

Burn Area Recovery Task Force (BARTF) Report San Diego County Witch Fire

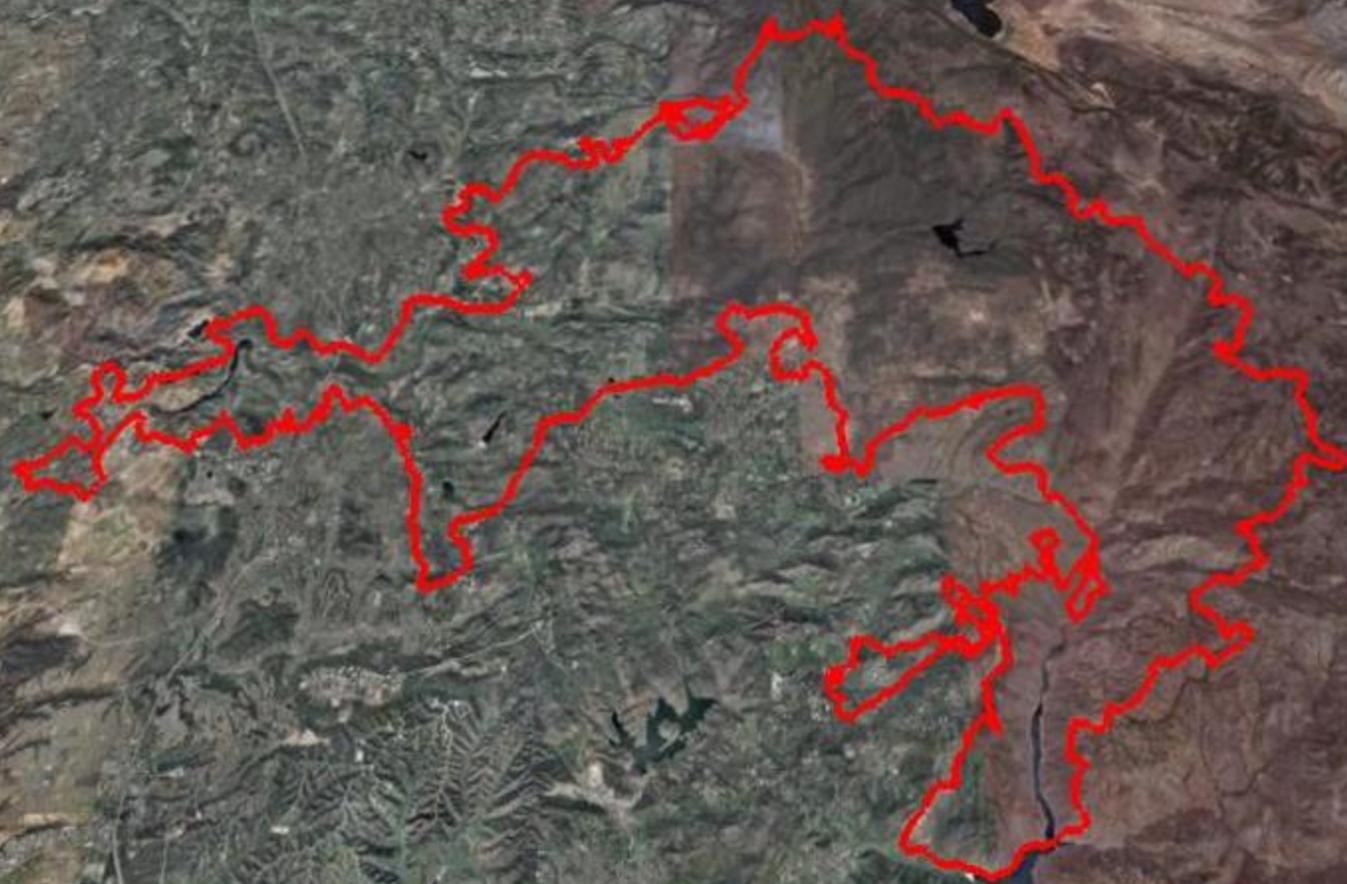


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Burn Area Recovery Task Force (BARTF) Report San Diego County Witch Fire

Executive Summary

The Witch Fire began in the Witch Creek Canyon near San Ysabel and burned over 197,990 acres, spreading to the communities of Ramona, Rancho Bernardo, Poway, Escondido, Lake Hodges, 4S Ranch, Del Dios, and Rancho Santa Fe. The significant issues identified in this report are summarized as follows:

- The denuded slopes within the burn area present a direct threat to approximately 1,462 buildings in several communities and associated infrastructure from mudflows, flooding and debris flows. The greatest risk to lives and property is in the area of Poway, Ramona, Ranch Bernardo, and several tribal lands including; Santa Isabel, Mesa Grande, and Barona.
- El Capitan Reservoir is at risk for sedimentation and debris flow.
- Potential emergency protective measures proposed by the BARTF team include installation of runoff barriers, emergency warning systems, and debris sedimentation basins.
- Potential funding for emergency protective measures include Federal Emergency Management Agency (FEMA) Public Assistance (PA) Category B, National Resources Conservation Service (NRCS), and the U.S. Army Corps of Engineers. California Office of Emergency Services (OES) California Disaster Assistance Act (CDAA) funding of projects may be considered for those exigent life-safety related projects that cannot be funded otherwise.
- More than 1,200 archeological sites and numerous protected animal species and protected or rare plant species are within the Witch Fire burn area. Emergency protective measures should be addressed when undertaking remediation measures.
- Several listed protected species are located within the risk areas. These species may require consultation with Department of Fish and Game (DFG) and US Fish and Wildlife Service (USFWS).
- Environmental permits may be required for many of the proposed projects identified in subsequent reports. Many of these proposed projects can be completed under emergency conditions or under the waiver process identified in the State Executive Order.

Purpose

This BARTF report presents a brief description and assessment of the Witch Fire, one of numerous Southern California wildfires included in the Presidential Disaster Declaration FEMA-1731-DR. This report is intended to facilitate the effective use of available resources to address threats to public safety, public and private property, and

infrastructure that may arise during the 2007 – 2008 winter rainy season due to denuded slopes, and the affiliated potential for flooding and debris flows.

The information was gathered for this report by state and federal Burned Area Emergency Response (BAER) reports, Post-Fire Hazard Awareness Maps, and meetings with various local, state, and federal officials.

The initial BAER report on the Witch Fire did not cover the area around the El Capitan reservoir due to the reservoir being nearly completely surrounded by tribal lands. Therefore, the BARTF team members visited the site and their report is enclosed.

Introduction

The Witch Fire burned 197,990 acres in central San Diego County. 1,125 homes and 500 outbuildings were destroyed, and two persons died. Soil fire burn severity ranged from severe to none. The fire also burned Lake Hodges, Blue Sky, and Boden Canyon Ecological Reserves owned and managed by DFG.

There are fifteen Hydrologic Unit Code (HUC-6) sub-watersheds in the fire burn area. These are the Escondido Creek, San Dieguito River, Santa Ysabel Creek/Rockwood Canyon, Santa Ysabel Creek/Boden Canyon, Temescal Creek, Santa Ysabel Creek/Sutherland Lake, Upper Santa Maria Creek, Cedar Creek, San Diego River/Dye Canyon, San Diego River/Boulder Creek, San Diego River/El Capitan Reservoir, Lower San Diego River, San Vicente Creek, San Diego South Coast, and Padre Barona Creek sub-watersheds. Though these are technically sub-watersheds, the term “watershed” is used to describe them.

Names for streams and reservoirs were gathered from the United States Geologic Survey (USGS) topographic maps. Google Earth was used to locate buildings and facilities, and to confirm topographies. The debris flow hazards were calculated and put in Geographic Information System (GIS) map form by FEMA.

All the watersheds are likely to have protected or rare species, and/or archaeological sites. Therefore, all work to be done in these watersheds must be careful to take precautions not to breach federal, state, or tribal laws regarding these.

Environmental permits may be required for many of the proposed projects identified in the BARTF Report. Many of these proposed projects can be completed under emergency conditions or under the waiver process identified in State Executive Order (S-13-07). Projects that do not fall under these classifications would need to follow the regular permit process (see Appendix A - Environmental Permitting Requirements and Appendix D - Biological).

There are over 1,200 archeological sites to be found within the Witch Fire burn area. There may actually be more sites exposed than what is presently known, as vegetation

that formerly hid archeological sites has been burned away. Therefore, emergency protective measures must take the presence of these sites into consideration, along with the protected species issues (See Archeological Appendix for further information).

There are several Native American Tribal Lands within the Witch Fire burn area. Bureau of Indian Affairs has jurisdiction over 10,302 acres within the fire. Sovereign nations within the affected area include the Barona, Capitan Grande, Inaja-Cosmit, Mesa Grande, and the Santa Ysabel tribal lands.

The identified risks and related post-fire issues have been identified and listed according to watershed boundaries as follows:

San Ysabel Creek/Sutherland Lake

Background

Roughly two-thirds of the San Ysabel Creek/Sutherland Lake watershed lies within the burn area. The Witch fire, named after the location where the fire started (Witch Creek) is located within this watershed. Communities at the highest risk within this watershed include the Santa Ysabel and Mesa Grande tribal lands.

Analysis

- Projected debris flows down Santa Ysabel Creek and Bloomdale Creek travel through the Santa Ysabel tribal lands. Black Canyon Creek travels through the Mesa Grande tribal lands, which is entirely within the burn area. Debris flows are projected to travel down Santa Ysabel Creek and Witch Creek into Lake Sutherland, and to continue down Santa Ysabel Creek into the Santa Ysabel/Boden Canyon watershed. All debris flows are projected to run within the ten year flood plain.
- Approximately twenty-two buildings, possibly homes, and a bridge are at high risk due to debris flows down Black Canyon Creek. These buildings are within the Mesa Grande tribal lands.
- The other creeks in this watershed do not seem to threaten lives or property.
- Lake Sutherland is at high risk for siltation due to the projected debris flows.
- Lake Sutherland is one of nine major water supply reservoirs for the City of San Diego. The high sedimentation that collects at the entrance to the lower elevation emergency outlet to the reservoir will need to be removed and dredged because the sediment accumulation compromises the function of the emergency outlet release for the reservoir. An inoperable emergency outlet to the reservoir can lead to loss of life downstream of the dam and reservoir in emergency situations.
- Sensitive species including; bald eagle, arroyo toad, and Gander's ragwort have the potential to occur within the fire area.

Potential Emergency Protective Measures

- Potential Emergency Protective measures, including installation of runoff barriers, placement of sandbags, dikes, ditching, jute netting, and fiber wattles, and an emergency warning system for the Mesa Grande tribal community, should be examined to help reduce the risk of destructive debris flows. This work could be eligible under FEMA PA Category B. Funding from NRCS could also be used to perform this work. Debris/silt removal for Lake Sutherland and the entrance to the reservoir's emergency outlet may be eligible under FEMA/OES PA Category A. Hydroseeding is not considered an option due to the potential for introduction of invasive species.
- Notification to wetland-permitting agencies for in-stream work should occur prior to conducting emergency work for all projects within streams/water courses.

Temescal Creek

Background

Most of the Temescal Creek watershed lies within the fire burn perimeter. The watershed is characterized by undeveloped lands covers the upper watersheds of Lake Hodges. The projected debris flows are within the ten year flood plain, and proceed down Temescal Creek and its tributaries into the Santa Ysabel Creek/Boden Canyon watershed.

Analysis

- One structure, possibly a house, is at moderate to low risk from debris flow in this watershed. The structure is identified at moderate risk due to distance from the creek and slightly higher elevation.
- Sensitive species including; California gnatcatcher, arroyo toad, and Gander's ragwort are know to occur within the watershed.

Potential Emergency Protective Measures

- Potential Emergency Protective measures such as runoff barriers, placement of sandbags, dikes, ditching, jute netting, and fiber wattles may be useful in reducing sediment load into Ysabel Creek. FEMA/OES Category B and NRCS funding may be available for this type of project.
- Hydroseeding is not considered an option due to the potential for introduction of invasive species.
- This watershed is included in the proposed San Diego County NCMSCP plan and proposed San Diego MHCOSP. These NCCPs cover state and federal endangered species permitting for several species including the coastal California gnatcatcher. It is recommended that projects within the watershed coordinate with the DFG

- and USFWS for consistency with the proposed NCCP planning efforts.
- Surveys for coastal California gnatcatcher, arroyo toad, and Gander's ragwort should occur within areas of suitable habitat prior to ground disturbance activities within this watershed.
 - Coastal California gnatcatcher habitat (coastal sage scrub) and arroyo toad habitat (riparian) impacts should be avoided or minimized. Unavoidable impacts would require consultation with USFWS and DFG.
 - Notification to wetland-permitting agencies for in-stream work should occur prior to conducting emergency work for all projects within streams/water courses.

Santa Ysabel/Boden Canyon

Background

The Santa Ysabel/Boden Canyon watershed lies entirely within the fire burn area. This watershed includes relatively undeveloped land north of the Ramona and constitutes a significant portion of the Santa Ysabel Creek Watershed south of Sutherland Lake. The northern portion of the City of Ramona is considered a high risk from debris flow in this watershed.

Analysis

- The debris flow projection map shows a large plateau area to the north of the City of Ramona which could be impacted by debris flow, and is outside of the ten year flood plain. The projected debris flows generally stay within the ten year flood plain and usually within the creek channels.
- In the Santa Ysabel Creek channel, the Temescal Creek channel, and the Clevenger Canyon Creek, there are no buildings except for a narrow bridge crossing Santa Ysabel Creek. The bridge is at high risk of being choked with debris and washed out.
- The plateau area north of Ramona (at the south end of this watershed) is unlikely to receive damaging debris flows, so the approximately 72 buildings found there are likely at low risk. However, any debris material flowing through this area could contribute to other flows downstream.
- Sensitive species including; coastal California gnatcatcher, least Bell's vireo, and arroyo toad are known to occur in this watershed.

Potential Emergency Protective Measures

- Potential Emergency Protective measures such as runoff barriers, placement of sandbags, dikes, ditching, jute netting, and fiber wattles may be useful in reducing sediment load into Ysabel Creek. FEMA/OES Category B and NRCS funding may be available for funding this type of project.

- Hydroseeding is not considered an option due to the potential for introduction of invasive species.
- Notification to wetland-permitting agencies for in-stream work should occur prior to conducting emergency work for all projects within streams/water courses.

Upper Santa Maria Creek

Background

The Upper Santa Maria Creek is located within the center of the southern edge of the fire perimeter. Slightly more than half of the Upper Santa Maria Creek watershed is within the burn area. The watershed includes the City of Ramona and portions of the Mesa Grande tribal lands, which were directly affected during the fire. The City of Ramona continues to be at risk due to flooding and debris flows post fire.

Analysis

- Approximately 700 buildings are potentially at risk from debris flows down Santa Maria Creek and Hatfield Creek into downtown Ramona (this does not include all outbuildings, most of this figure are homes, and there are some large commercial buildings involved). Approximately 500 of the buildings should be considered at high risk; 200 buildings are outside of the burn area but within reach of debris flows, which include a school, a day care center, and a wastewater treatment plant facility.
- Most of the debris flows are projected to stay within the ten year flood plain. Hatfield Creek joins Santa Maria Creek above the downtown area and contributes debris hazard accordingly.
- Contributing flows from the high plateau area north of Ramona will likely be surface runoff and have little contribution in debris content. Possible ten year storm event flows originating from an unnamed creek flowing through central Ramona, which is a tributary to Santa Maria Creek, are not likely to contain much debris content.
- Coastal California gnatcatcher is known to occur within this watershed.

Potential Emergency Protective Measures

- Potential Emergency Protective measures such as runoff barriers, placement of sandbags, dikes, ditching, jute netting, and fiber wattles may be useful in reducing sediment load into Santa Maria Creek. FEMA/OES Category B and NRCS funding may be available for this type of project.
- Hydroseeding is not considered an option due to the potential for introduction of invasive species.
- Notification to wetland-permitting agencies for in-stream work should occur prior to conducting emergency work for all projects within streams/water courses.

Santa Ysabel Creek/Rockwood Canyon

Background

The Santa Ysabel Creek/Rockwood Canyon watershed is almost entirely within the burn area. The watershed is the confluence of three major water courses of the burn area. This confluence becomes Lake Hodges, a significant water supply for the County of San Diego. The confluence will receive debris flows that begin in the Temescal Creek, Upper Santa Maria Creek, the Santa Ysabel Creek/Boden Canyon and Santa Ysabel/Sutherland Lake watersheds. Additionally, the watershed receives debris flows in its northernmost reach from the Poomacha Fire, and is partly within the Poomacha Fire burn area as well. That part of the watershed will be dealt with in the Poomacha Fire BARTF Team report. This watershed contains the historic San Pasqual Valley.

Analysis

- Approximately 320 buildings (mostly homes) are at high risk in this watershed. Facilities at risk include the San Diego Wild Animal Park. A school and two golf courses are also at risk, along with numerous orchards and other agricultural interests.
- Besides debris flows that would come down Santa Ysabel Creek, debris flows are forecast to come down Santa Maria Creek, Rockwood Canyon, and an unnamed creek at the northwest end of the Pasqual Valley.
- Sensitive species including; southwestern willow flycatcher, least Bell's vireo, coastal California gnatcatcher, coastal cactus wren, arroyo toad, and San Diego thorn-mint are known to occur within the watershed.

Potential Emergency Protective Measures

- The most effective protective measures for this watershed would be to reduce sediment flow for all the contributing watersheds, plus for Rockwood Canyon, Santa Maria Creek, and the other primary creeks feeding into Santa Ysabel Creek within this watershed. The valley is too wide to attempt any sort of effective catchment or debris barrier system within it, and the projected flows are shown to run the entire width of the valley. FEMA/OES Category B and NRCS funding may be available for these types of projects.
- Notification to wetland-permitting agencies for in-stream work should occur prior to conducting emergency work for all projects within streams/water courses.

San Dieguito River

Background

The San Dieguito River watershed is located within the western most portion of the Witch Fire. Communities at risk include the City of Poway, and communities and cities along San Dieguito River including parts of Escondido, Rancho Bernardo and Rancho Santa Fe. Lake Hodges lies in the path of the projected debris flow from the San Dieguito River Watershed.

Analysis

- The entire debris flow that impacts the Santa Ysabel Creek/Rockwood Canyon watershed is projected to flow into the San Dieguito River and Lake Hodges.
- Most of the projected debris flow lies within the ten year flood plain.
- A small but long debris flow is projected to flow into the City of Poway and down an unnamed creek to the west of Lake Poway. This projected debris flow is independent of the ten year flood plain.
- Lake Poway and Lake Ramona are both surrounded by burn area and will likely experience siltation from the excessive debris flow. The San Dieguito River is a well-defined and confined channel for most of its length, so projected debris flows of a ten year flood event would have little effect on infrastructure, except for Lake Hodges and possibly the 12 buildings at the west end of the burn area. These 12 buildings would likely have a low risk of debris flow damage as Lake Hodges would act as a catchment.
- The unnamed creek in the north section of Poway (mentioned above) would carry a projected debris flow that could place approximately 118 buildings (mostly homes) at risk. Half of these buildings appear to be at high risk. These all lay outside the burn area.
- Sensitive species including; least Bell's vireo, coastal California gnatcatcher, coastal cactus wren, arroyo toad, Encinitas baccharis, Orcutt's spineflower, San Diego ambrosia, and San Diego thorn-mint are know to occur within the watershed.

Potential Emergency Protective Measures

- Debris flow control and reduction efforts upstream of Lake Hodges, Lake Poway, and Lake Ramona will be essential in reducing the amount of debris and sediment that could possibly end up in the reservoir.
- Lake Hodges, Lake Poway, and Lake Ramona may possibly experience siltation from the excessive debris flow, and would need to be dredged. Lake Hodges is one of nine major water supply reservoirs for the City of San Diego, Lake Poway the water supply for the City of Poway, California and Lake Ramona the main water supply for Ramona, California. The high sedimentation that collects at the

entrance to the lower elevation emergency outlet of the reservoirs will need to be removed and dredged because the sediment accumulation compromises the function of the emergency outlet release for the reservoir. An inoperable emergency outlet of the reservoir can lead to loss of life downstream of the dam and reservoir.

- Lake Hodges provides a catchment basin for the projected debris flow down the San Dieguito River, therefore, no protective measures are proposed by the BAER reports for this section of the San Dieguito River down stream of Lake Hodges to reduce risk to life and property.
- Debris removal and sediment removal of the reservoir and the emergency outlet entrance from Lake Poway and Lake Ramona could be eligible for funding under FEMA/OES PA Category A.
- Erosion control, such as runoff barriers, placement of sandbags, dikes, ditching, jute netting, and fiber wattles should be considered as emergency protective measures for the unnamed creek to the west of Lake Poway. These could be eligible under FEMA/OES PA Category B, or under NRCS.
- Hydroseeding is not considered an option due to the potential for introduction of invasive species.
- Unavoidable impacts would require consultation with USFWS and DFG.
- Notification to wetland-permitting agencies for in-stream work should occur prior to conducting emergency work for all projects within streams/water courses.

San Vicente Creek

Background

The burn area of the Witch Fire only involved the uppermost reach of San Vicente Creek watershed. The community of San Diego Country Estates is within this watershed. Only low risk to this community was identified in the report.

Analysis

- The projected debris flow down the uppermost reach of San Vicente Creek places 28 homes and other buildings in the San Diego Country Estates subdivision at low risk from damage due to debris. This is due to the creek being somewhat channelized, and due to the homes and other buildings being at a higher elevation than the creek bed. The creek is also not likely to carry a large flow at this elevation, and the debris flow is within the ten year flood plain.
- The projected debris flow is within the ten year flood plain.
- Sensitive species including; coastal California gnatcatcher and San Diego thornmint have the potential to occur within the watershed.

Potential Emergency Protective Measures

- Potential Emergency Protective measures, including installation of debris flow barriers, placement of sandbags, dikes, ditching, jute netting, and fiber wattles may be considered by the County to protect the water and fish habitat resource from degradation. Since lives and property are at low risk, this is not a high priority project among the others.
- Notification to wetland-permitting agencies for in-stream work should occur prior to conducting emergency work for all projects within streams/water courses.

San Diego River/Dye Canyon

Background

About two-thirds of the San Diego River/Dye Canyon watershed lies within the Witch Fire burn area. This portion of the fire includes the upper reach of the San Diego River that drains into El Capitan Reservoir downstream. The watershed is primarily open space; therefore, no risks to life or property were identified in this watershed.

Analysis

- Any debris flows that arise within this watershed would be greatly constrained by the narrow canyon walls that line the San Diego River.
- This watershed feeds directly into the El Capitan watershed which supplies water to El Capitan Reservoir, one of nine main water supply reservoirs for the City of San Diego.
- Coastal California gnatcatcher has the potential to occur within the coastal sage scrub habitat within this watershed.

Potential Emergency Protective Measures

- No protective measures seem necessary for protection of life and property within this watershed itself, but would be warranted for reducing debris flows downstream into El Capitan Reservoir. These would include debris barriers, placement of sandbags, dikes, ditching, jute netting, and fiber wattles. These could be eligible under FEMA/OES PA Category B, or under NRCS.
- No threat to lives or property appears to be found within this watershed, but there are projected debris flows down the San Diego River. In order to reduce impacts on the El Capitan Reservoir, runoff and debris flow barriers should be considered for this watershed.
- Notification to wetland-permitting agencies for in-stream work should occur prior to conducting emergency work for all projects within streams/water courses.

Cedar Creek

Background

Approximately two thirds of the Cedar Creek watershed was burned by the Witch Fire. The Inaja-Cosmit tribal land is a community at risk within the watershed. Cedar Creek itself is generally well contained within narrow canyon walls, with the possible exception of its upper reach within the burn area. The upper portion of Cedar Creek has a low potential for debris flow.

Analysis

- No debris flows outside of the ten year flood plain are projected.
- There does not appear to any direct threat to life or property within this watershed, but reasonable protective measures should be taken to reduce debris flows downstream of the watershed, in order to reduce impacts on the El Capitan Reservoir.
- This watershed feeds indirectly into the El Capitan Reservoir, the main water supply for the City of San Diego.

Potential Emergency Protective Measures

- No protective measures seem necessary for protection of life and property within this watershed itself, but would be warranted for reducing debris flows downstream into El Capitan Reservoir. These would include runoff barriers, placement of sandbags, dikes, ditching, jute netting, and fiber wattles. These could be eligible under FEMA/OES PA Category B, or under NRCS.
- Notification to wetland-permitting agencies for in-stream work should occur prior to conducting emergency work for all projects within streams/water courses.

San Diego River/Boulder Creek

Background

The San Diego River/Boulder Creek is located on the eastern most section of the Witch Fire. Approximately one-fifth (lower watershed) of the San Diego River/Boulder Creek was burned by the Witch Fire.

Analysis

- Projected debris flows are likely down Boulder Creek into the San Diego River. Debris flow is projected to remain inside the ten year flood plain. The Boulder Creek canyon is narrow and confining.

- This watershed feeds indirectly into the El Capitan watershed, which supplies water to El Capitan reservoir, one of nine main water supply reservoirs for the City of San Diego.
- There is one home site which, if it survived the fire, would be at a moderate to low threat of damage from a debris flow.
- Reasonable protective measures should be taken to reduce debris flows downstream of the watershed, in order to reduce impacts on the El Capitan Reservoir.
- Sensitive species including; coastal California gnatcatcher and arroyo toad are known to occur within the watershed.
- This watershed is likely to contain numerous archaeological sites and many protected species.

Potential Emergency Protective Measures

- No protective measures seem necessary for protection of life and property within this watershed itself, but would be warranted for reducing debris flows downstream into El Capitan Reservoir. These could include runoff barriers, placement of sandbags, dikes, ditching, jute netting, and fiber wattles.
- These projects could be eligible for funding under FEMA/OES PA Category B, or under NRCS.
- Notification to wetland-permitting agencies for in-stream work should occur prior to conducting emergency work for all projects within streams/water courses.

San Diego River/El Capitan Reservoir

Background

The San Diego River/El Capitan Reservoir watershed includes part of the Capitan Grande tribal lands and surrounds most of El Capitan Reservoir. Water from the San Diego River, Cedar Creek, and Boulder Creek flow into El Capitan Reservoir. About half of the San Diego River/El Capitan Reservoir watershed was burned in the Witch Fire. The El Capitan Watershed is approximately 189 square miles in area and drains into this reservoir. The Witch Fire burned approximately one-quarter of the El Capitan watershed. Land areas immediately surrounding the El Capitan Reservoir appear to have received low to moderate burn severity. Structures at the reservoir used for recreational purposes and the El Capitan dam reportedly were not damaged by the Witch Fire.

El Capitan Reservoir is the largest capacity reservoir in the City of San Diego water supply system and is a main source of drinking water for the City of San Diego.

Since the area within the El Capitan Reservoir was not identified in the BAER reports, the BARTF teams used the following resources to obtain information for this reservoir to complete this report:

- Plan entitled “Source Water System and October 2007 Fires” prepared by San Diego Water Department dated 29 November 2007.
- Plan entitled “Source Water System and 2003 & 2007 Fires” prepared by the San Diego Water Department dated 30 November 2007.
- Post-Fire Hazard Awareness Map.
- Google Earth software to identify potential outlying structures within the El Capitan Watershed.

For areas adjacent to or within the El Capitan Reservoir, the BARTF team recommends that sediment and debris transport into the reservoir be monitored. Removal and disposal of silt/debris from El Capitan Reservoir caused by potential debris flows will be needed in order to maintain a safe reservoir and emergency relief system at the dam. This work may be eligible under FEMA/OES PA Category A (Emergency Work - Debris Removal) and/or Category G (Permanent Work - Parks, Recreational, and Other). Funding from NRCS could also be used to perform this work.

On December 11, 2007, Mr. Patrick Walter, ranger with the City of San Diego Water Department provided a tour of the El Capitan Reservoir to members of the BARTF team. Findings from this site visit are discussed in this report.

The El Capitan Reservoir provides potable water to the City of San Diego and has a capacity of approximately 118,000 acre-feet. El Capitan Reservoir has the largest capacity in the City of San Diego Lakes system. When full, the reservoir has 1,562 surface acres, a maximum water depth of 197 feet, and 22 miles of shoreline although there are only about four miles of shoreline that are reasonably accessible by foot. It is located approximately 30 miles northeast of downtown San Diego, on the San Diego River.

Analysis

- The El Capitan Reservoir would serve as a catchment basin for projected debris flows from the three watersheds feeding into it, so most if not all of the debris flows would not reach downstream on the San Diego River.
- The projected debris flows would remain inside the ten year flood plain.
- However, the high sediment volumes that are projected to wash down into the reservoir would make it essential that dredging of the sediment must take place in order to preserve the reservoir as a water source for the City of San Diego.
- The high sedimentation that collects at the entrance to the lower elevation emergency outlet to the reservoir will need to be removed and dredged because the sediment accumulation compromises the function of the emergency outlet release for the reservoir. An inoperable emergency outlet to the reservoir can lead to loss of life downstream of the dam and reservoir.

- Potential Emergency Protective measures and repair of storm related damage should take the presence of archaeological sites into consideration, along with the protected species issues.
- Potential debris flows do not appear to threaten structures located within and around the perimeter of the El Capitan Reservoir.
- Debris flows will likely be conveyed by the portion of the San Diego River upstream of the reservoir. Debris flows from the San Diego River will enter the reservoir at the North Arm of the reservoir.
- Siltation and deposition of debris into the El Capitan Reservoir appears to be the main consequence of potential debris flows.
- Sensitive species including; southwestern willow flycatcher and arroyo toad have the potential to occur within the fire perimeter.

Potential Emergency Protective Measures

- The El Capitan Reservoir provides a catchment basin of sorts for the projected debris flow down the San Diego River, and so no protective measures are proposed downstream for the San Diego River itself. The debris removal from the reservoir and the sediment removal from the emergency outlet entrance could be eligible for funding under FEMA/OES PA Category A. However, debris flow control and reduction efforts upstream of the El Capitan Reservoir will be essential in reducing the amount of debris and sediment that would otherwise end up in the reservoir.
- There does not appear to be an immediate threat to structures within and around the reservoir. Emergency protective measures are recommended, however due to the increased sediment and debris transport into the reservoir caused by the burning of vegetation around the reservoir, it is also recommended that sediment and debris flow into the reservoir be monitored as well. Removal and disposal of silt/debris from El Capitan Reservoir caused by potential debris flows may need to be completed in order to maintain a navigable waterway within the North Branch water body, to protect the quality/quantity of this water supply for the city of San Diego, and to maintain the safety of the reservoir for population downstream of the dam
- In addition, it may become necessary to construct a debris barrier on the upstream side of the of the dam's spillway and around the outlet tower. This debris barrier should help to prevent large debris from entering and clogging the spillway and outlet tower/outlet pipe. Silt buildup around the lower level outlets in the tower should also be monitored and remediated if conditions warrant action. It is recommended that an assessment of the potential for large debris to enter and clog the spillway and outlet tower be completed and that the need for debris barriers be based on the conclusions of this assessment.
- This work may be eligible under FEMA/OES PA Category A (Emergency Work - Debris Removal) and/or Category G (Permanent Work - Parks, Recreational, and Other). Funding from NRCS could also be used to perform this work.

Hydroseeding is not considered an option due to the potential for introduction of invasive species.

- Notification to wetland-permitting agencies for in-stream work should occur prior to conducting emergency work for all projects within streams/water courses.

Lower San Diego River

Background

The Lower San Diego River watershed is located downstream of El Capitan Reservoir. Only a small portion of the watershed on the eastern side was burned in by the Witch Fire. A large debris flow is shown on the Post-Fire Hazard Maps downstream of the dam, however, it is anticipated that a majority of the sediment will be impounded behind the dam.

Analysis

- Most of the potential debris from upstream would be contained behind the El Capitan Reservoir and dam. Very little debris would make it past the dam into the lower San Diego River. Hazards to life and property below the dam are therefore about the same as a ten year flood would normally present.
- The debris flow projection follows the ten year flood plain of the San Diego River.
- Having noted this, there are over 90 buildings at risk from a ten year storm event in the San Diego River floodway, based on the area defined as “debris flow” in the hazard map. These are all outside the burn area.
- No sensitive species were identified within this watershed.

Potential Emergency Protective Measures

- Owners of buildings within the San Diego River floodway should be encouraged to relocate their facilities to higher ground.
- Notification to wetland-permitting agencies for in-stream work should occur prior to conducting emergency work for all projects within streams/water courses.

San Diego South Coast

Background

The San Diego South Coast watershed is a large watershed however, only a small section of the watershed was burned by the Witch Fire. This watershed includes the southern portion of the City of Poway. The City of Poway is a value at risk within this watershed.

Analysis

- Projected debris flow would come down Rattlesnake Creek into central Poway. At least 180 buildings, mostly homes, are at high risk from a debris flow. Properties at risk include a day care center at the far end of the flow. All values at risk are outside the burn area.

Potential Emergency Protective Measures

- Potential Emergency Protective measures, such as catchment basins or runoff barriers, placement of sandbags, dikes, ditching, jute netting, and fiber wattles should be pursued in order to reduce risk to life and property. Potential funding for these measures could come from FEMA/OES PA Category B or NRCS. Funding for the catchment basins could come from U.S. Army Corps of Engineers also.
- Notification to wetland-permitting agencies for in-stream work should occur prior to conducting emergency work for all projects within streams/water courses.

Padre Barona Creek

Background

The Padre Barrona watershed is located on the southern portion of the fire. Approximately one quarter of this small watershed was burned by the Witch Fire. The Barona tribal lands, a value at risk, dominate over half of the watershed, including part of the burn area.

Analysis

- A projected debris flow from the burn area runs into the Barona tribal lands. This debris flow is outside of the ten year flood plain.
- About 20 buildings could be at high risk from a debris flow down Padre Barona Creek. Most of these appear to be homes. The buildings at risk include a school. These are all outside the burn area.
- Dunn's mariposa lily, a listed plant species, has the potential to occur within the watershed.

Potential Emergency Protective Measures

- Potential Emergency Protective measures, such as runoff barriers, placement of sandbags, dikes, ditching, jute netting, and fiber wattles should be pursued in order to reduce risk to life and property. Potential funding for these measures could come from FEMA/OES PA Category B or NRCS.

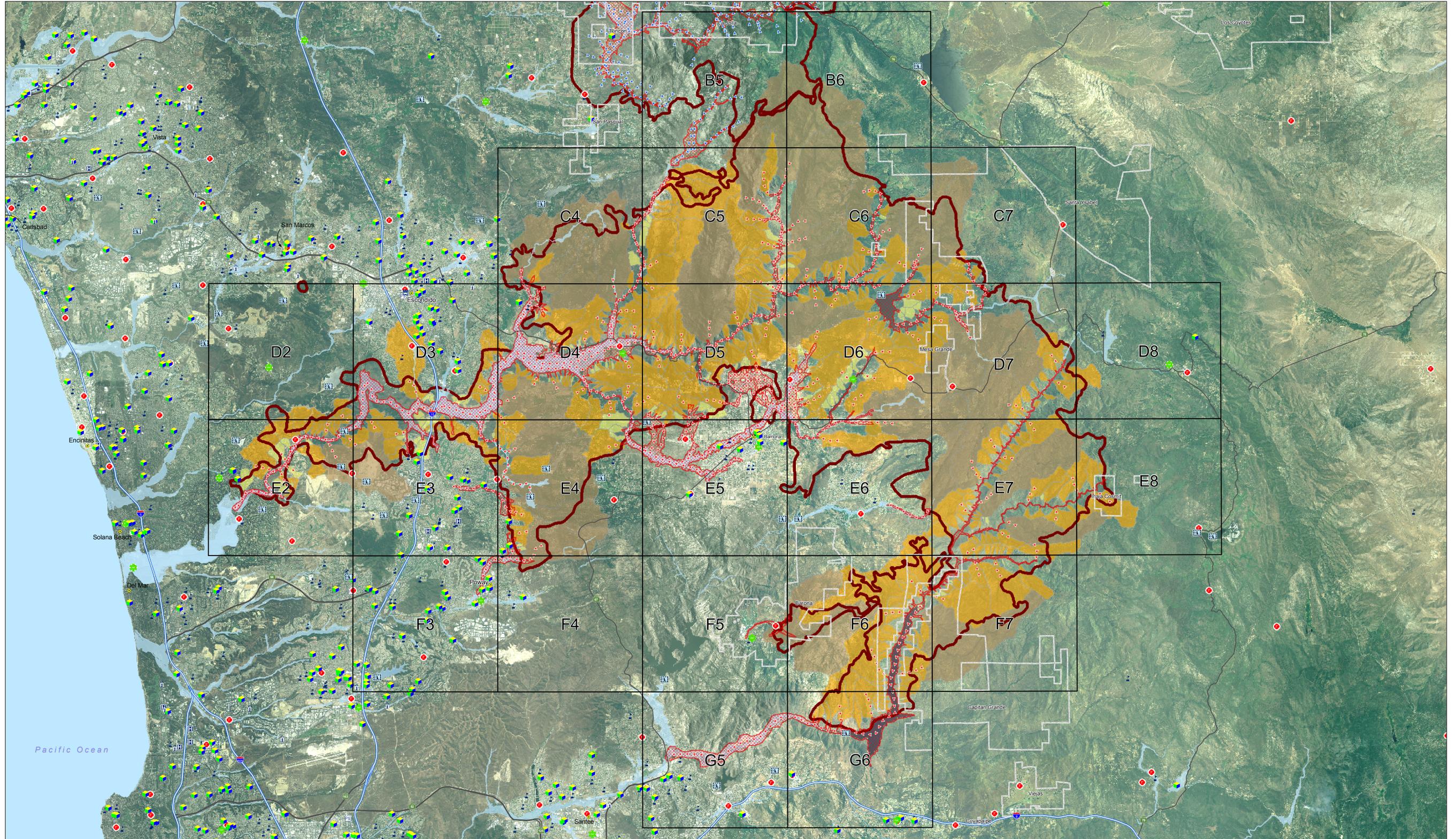
- This watershed is included in the proposed San Diego County NCMSCP plan and proposed San Diego MHCOSP. These NCCPs cover state and federal endangered species permitting for several species including the coastal California gnatcatcher. All projects within the watershed should be coordinated with the DFG and USFWS for consistency with the proposed NCCP planning efforts.
- Surveys for Dunn’s mariposa lily should occur within areas of suitable habitat prior to ground disturbance activities within this watershed.
- Notification to wetland-permitting agencies for in-stream work should occur prior to conducting emergency work for all projects within streams/water courses.

Table 1 – Possible Funding Sources

Yes	No	Funding Sources
X		FEMA/OES Public Assistance Emergency Work (Cat A & B)
X		FEMA/OES Public Assistance Permanent Work (Cat C-G)
	X	406 Hazard Mitigation
	X	404 Hazard Mitigation
X		Natural Resource Conservation Service (NRCS)
	X	U.S. Fish & Wildlife Service
X		U.S. Army Corps of Engineers
	X	National Marine Fisheries Service (NMFS)
X		California Disaster Assistance Act
	X	Federal Highway Administration (FHWA)
	X	Other funding

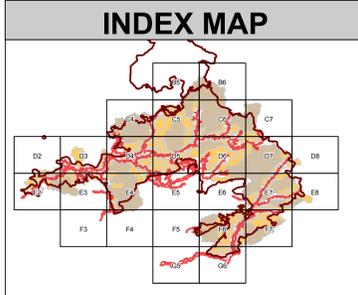
Appendices

- Appendix A – Environmental Permitting Requirements
- Appendix B – Archaeological
- Appendix C – Descriptions of State and Federal Program Funding
- Appendix D – Biological
- Appendix E – Preliminary Suggested Projects



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LEGEND	
	Populated Places
	Daycare Facilities
	EMS
	School
	Fire Station
	Police
	Hospital
	Dams
	Witch Debris Flow Lines
	Poomacha Debris Flow Lines
	Tribal Lands
	FEMA Flood Hazard Areas
	Fire Perimeters
	FEMA Potential Debris Flow Areas
USGS Potential Debris Volume	
	0 to 1,000 cubic meters
	1,001 to 10,000 cubic meters
	10,001 to 100,000 cubic meters



Department of Homeland Security
Federal Emergency Management Agency
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Version: V 1.0

MAPS FOR ADVISORY PURPOSES ONLY. NOT FOR INSURANCE RATING PURPOSES. For insurance rating purposes, please refer to the Flood Insurance Rate Map currently in effect. Debris flow information is PRELIMINARY. Debris flow volumes calculated in response to a 10 year recurrence based on 3 hour duration storm producing 2.25 inches of rainfall. Volumes based on a model currently being tested. Debris flow behavior is highly unpredictable and this map shows the best available information at the time of printing. Populations estimated using 2000 Census data and are calculated for those areas only within the grid index. 2000 Census data does not include Tribal Populations.