recent information suggests that gobies have a wide tolerance for salinity, oxygenation, and temperature, especially over a short period of time. **While their habitat was not directly impacted by the Canyon Fire, debris loads and sedimentation will travel down Malibu Creek and be deposited into the lagoon negatively impacting water quality and habitat.**

II. Resource Condition Assessment

A. Resource Setting

A total of five drainages were impacted by the Canyon Fire; Winter Canyon, Malibu Creek, Sweetwater Creek, an unnamed tributary to Sweetwater Creek and Carbon Canyon. All drainages were surveyed for impacts to native fisheries. Malibu Creek is the largest of the five creeks and currently has two endangered species occupying its waters; southern steelhead trout (*Oncorhynchus mykiss*), located from just below Rindge Dam to the Pacific Ocean and tidewater goby (*Eucyclogobius newberryi*), occupying Malibu Lagoon. The four remaining creeks did not hold native fish potential and were essentially rural drainages, overgrown with non-native plant species. Only Malibu Creek, Winter Canyon and Sweetwater Creek had available water when the surveys were conducted (November 5th and 6th, 2007).

B. Findings of On-The-Ground Surveys

Winter Canyon: The entire length of Winter Canyon burned, from the headwaters to where the creek intersects with Malibu Canyon Road. The fire burned with a moderate to high severity, impacting both banks and the riparian zone. A high percentage of the riparian was scorched, with most of the understory severely burned. No native fisheries issues are present within this creek. Standing water was observed during the survey.

Malibu Creek: Approximately 2.5 miles of Malibu Creek burned from just below Rindge Dam to just above the lagoon. The fire burned with a low to moderate severity impacting both banks. Approximately 20-30% of the riparian zone was scorched, with a low percentage of the understory burned. The fire appeared to burn with a higher severity as it moved downstream towards the lagoon. Moving water was observed during the survey.

Sweetwater Creek: The entire length of Sweetwater Creek burned with a moderate to high severity, impacting both banks. Approximately 40-50% of the riparian zone was scorched, with a large percentage of the understory impacted. No water was observed during the survey. This drainage has no native fisheries issues present within this creek.

Unnamed Tributary: This creek is little more than a rural drainage. The entire creek burned on both banks at a moderate severity. The non-native grasses made up most of the in-creek vegetation and 50% of that was left intact. All vegetation within the creek was singed. No native fisheries issues are present within this creek.

Carbon Canyon: This steep canyon was completely burned on both banks. The fire severity here was moderate to high, with approximately 50-70% of the

riparian zone scorched and approximately 50% of the understory impacted. No native fisheries issues are present within this creek and no water was observed during the survey.

Fire Consequences:

The loss of surrounding vegetation in and around a drainage due to fire can have serious consequences to the creek community. Depending on the fire severity, vegetative debris, heavy ash, silt and sediment will travel down slope and collect in the drainage. This debris field will collect in drainage pools and destroy habitat. Additionally, the water quality in the impacted drainages will severely decline, increasing pH levels and lowering dissolved oxygen levels impacting fish communities. Fires also release pollutants that are normally found in soil and in living and decaying plants that are washed into streams during run off events.

High water events are usually more severe and violent after a fire, as the water volume travels unimpeded down the drainage, scouring the stream bed and destroying the stream community. These high water events will wash boulders and fire debris into the creek again greatly reducing the habitat quality. The severity of the post fire impacts on drainages depend on two things: fire severity on the surrounding bank habitat and riparian zone, and the frequency and intensity of rain events immediately following the fire event.

III. Emergency Determination

As it relates to life, property and immediate negative impacts to resources, the issues described in this report do not constitute an emergency.

IV. Treatment to Mitigate the Emergency

N/A

V. Discussion/Summary

Of the five drainages impacted by the Canyon Fire, the only creek that had native fisheries issues was Malibu Creek. The fire impacted portion of the creek was divided into five sections denoted by Waypoints (MCR1-MCR5) see appendix 1. Each section was examined for fire severity, riparian impact, and using the steepness of the creek banks, sedimentation potential. Digital photos were taken at each waypoint documenting the state of the creek and riparian zone.

MCR1: The fire severity was low, with both banks burned from the creek edge to beyond the ridge line. Approximately 20-30% of the riparian zone was scorched, with a large portion remaining intact. The east side bank displayed a heavy ash load and a higher burn severity. The steepness of the bank and the increased ash

load in this area will significantly contribute to sedimentation and debris issues within the creek. (See appendix 2)

MCR2: The fire severity was low, with both banks burned from the creek edge to beyond the ridge line. Approximately 30-40% of the riparian zone was scorched, with a large portion remaining intact. The surrounding, rocky terrain had a minimal ash load and a medium slope angle. Both banks had a low fire severity, with much of the vegetation, scorched, but standing. The bank topography and low fire severity indicates that this area will have a minimal contribution to sedimentation and debris loads into the creek. (See appendix 3).

MCR3: The fire severity was moderate to high in this creek section, with over 70% of observable riparian zone scorched. The fire burned both banks from the creek edge to beyond the ridge line. The bank fire severity appeared to be low, with all vegetation scorched, but standing. The steep canyon walls will facilitate high sedimentation loads and ash issues at this section. This area had the highest degree of fire impact (see appendix 4).

MCR4: The fire severity was low, burning the southern bank from the creek edge to beyond the ridge line. The fire jumped the northern bank, which is essentially Malibu Canyon Road. Only 20% of the riparian zone was scorched, with most of the creek vegetation left intact. Water was visible at the time of the survey and was flowing, clear of observable ash and debris. The canyon here is very steep and rocky and will facilitate sedimentation loads and ash into the creek during rain events. However, the low burn severity and the minimal burned vegetation on the southern bank suggest that sedimentation and debris loads will be minimal (See appendix 5).

MCR5: This was the end of the burn zone on Malibu Creek. The fire severity was low, with infrequent burn spots along both banks. The fire burned down to the creek edge on the southern bank and partially up the ridge line. Less than 10% of the riparian zone was impacted at this site. Water was visible during the survey and appeared to be running and free of debris. The canyon here is very steep and rocky and will facilitate sedimentation loads and ash into the creek during rain events. However, the low burn severity and the minimal burned vegetation on the southern bank suggests that sedimentation and debris loads will be minimal (See appendix 6).

VI. Recommendations:

A large portion of the Malibu Creek steelhead habitat was impacted by the Canyon Fire. While the tidewater goby habitat (lagoon) was not directly impacted by the fire, it will surely see an increase in sedimentation and debris load during a high water event. These two systems have seen relatively recent catastrophic fire damage and first-year wet season events following the 1993 fire. Both have recovered. Both endangered species (southern steelhead trout and tidewater goby) survived these scorching and high water events. Recent research has shown that fire and seasonal rain have no significant impact to drainage health or steelhead habitat (Spina and Tormey, 2000). This research was conducted on Malibu Creek following the 1993 fire event. The conclusions of the researchers were that no management action was needed to mitigate the effect of sediment deposition on pool habitat due to fire.

It is important to increase the understanding of drainage impacts due to catastrophic events such as fire. Similarly, data gathered documenting the adaptation and recovery of sensitive species to fire and post fire water events may steer future management actions. Post fire monitoring and analysis of this sensitive drainage (Malibu Creek) and how they recover, will assist in management practices in the future.

I strongly recommend that post fire monitoring of the effected areas of Malibu Creek take place. Fisheries experts from the California Department of Fish and Game (the Department), the National Oceanic and Atmospheric Administration (NOAA), the National Park Service (NPS) and the United States Fish and Wildlife Service (USFWS) concur with these recommendations. The assessment should include water quality (pH, dissolved oxygen, turbidity and temperature), stream habitat monitoring (steelhead) and sedimentation deposition assessment in the main drainage (Malibu Creek). The data collected would increase the level of understanding in determining the proper management practices for future post fire issues.

Monitoring Treatment:

The following treatments (monitoring) apply to both southern steelhead trout and tidewater goby habitat and will monitor impacts on the water ways due to the Canyon Fire. The treatment applications are to encompass all impacted portions of Malibu Creek as well as Malibu Lagoon.

A. Treatment Type:

-Water Quality Monitoring (pH, dissolved oxygen, turbidity, temperature)
-Stream Habitat monitoring (steelhead habitat assessment)
-Steelhead population changes from baseline conditions
-Sedimentation Deposition Assessment.

B. Treatment Objective:

To assess the fire impacts to Malibu Creek due to the Canyon Fire event. Monitoring efforts will focus on southern steelhead trout habitat from the upstream extent of the fire impacts to the drainage down to the lagoon mouth. Additional monitoring efforts will occur in Malibu lagoon to assess the health and status of the tidewater goby population.

C. Treatment Description:

Monthly water quality monitoring will include the recording of the following data; dissolved oxygen (DO), pH, temperature, turbidity and alkaline levels. Habitat monitoring will include in-stream channel changes, sedimentation deposition and transport related to pool-channel characteristic habitat and debris load. Sedimentation deposition assessment can co-occur with habitat monitoring. Monthly snorkel surveys will be needed to count steelhead and document any population changes.

D. Treatment Cost:

Monthly monitoring and analysis	$40,000.00
Final report and recommendations	$15,000.00
Total cost	$55,000.00

References

Spina, A. P., and D. Tormey. 2000 Post fire Sediment Deposition in Geographically Restricted Steelhead Habitat. North American Journal of Fisheries Management 20:562-569, 2000.

APPENDIX

1. **Photos of impacted riparian zone in Malibu Creek (MCR1)**
2. **Photos of impacted riparian zone in Malibu Creek (MCR2)**
3. **Photos of impacted riparian zone in Malibu Creek (MCR3)**
4. **Photos of impacted riparian zone in Malibu Creek (MCR4)**
5. **Photos of impacted riparian zone in Malibu Creek (MCR5)**
6. **Site Map of Fisheries Surveys**

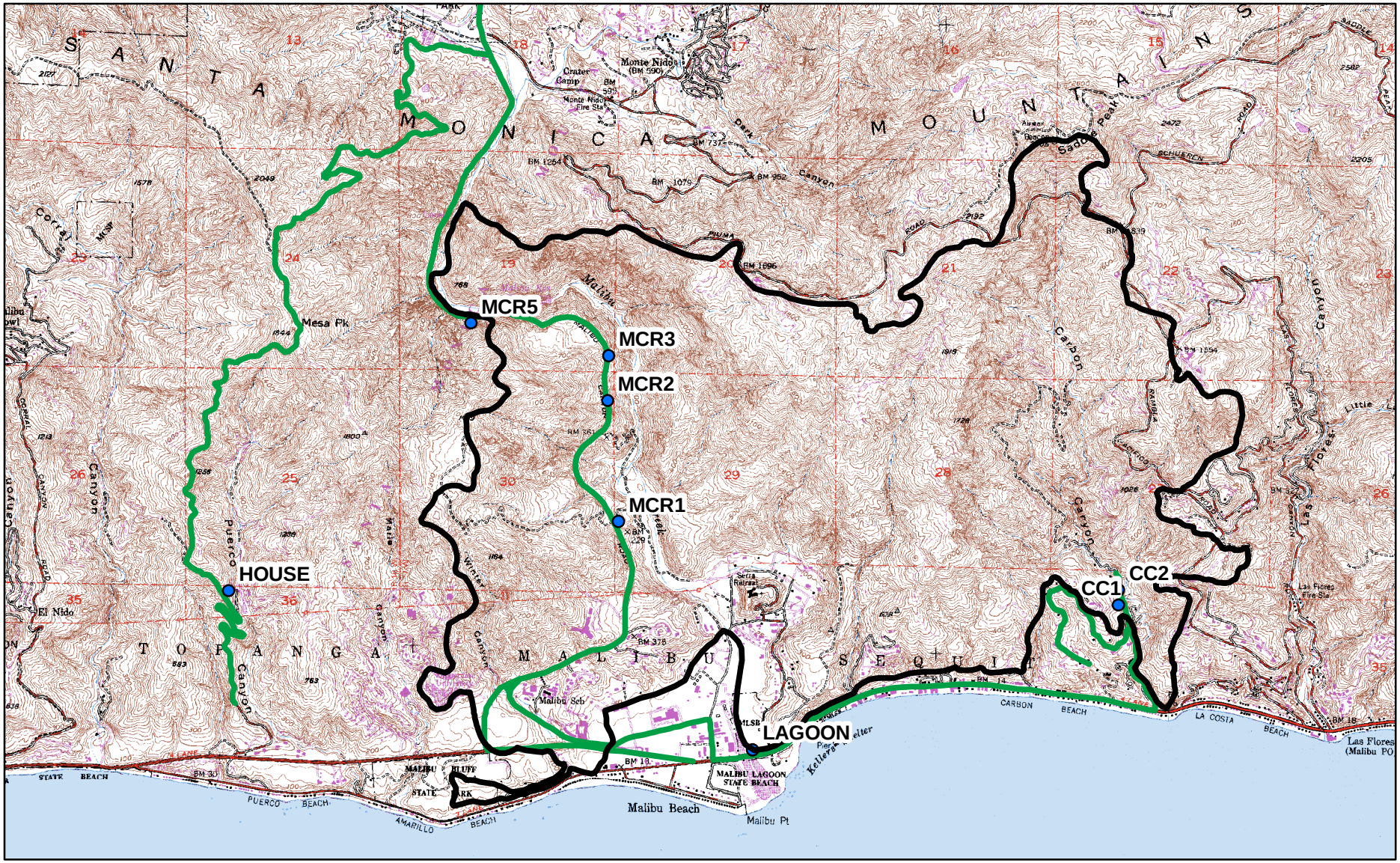
Two photos taken at the waypoint MCR1 showing the burn severity of the Malibu Creek riparian zone and the surrounding habitat.

Two photos taken at the waypoint MCR2 showing the burn severity of the Malibu Creek riparian zone and the surrounding habitat.

A photo taken at the waypoint MCR3 showing the burn severity of the Malibu Creek riparian zone and the surrounding habitat.

A photo taken at the waypoint MCR4 showing the burn severity of the Malibu Creek riparian zone and the surrounding habitat.

A photo taken at the waypoint MCR5 showing the burn severity of the Malibu Creek riparian zone and the surrounding habitat.



Miles

0 0.25 0.5 1 1.5 2

GPS Waypoint

GPS Tracks

Fire Perimeter

Canyon Fire - Malibu, California
Fisheries - GPS Tracks and Waypoints
November 15, 2007

Appendix 6

Cultural Resources Assessment Report

TECHNICAL SPECIALIST'S REPORT
Burned Area Emergency Report

Resource: Cultural Resources (Archaeology/History)

Fire Name: Canyon Fire **Month/Year:** November, 2007

Author Name: David L. (Larry) Felton
Associate State Archaeologist
CA Department of Parks and Recreation
2505 Port St.
West Sacramento, CA 95691
(916) 375-5923 Cell: (916) 471-9165 (lfelt@parks.ca.gov)

Note These appendices contain confidential information regarding archeological site locations, so have been removed from public copies of this report in accordance with the policy of the Office of Historic Preservation as adopted by the State Historical Resources Commission under the authority of Public Resources Code 5020.4.

The original copy of this material is maintained in a confidential file by the author at California Department of Parks and Recreation's State Archaeological Research Facility, 2572 Port St., West Sacramento, CA 95691

I. Potential Values at Risk

Cultural resources reflecting prehistoric and historic period human activity are present within the Canyon Fire vicinity. These include archaeological sites representing Native American (Chumash) occupation, as well a variety of historic structures and landscape features resulting from historic period uses. These resources are routinely documented by the California Historic Resource Information System (CHRIS). Their significance is typically evaluated with reference to National Register of Historic Places (NRHP) criteria.

Potential threats to the physical integrity of these cultural resources include:

- Fire itself;
- Measures taken to fight the fire (e.g. contingency lines);
- Erosion initiated or exacerbated by either of the above;
- Post-fire rehabilitation efforts to minimize erosion or restore habitat, and
- Unauthorized excavation or artifact collecting from archaeological site made accessible by loss of vegetation or grading.

II. Resource Condition Assessment

A. Resource Setting

Upon mobilization of the BAER team, a cultural resource inventory of the effected area was compiled from the following sources:

1. National Park Service (NPS), Santa Monica Mountains Recreation Are (Robert S. Taylor; Phil Holmes).
2. California Department of Parks and Recreation (DPR); Angeles District Archaeologist (Barbara Tejada), and on-line document library (UDF-Unit Data File).

3. CHRIS - South Central Coastal Information Center (SCCIC), CSU Fullerton (Thomas Shackford, Michelle Galaz).

CONFIDENTIAL ARCHAEOLOGY INFORMATION

CONFIDENTIAL ARCHAEOLOGY INFORMATION

CONFIDENTIAL ARCHAEOLOGY INFORMATION

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CONFIDENTIAL ARCHAEOLOGY INFORMATION

Appendix 7

Forestry Assessment Report

TECHNICAL SPECIALIST'S REPORT

Resource: Forestry
Fire Name: Canyon Fire **Month/Year**: November 2007

Author Name: Ruth Norman, Registered Professional Forester #2474
California Department of Forestry and Fire Protection
135 Ridgway Avenue
Santa Rosa, CA 95401
ruth.norman@fire.ca.gov
Office (707) 576-2940

2. Potential Values At Risk

The potential values at risk are roads, utility lines and structures (homes, businesses, outbuildings, etc) that could be directly damaged by falling trees as well as the function of downstream drainage facilities that could be impacted indirectly by woody material transported in streams during high flows.

3. Resource Condition Assessment

A. Resource Setting

The Canyon Fire burn area (approximately 4,329-acre) is approximately 51% LA County responsibility area (mostly undeveloped Conservancy land), 26% State Park land, 22% City of Malibu responsibility area with an incidental amount of National Park Service responsibility land (percentages from NRCS). The burn area does not contain any commercial timber stands as defined by the Forest Practice Act. There are minor amounts of alder (*Alnus rhombifolia*), California walnut (*Juglans californica*), California sycamore (*Platanus racemosa*), California liveoak (*Quercus agrifolia*) and California bay/laurel (*Umbellularia californica*) in the undeveloped lands above the community of Malibu. Within the city limits there are a wider variety of tree species, many exotic, such as eucalyptus.

B. Findings of on the ground survey

Undeveloped areas were evaluated from roads, aerial photography and preexisting vegetation mapping. Urban trees were noted in a general fashion but not specifically evaluated. It does not appear that there are any sizable areas of woodland or forest within the burned area, with most of the trees in the undeveloped portion of the watershed being concentrated in the bottom of the Malibu Canyon drainage, see photographs in other specialist's reports.

1. Resource condition resulting from fire

Individual trees were damaged or killed by the fire, many trees were unaffected. Some living trees in Malibu Canyon showed evidence of repeated fire exposure. Basal fire scars were present and the bark clearly showed growth following the earlier burn damage. Many of these trees are expected to survive. Some more extensively damaged trees (and many of the shrub species) are likely to sprout from the root collar. Sprouting at the base of shrubs denuded by the fire was observed in several locations. Unburned vegetation and sprouting trees (and shrubs) will maintain living root systems and will continue to hold soils in place to some degree.

For most of the burn area the dead material (fallen leaves and twigs) that had protected the soils from direct rainfall impacts has been completely removed. Where trees were damaged or killed but the leaves were not consumed by the fire these leaves are now falling and providing some protection to the soil surface from raindrop impact. This effect is limited due to the small areas where trees are present. In many of the areas that only had shrub cover prior to the fire all leaves were consumed in the burn and there are no leaves left to fall and protect the soil surface. However, other vegetation (notably giant wildrye, *Leymus condensatus,* a grass species) has also sprouted in many areas providing root binding and some soil surface protection. See the Botanist's and other Technical Specialists reports for additional discussion of how this may be influence soil erosion and runoff potential.

2. Consequences of fire on values at risk

The values at risk considered in this assessment include the possible loss of life and property due to falling trees. While these hazards are part of natural processes there will be more standing dead stems and falling limbs as a result of fire damage. It is expected that individual property owners are currently or have already removed fire killed trees that could damage their homes and other improvements on their property. With the limited extent of forest and woodlands outside of the developed extent of the City of Malibu the impact from dead trees will be small as few trees (living or dead) appear to be present in the immediate vicinity of roads and utility lines. Trees or limbs falling into drainages could migrate downstream during heavy flows and exacerbate bottlenecks in the flow patterns. This impact is limited by the finite number of trees in the undeveloped areas and the fact that most are standing and not expected to fall in the immediate future absent some other event, such as a severe wind storm.

The standing burned brush is unlikely to wash downslope in large volumes this winter. Sprouting (new green shoots) from the root collars of standing burned brush in many locations indicated that the root systems are not dead. These plants, even though the upper portions are dead, are likely to remain in place. Only the smallest twigs are likely to detach from the burned bushes this winter and they should pass through downstream culverts and other structures without impeding flows.

There may be individuals (landowners) removing the dead brush from near homes and transporting the material by pickup truck a short distance to the nearest undeveloped area and depositing the burned material there. This is a concern if material is placed near enough to a stream channel to allow it to be caught in high flows and move downstream to a culvert or flood control structure where it could block or impede the flow.

4. Emergency Determination

The existing condition does not appear to present an emergency in itself. As it relates to the potential for blockage of drainage facilities removal of woody debris would included drainage maintenance as described in other reports. As indicated above trees of significant size are rare in the watersheds within the burned area.

Within the City of Malibu tree removal is expected to be covered in many cases by the property owners insurance and to be expedited by the desire of the residences to remove the potential hazard to their dwellings and other structures.

5. Recommendations

A. General Recommendations:

1. Evaluate damaged trees within the Malibu city limits and near residences, roads, frequently used trails etc. throughout the drainage for removal of those stems that could fall on structures, vehicles or people, that could damage powerlines/utilities, or fall where they could damage or block drainages/flood control structures.
2. Inspect culvert and pipe inlets frequently for limbs and other vegetation that may have come from upslope during high flows. Remove such material promptly.
3. Any dead or severely damaged trees noted by citizens, City of Malibu personnel or County personnel that appear to lean toward or could fall on public roads, powerlines or other public utility facilities should be reported to the appropriate authority for immediate removal.
4. Stations should be established for collecting material removed from private ownerships to prevent dumping of this material indiscriminately on the undeveloped lands.
5. Publication of the recommendations to report trees that could threaten roads/public utilities and to avoid disposal of burned brush in the wildlands above town should be done in various media formats – newspaper, website and possibly cable television.

This report has no references or appendices.

Appendix 8

Contacts

BAER Team #7 Primary Contacts

Below is the list of PRIMARY contacts for known governmental stakeholders for the Canyon Fire BAER assessment.

As per our Archaeology Technical Specialist, it may also be advisable to include in any MASG outreach the Office of Historic Preservation, Milford W. Donaldson (Wayne), State Historic Preservation Officer,Office of Historic Preservation, PO BOX 942896, SACRAMENTO, CA 94296-0001, Phone: (916) 653-7113 Fax: (916) 653-9824 Email: mwdonaldson@parks.ca.gov

Mike Takeshita is the LAC Fire liaison to all other government agencies and stakeholders in the area for the Canyon Fire and has coordinated previous meetings regarding post fire effects.

BAER Team #7 Primary Contacts for Canyon Fire assessment

*** Primary contact for agency/entity.

	AGENCY/ENTITY	FIRST	LAST	TITLE	PHONE	EMAIL
***	LAC Fire	Michael	Takeshita	(LAC Fire Liaison to governments)	818-222-1108	mtakeshi@lacofd.org
***	LAC Public Works	Chris	Stone		626-458-6102	scstone@dpw.lacounty.gov
***	State Parks	Suzanne	Goode	Environmental Scientist	818-880-0364	sgood@parks.ca.gov
***	Cal Trans	Marvin	Pruitt		818-881-6074	marvin-pruitt@dot.ca.gov
***	Nat'l Park Service	Kathy	Kirkpatrich		805-370-2391	kathryn-kirkpatrick@nps.gov
***	City of Mailbu	Robert	Brager	Public Works Director City Engineer	310-804-9800	bbrager@ci.malibu.ca.us
***	NRCS	Brooks	Englehart		805-469-8267	
***	LA RWQCB	Dave	Bacharowski	Assistant Executive Officer	213-576-6607	dbacharo@waterboards.ca.gov
***	Nat'l Park Service	Robert	Taylor	GIS	805-370-2357	robert_s_taylor@nps.gov
***	Native American Heritage Commis	Dave	Singleton	Program Analyst	916-653-6251	cell 760-801-8011

Name	Agency	Phone	e-mail
Michael Takeshita	LAC FIRE	818 222-1108	Mtakeshi@lacofd.org
Chris Stone	LAC Public Works	(626) 458-6102	cstone@dpw.lacounty.gov
LARRY FELTON	STATE PARKS/BAER	(916) 375-5923	LFELT@PARKS.CA.GOV
Kristi Birney	State Parks	(818) 880-0350	Kbirney@parks.ca.gov
Barbara Tejada	State Parks-Angeles	818-880-0350	btejada@parks.ca.gov
Suzanne Goode	Ca. State Parks	818-880-0364	Sgood@parks.ca.gov
Kevin Johnson	LAC Fire	323 890-4330	KTJohnso@LACOFD.org
Marvin Pruitt	Caltrans	(818) 881-6074	marvin_pruitt@dot.ca.gov
Reginald Lee	Asst. Chief LACo. Fire Div. 7	(310) 317-1807 323 881-6183	rlee@fire.lacounty.gov
BRAD DAVIS	Emergency Management CITY OF MALIBU	310.456.2489	BDAVIS@CI.MALIBU.CA.US
Kathy Kirkpatrick	NPS	805 370-2391	kathryn_kirkpatrick@nps.gov
Michael Manson	Calif Geological Survey	707/480-8598	mmanson@conservation.ca.gov
ROBERT BURNS	CA - DEPT WATER RESOURCES	916-227-5637	rburns@water.ca.gov
Ruth Norman	CalFire (CDF)	707-570-9127	ruth.norman@fire.ca.gov
Wendy Snyder	CalFire (BAER TEAM)	707-576-2941	wendy.snyder@fire.ca.go
John Munn	CALFIRE (BAER)	916-203-0318	john.munn@fire.ca.gov
Kevin Taylor	DWR (BAER)	530.949.1455	ktaylor@water.ca.gov
Robert S. Taylor	NPS	(805) 370-2357	robert_s_taylor@nps.gov

Attendance list of stakeholders meeting on Nov 5, 2007

Resource Specialist Kevin Taylor 11-12-07

BAER TEAM # 7 – CANYON FIRE – STAKEHOLDER CONTACTS

SPECIALIST (name)	CONTACT (phone, address)	CONTACT DATE (field, office, meeting)	RESOURCES ACQUIRED (Maps, Reports, References for Group Report)	COMMENTS
Kevin Taylor	Chris Stone	11-5-07 mtg. Monday @ civic cntr.	offer of assistance & intro to LA County hydrologist	Explained 'phase' discharge model and proposed delivery date of product as 4-8 wks
Kevin Taylor	Robert Brager Arthur Aladjadjian Richard Calvin	11-9-07 mtg. Friday @ City Hall	offer of assistance provided maps of debris basins & culverts	All ph #'s 310.456.2489 R.B. ext 247 A.A. ext. 235 R. Calvin by telephone ext. 264
Kevin Taylor	Mike Takeshida	11-5-07 mtg. @ Civic Center	quad maps of Malibu	Helpful - secured & delivered resource
Kevin Taylor	Chang Lee	11-5-07 telephone	quad maps of Malibu	Helpful - secured & delivered resource
Kevin Taylor	Tim Ross	11-5-07 telephone	quad maps of Malibu	Helpful - facilitated production of Quad maps
Kevin Taylor	Iraj Nasseri LA Co DPW - Hydrology	11-13-07 telephone	Preparation of flow/debris model for Malibu Watershed	Operated LA Co. DPW - Hydrology model for flows w/ little notice.
Kevin Taylor	Ben Willardson LA DPW-hyd	11-15-07 telephone	LA Co. Debris Production rate curves.	Described parameters and function of Malibu discharge model.

Resc. Specialist J. Ekhoff

BAER TEAM # 7 – CANYON FIRE – STAKEHOLDER CONTACTS

SPECIALIST (name)	CONTACT (phone, address)	CONTACT DATE (field, office, meeting)	RESOURCES ACQUIRED (Maps, Reports, References for Group Report)	COMMENTS
Suzanne Goode Senior Env. Sci.	(818) 880-0364 sgood@parks.ca.gov	11-6-07 Office meeting 11-15-07 T/C	Lower Malibu Crk Watershed Gen. Veg. Typo Map by photo interpretation Lower M. Crk veg. map classes Discussion of resources	CA Dept of Parks & Rec Walked lower portion M Crk St. Pk 3 days post-fire ~1/2 mi. Flew over briefly.
Nathaniel Cox Environmt Scientist	(818) 880-0350 ncox@parks.ca.gov c (310) 699-3951 1925 Las Virgenes Rd. Calabasas	11-6-07 Office Mtg, Field T/C 11/7/07	See above - 'Nat' lead BAER team (Hovey, FeHo, Ekhoff) to Western Contingency Line	CA Dept. Parks & Rec Walk over MCSP in drainage short distance from Malibu city ~1/2 mi.
Khristi Birney Environ Sci.	(818) 880-0350 kbirney@parks.ca.gov	11-6-07 office mtg, T/C 11-7-07		CA Dept of Parks & Rec
Kathryn Kirkpatrick Fire Mgmt Officer	(805) 370-2391 401 W. Hillcrest Dr. Thou. Oaks, CA 91360 kathryn_kirkpatrick@nps.gov	11-7		NPS Nat'l Park Service - Santa Monica Nat Rec Area
Marti Witter, PhD Fire Ecologist N.P. Service	(805) 370-2333 see above marti_witter@nps.gov	11-7, 13, 15-07		N.P.S - SM Mts. N. Rec Area
Robert Taylor, PhD Fire GIS Specialist/ Biogeog.	(805) 370-2357 robert_s_taylor@nps.gov	11-13, 14, 15-07		

BAER TEAM # 7 – CANYON FIRE – STAKEHOLDER CONTACTS

SPECIALIST (name)	CONTACT (phone, address)	CONTACT DATE (field, office, meeting)	RESOURCES ACQUIRED (Maps, Reports, References for Group Report)	COMMENTS
Rorie Skei Chief Deputy Director of	(310) 589-3200 x112 c(310) 985-5102 5750 Ramirez Cyn. Rd, Malibu 90265	11-8, 13, 15-07 Telephone Calls T/C	Entrance Gate comb lock combination	SMMC is a State Agency chartered to acquire wildlands the Malibu Recreation Conservation Authority lands has a JPA to hold land in title. Rorie is Chief Deputy CEO of MRCA Outside Fire crews less sensitive than locals
Jo Kitz Program Director Mt. Restoration Trust	(818) 591-1859 x203 Mt. Restoration Trust 3815 Old Topanga Rd. Calabasas 91302	11-7-	Telephone conv.	Santa Monica Bay Commission has funded weed abatement in Malibu Cyn St. Park. 2nd grant from 05 to 10 had final approval Oct '06. more info. on weeds given.
Carl Bell UCCE Davis-San Diego Region	(858) 694-3386 San Diego Co. Agri. Com. office 134	11-15-07 T/C	information on weed controls willing to help direct.	available to help plan wildland weed treatment on Malibu Cyn St. Pk on Malosma/grass type-conversion.
David Bainbridge Erosion Control	(858) 635-4616 Alliant International University San Diego	11-15-07 T/C	Post-fire erosion control consulting information	available to direct erosion control questions in future.

SPECIALIST: LARRY FELTON

BAER TEAM # 7 – CANYON FIRE – STAKEHOLDER CONTACTS

~~SPECIALIST~~ (name) CONTACT	CONTACT (phone, address)	CONTACT DATE (field, office, meeting)	RESOURCES ACQUIRED (Maps, Reports, References for Group Report)	COMMENTS
Robert S. Taylor	NPS, GIS FIRE (805) 370-2357	11/5/2007 meeting w/ City/County	- PRINTED MAP - GIS DATA (SHP Files FOR: Archaeology, Property Boundaries, etc	- Archaeological GIS Data was A tremendous asset & time saver
Phil Holmes	NPS, Anthropologist (805) 370-2300, ext. 2335	11/9/2007 Phone call	Referred to by Robt. TAYLOR; DISCUSSED Damage to Archaeology SITE LAN-1915	- Hope THAT Phil, NPS STAFF WILL TAKE ON DOCUMENTATION/ DATA RECOVERY WORK FOR this Arch. SITE
SUZANNE GOODE	STAT PARKS ENVIRON. SCIENTIST. (818) 880-0364	11/5/2007 – City/Co. meeting 11/6/2007 – meet @ PARKS DISTRICT OFFICE	General INFORMATION ON Fire DAMAGE, esp Contingency LINES; consult with BAER BOTANIST, BIOLOGIST	
Barbara TejaDA	STATE Parks DISTRICT Archaeologist (818) 880-0350	11/5, 6, 9/2007 meetings @ City HALL, PARKS DIST. OFFICE	- MAPS OF ARCHAEOLOGICAL SITES IN STATE Park Property; Rindge DAM, HIWAY TUNNEL Records	
Thomas SHACKFORD, Michelle Galaz	CA Historical RESOURCES INFORMATION center (714) 278-5395	11/7/2007 at I.C. OFFICE, CSU, Fullerton	copies OF Archaeological MAPS, RECORDS OF FIRE AREA.	very Helpful; HAVE OPEN ACCOUNT FOR Followup INFORMATION IF Needed
DAVE Singleton	Native American HERITAGE Commission (916) 653-6251	11/9-13/07 EMAIL	List OF Native American community Contacts	Per INSTRUCTIONS FROM Rich Jenkins – Included in Report.

Resource Specialist
FELTON

BAER TEAM # 7 – CANYON FIRE – STAKEHOLDER CONTACTS

SPECIALIST (name)	CONTACT (phone, address)	CONTACT DATE (field, office, meeting)	RESOURCES ACQUIRED (Maps, Reports, References for Group Report)	COMMENTS
PAUL VEISZE, Roland Shield, Gary Walter	DPR GIS Specialists	Various	Pre-Fire Aerial Photograph,	They Also made Contacts with a Variety of Agencies, trying to Learn whether post-Fire Aerial Photog. was Available
Rich Jenkins, Herb Dallas	CDF			

Resource Specialist - Alex Alimohammadi

BAER TEAM # 7 – CANYON FIRE – STAKEHOLDER CONTACTS

SPECIALIST (name)	CONTACT (phone, address)	CONTACT DATE (field, office, meeting)	RESOURCES ACQUIRED (Maps, Reports, References for Group Report)	COMMENTS
Arthur Aladjadjian	City of Malibu DPW (310) 804-9800 xt. 247	11/10/07	Maps	Very helpful w/ locating Storm Drains. Very Cooperative
Joe Aubry	Contractor w/ city of Malibu (310) 804-9800	11/10/07	Maps	

Resource Specialist - Tim Hovey

BAER TEAM # 7 – CANYON FIRE – STAKEHOLDER CONTACTS

SPECIALIST (name)	CONTACT (phone, address)	CONTACT DATE (field, office, meeting)	RESOURCES ACQUIRED (Maps, Reports, References for Group Report)	COMMENTS
T.H. ?	MARK CAPELLI (NOAA)	NOV. 12 2007	REFERENCES	NOAA
T. HOVEY	MARY LARSON	NOV. 9 2007	REFERENCES	CDFG
T. HOVEY	CAMM SWIFT	NOV. 12 2007	REFERENCES	ENTRIX (CONSULTING)
T. HOVEY	DWAYNE MAXWELL	NOV. 9 2007	REF.	CDFG
T. Hovey	USFWS CHRIS Delith.	NOV 13th	Ref	USFWS
T.H.	Anthony Spina	NOV 13th	Ref (Paper)	NOAA

BAER TEAM #7
CONTACT LIST

POSITION	FIRST	LAST	TITLE	AGENCY	CELL	OFFICE	EMAIL
Team Leader	Wendy	Snyder	Forester II	CALFIRE Resource Management	707-303-5026	707-576-2941	wendy.snyder@fire.ca.gov
Geology	Mike	Manson	CEG	Dept. of Conservation CGS	707-480-8598		mmanson@consrv.ca.gov
Hydrology	Kevin	Taylor	Water Master	Depart. Of Water Resources	530-949-1455		ktaylor@water.ca.gov
Soils	John	Munn	Forester II	CALFIRE Resource Management	916-203-0318		john.munn@fire.ca.gov
Wildlife	Tim	Hovey	Associate Fisheries Biologist Inland Fisheries Management South Coast Region	Inland Fisheries Management South Coast Region	661-263-9418	661-297-8920	thovey@dfg.ca.gov
Fisheries	Tim	Hovey	Associate Fisheries Biologist Inland Fisheries Management South Coast Region	Inland Fisheries Management South Coast Region	661-263-9418	661-297-8920	thovey@dfg.ca.gov
Botany	John	Ekhoff	Associate Biologist	South Coast Region (R5) Land Management and Monitoring Program	858-467-4250		jekhoff@dfg.ca.gov
Forestry/ Safety Officer	Ruth	Norman	Forester I	CALFIRE Resource Management	707-570-9127		ruth.norman@fire.ca.gov
Engineer	Alex	Alimohammadi	Water Resources control Engineer	CA EPA, CA RWQCB, LA Region	213-305-2204	213-620-2243	aalimohammadi@waterboards.ca.gov
Archaeology	Larry	Felton		Ca. State Parks	916-471-9165		lfelt@parks.ca.gov
GIS	Robert	Burns		Dept. of Water Resources	916-599-4175		rgburns@intergate.com