

Preliminary
State Emergency Assessment Team
DRAFT
Report Gap Fire
Santa Barbara County
October 9 2008

Figure 1 Google Earth view of the Gap Fire



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

GAP FIRE COMPLEX SEAT TEAM REPORT

Executive Summary	3
Acknowledgements	
Team Members	6
Contacts List	7
Specialist Reports Findings Summary	
Geology Overview	8
Resource Conditions Descriptions	14
Resources at Risk Summary	23
Preliminary Evaluation of Potential Post Fire Hazards	27
Other SEAT Team	42
Other Resources at Risk	44
City of Goleta Response to the Gap Fire	47
County of Santa Barbara Response to the Gap Fire	51
NRCS Damage Survey Reports	55

GAP FIRE COMPLEX SEAT TEAM REPORT

Executive Summary

The Gap Fire burned 9,544 acres between July 1, 2008 and July 28, 2008. The fire burned approximately 48% National Forest Service (NFS) lands and 52% private property both a mix of orchards and open range. These lands had not burned for approximately 50 years prior to the Gap Fire. Dense vegetative cover and high winds caused the fire to consume most of the vegetation and much of the underlying soil became impenetrable to water (hydrophobic). These post fire conditions will significantly increase the amount of storm water runoff, erosion and channel-derived debris flow activity during storm events, which will greatly increase the chance of flooding of downstream areas. Reduction of sediment discharges at the source is a major concern as the State Emergency Assessment Team's (SEAT) primary mission at this time is identification of areas susceptible to flooding where lives and property are at risk.

We understand that the County of Santa Barbara and City of Goleta are completing projects designed to reduce impacts from the expected runoff, but existing infrastructure under Highway 101 and in other areas are major limiting factors. All transportation, both rail, highway and airport are within design flow inundation paths. Water and electric supplies are also expected to be interrupted during a 4.66 inch rain in a 6 hour period. Planning for this magnitude of storm are difficult but the emergency and public awareness programs have been ongoing and the community is making preparations for the projected flow and sediment. The protection of homes, infrastructure and improved drainage capacity is the remaining goal for the County and City of Goleta as a follow up for this fire.

The Natural Resources Conservation Service identified and approved emergency projects totaling about \$4.7 million dollars to help protect life and property at risk from the increased runoff, mud and debris flows from the burned areas. The projects are being funded through the agencies Emergency Watershed Protection (EWP) Program. The approved projects include, hydromulching burned slopes, channel clearing, trash rack construction, sediment basin enlargement (excavation) and k-rail and sand bag placement. Sponsors working with NRCS on this include the County of Santa Barbara and the City of Goleta. The local County and City jurisdictions have responded quickly to develop public education and emergency notification programs along with sand bag stations. The National Weather Service will also supply additional information targeted for the area of the Gap Fire and the communities below the fire

The SEAT is tasked with helping local agencies identify post-fire hazards that could primarily affect lives and property, and secondarily affect the environment. Because of the existing development near streams in the City of Goleta, numerous houses, public infrastructure, and other values now have a high risk of being flooded or inundated by debris flow (mudflow) deposits. Mitigation measures may benefit some, but the SEAT wants to emphasize the need and value of the emergency preparedness plan being developed and implemented by the City of Goleta and Santa Barbara County.

The Gap Fire burned mostly through the upper portions of the Tecolote, Winchester, Tecolotito, Los Carneros, San Pedro, Las Vegas and the San Jose watersheds. Each of these watersheds drains through the City of Goleta. The acreage and percent of the watershed burned by the Gap

GAP FIRE COMPLEX SEAT TEAM REPORT

Fire is shown in the following table created by the City Of Goleta from information included in the USFS BAER (Burned Area Emergency Response) Report (attachment 1).

Watershed	Acres Burned	% of Watershed
Tecolote	984	27%
Winchester	2103	54%
Tecolotito	1892	64%
Los Carneros	1508	73%
San Pedro	1535	63%
Las Vegas	252	24%
San Jose	1080	23%

The BAER report indicated (76%) or 7,250 acres are burn rated from moderate to high severity burn, with 24% (2,290 acres) burn rated as low burn severity or unburned within the 9,544 acre burn perimeter. What is important to note is that this fire burned off all vegetative cover on the vast majority of the burned area with the exception of some of the riparian areas in the bottom of the larger drainages. The BAER Report states that “The potential for increased flows leading to flooding and debris flows is high to very high.” and “East facing slopes with greater than 55% gradient and high soil burn severity have a very high risk of both landslides and debris flows. “



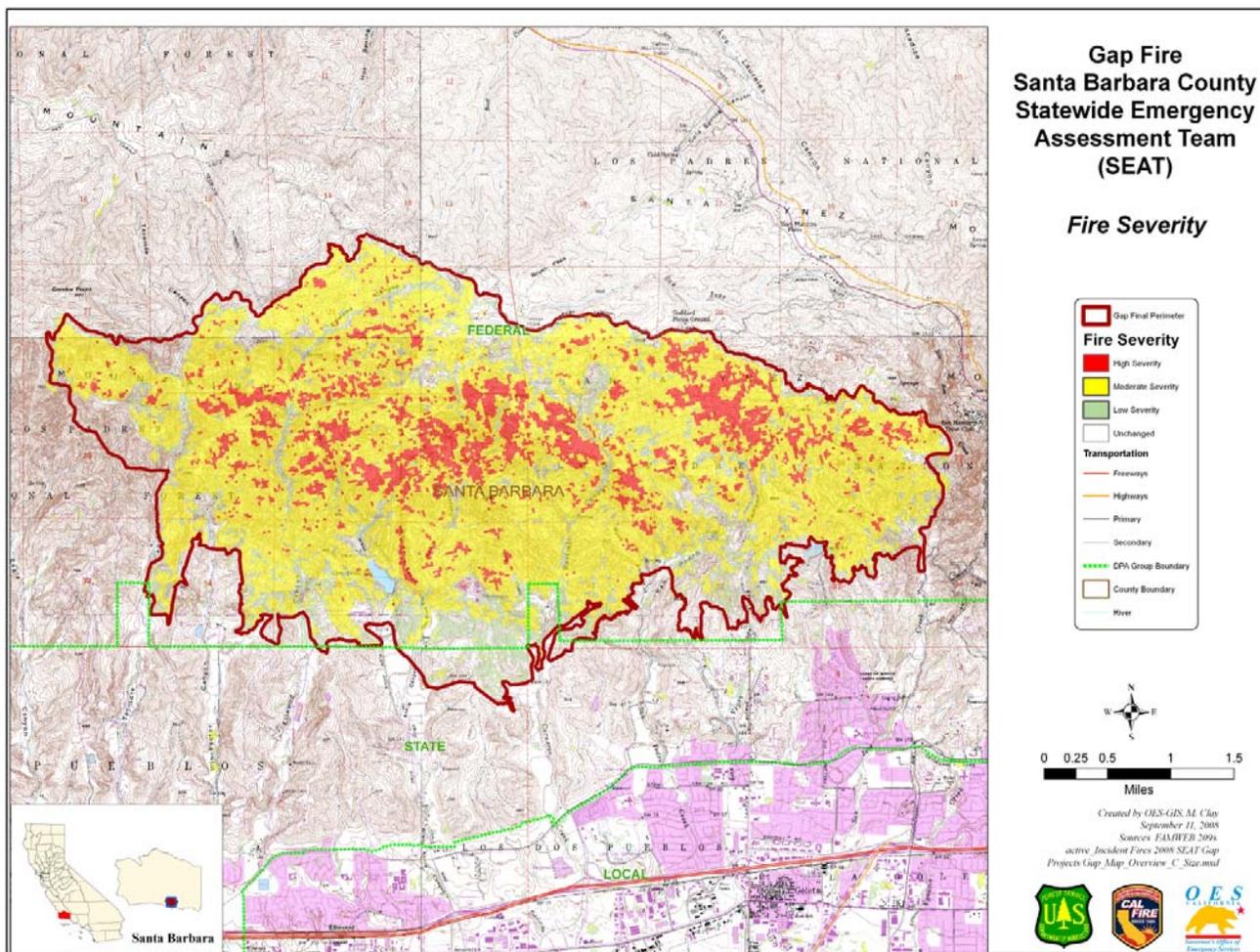
In reviewing the BAER Report the SEAT found that the conclusions regarding increased runoff and sediment loads predicted give a good guidance for what to expect during a 3-5 year storm event (in which 4.66 inches over a 6 hour period) would generate flooding that is equal to a 100 year storm in magnitude. This is especially true for the first winter storms, if light early rains do not help to reduce soil hydrophobicity and generate seeds. Using information taken from (table 2 and table 3) the BAER Report predicts severe increases in runoff and sediment production rates as a result of the Gap Fire could result in the doubling of flood volumes and a 10 to 20 time increase in sediment production for the listed watersheds. It must be stated again that the SEAT review of the fire response on the landscape indicates that at least 80% of the burn area will react as a High Intensity Burn.

GAP FIRE COMPLEX SEAT TEAM REPORT

Table 2: Summary of sediment potential (cubic yards/ square mile)

Watershed	Sediment potential 1-year following Gap Fire		
	Normal	Post-fire	% of pre-fire
Upper San Jose Creek	2810	18830	670%
Upper Las Vegas Creek	1030	2480	240%
Upper San Pedro Creek	2340	32250	1380%
Upper Carneros Creek	2690	48200	1790%
Upper Glen Annie Canyon	3400	55600	1640%
Bell Canyon	3080	51720	1680%
Tecolote Canyon	2330	17500	750%
Eagle Canyon	3290	5080	150%

Figure 2 Table 2 from the BAER Gap Fire Complex Report



GAP FIRE COMPLEX SEAT TEAM REPORT

Acknowledgements

SEAT TEAM MEMBERS

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GAP FIRE COMPLEX SEAT TEAM REPORT

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GAP FIRE COMPLEX SEAT TEAM REPORT

SEAT Geology Overview

A limited State Emergency Assessment Team (SEAT) assembled at the Santa Barbara County Fire Department Headquarters on September 17, 2008. After an introductory informational session SEAT members began to meet with local authorities and agencies. Prior work by multiple agencies had produced numerous documents including but not limited to:

- Gap Fire BAER initial Assessment, August 29, 2008 Redacted Version, by USFS
- Gap Fire Emergency Watershed Response Plan, August 2008, by Santa Barbara County Public Works Department
- Gap Fire Pre-Winter Storm Emergency Response Plan, September 2008, by City of Goleta

The SEAT members were provided a tour of existing debris catchment structures (debris racks) and other debris rack locations under construction by Thomas Fayram, County of Santa Barbara Deputy Public Works Director.

Areas that do exhibit moderate to high burn severity or are located upslope of identified high value features (locations that are at risk for possible loss of life and property due to in-channel floods, concentrated floods, out-of-channel floods, debris flows, debris torrents, slope-generated landslides, rock fall, rock avalanche, and other mass wasting events were visited where access was available during this preliminary assessment. In canyon areas or private lands where access was restricted due to locked gates with no trespassing signs posted, visitation and evaluation was not performed.

There may be locations or areas of potential danger that are at risk for possible loss of life and/or property in these inaccessible areas.

Areas that contained concentrations of homes, businesses, and public infrastructure received the greatest attention. Road, off-road with 4WD, and foot inspections were conducted in the high value/high risk areas over a number of days between September 18 and 23, 2008. Aerial transport for regional aerial review was not available for this preliminary assessment.

On September 20, 2008, the SEAT received printed copies of maps titled: Gap Fire Post-Fire Hazard Awareness Map, created by the Governor's Office of Emergency Services (OES) and United States Geology Survey (USGS).

The magnitude of post-fire damage will ultimately be determined by the location, intensity and duration of storms that impact the burn area, particularly during the winter of 2008-09.

Recommendations found in this report are to serve as a supplement to prior guidelines and plans generated by the USFS Gap Fire BAER Initial Assessment, the County Gap Fire Emergency Watershed Response Plan, and the City Gap Fire Pre-Winter Storm Emergency Response Plan for possible mitigation to decrease the risk to life and property. The following information summarizes key findings contained in the preliminary post fire assessment of the Gap fire.

GAP FIRE COMPLEX SEAT TEAM REPORT

General Observations

1.) Gap Fire Post-Fire Hazard Awareness Map

The map titled “Gap Fire Post-Fire Hazard Awareness Map – Draft”, (September 18, 2008), by the OES and USGS, graphically depicts the potential aerial extent of areas at risk for flooding and potential debris flow risk. Site specific accuracy of map line locations is out of the scope of this preliminary report. There may be locations or areas of potential danger that are at risk for possible loss of life and/or property which may be on the fringe or out side of the mapped areas at risk.

2.) City and County Road System, Interstate Highway 101, Amtrak Corridor, Santa Barbara Airport, Power, Water, and Wastewater Infrastructure

Water courses, stream channels and drainages descending from the Gap burn area may impact much infrastructure in the Goleta/Santa Barbara urban areas as well as many private lands. Numerous bridges, culverts, and other watercourse crossings are located along State, county and local government roads in and downstream from the burn area. Numerous privately owned and maintained bridges, private roads, and additional structures are also within the drainage areas affected by or located below the burn area.

Additionally, major infrastructure such as the Interstate Highway 101, the Amtrak rail corridor, the Santa Barbara Airport, power, water, and waste water treatment facilities may all be impacted due to in and out-of-channel flooding, concentrated floods, sudden debris flows and/or debris torrents. The Cities of Goleta and Santa Barbara, and the Santa Barbara County Department of Public Works recognize the severity and are proactively moving forward with emergency response plans.

3.) Threats to Wildlife, Botanical Values, and Fisheries

As a result of the fire and the impacts from the loss of vegetation and burn severity, biological and fisheries habitats are at an increased risk to flooding, debris flows, and sedimentation along the creek drainages downstream from the burn area. As noted on the SEAT Sensitive Species Overview Map, habitat areas of concern exist along reaches of Tecolote Creek, Bell Canyon, lower portions of Ellwood Creek, and Las Vegas Creeks. It is understood that if the winter rain season is somewhat normal, that excessive flooding and debris flows will scour out much, if not all of the plant cuttings that were left in the channels. If a drought condition deepens to where very little rain occurs, the cuttings left to decay in the creeks may reduce oxygen levels to anoxic conditions for the biota.

GAP FIRE COMPLEX SEAT TEAM REPORT

4.) Surface Water and Groundwater Quality Concerns

Concerns are raised for surface water quality degradation during the initial first pulses of flooding, debris flows and/or debris torrents. Depending upon severity, duration, and location of rainfall or storm tracks, high-intensity flooding, debris flows or debris torrents may initiate. Unprotected surface items such as natural gas tanks or bottles, agricultural, domestic, and/or municipal chemical storage containers, or buildings may become entrained within the flooding or debris flow waters. Accidental discharge of combustible and/or toxic materials or liquids may occur. Additional items that may be entrained in the flood waters include but are not limited to: fertilizers, pesticides, petroleum products, outhouses, excavation or entrainment of dead animals, equipment, buildings, and vehicles.

Groundwater quantity and quality may become affected. Development of hydrophobic layers in the burn area may contribute to increased runoff but may also inhibit recharge of groundwater supplies. Domestic wells located down gradient from recharge areas may notice a drop in groundwater levels over time as well a change in groundwater quality. Domestic groundwater wells, wellheads and pumping equipment, agricultural wells, pumping and storage equipment which are located within the flow paths of flooding, concentrated flooding, debris flows, and/or debris torrents may be subject to damage and loss. Unprotected, damaged, or opened wellheads may become conduits for groundwater contamination by previously listed concerns

5.) Areas Not Assessed.

Several homes, ranches, agricultural buildings and structures may exist in the interior of or below some of the burn areas. Accessibility was limited and in some areas not at all due to locked gates, or postings of No Entry and/or No Trespassing signs. It should be noted that it is beyond the scope of this preliminary evaluation to gain access to every residential structure and/or camp that may be at risk. Areas with low, moderate, and high potential risks to life and property from slope instability may exist in the vicinity and down slope of the Gap Fire. Evaluation of all properties within the burn areas is beyond the scope of this review. The evaluation of sites not directly affected by the fire is also beyond the scope of this evaluation.

Specific Observations (keyed to Hazard Summary Table)

The Gap Fire Post-Fire Hazard Awareness Map – Draft, graphically depicts the potential aerial extent of areas at risk for flooding and potential debris flow risk. There may be locations or areas of potential danger that are at risk for possible loss of life and/or property which may be on the fringe of, or out side of the mapped areas at risk. Additional Values-at-Risk include outdoor daily work locations (orchards and fields adjacent to drainage courses), power and water conveyance structures, homes, outbuildings, and equipment appear to be in positions where they may be affected by significant in-channel floods, concentrated floods, debris flows, debris torrents, land sliding or other mass-wasting events. At risk sites that were identified as having

GAP FIRE COMPLEX SEAT TEAM REPORT

potential risks to lives or property are listed and briefly described below and summarized in the Hazard Location Summary Sheet at the end of this report.

Emergency Determination

An Emergency Determination is made for Values at Risk graphically portrayed in the Gap Fire Post-Fire Hazard Awareness Map. Values at Risk considered in this evaluation include the possible loss of life and property due to landsliding, debris flow, debris torrents, and concentrated flooding from increased surface water runoff. In general, the risk from landslides, debris flows and floods are possible where roads, residences or other developments are located within and/or adjacent to canyon stream channels, in narrow valleys whose valley floors have previously been sites for flooding, debris flow or debris torrent runout or on alluvial fans, urban streets located along stream channels, infrastructure which crosses natural and existing stream discharge areas, colluvial slopes and debris flow deposits.

It should be noted that these hazards are part of the natural processes in this environment, and that these risks were present to a degree under pre-fire conditions. Existing structures in the burn area and downstream of the burn area have been and will continue to be at risk from post-burn hazards. The potential for these processes to be exacerbated by fire is primarily dependent upon burn severity and slope steepness, both of which are highly variable in the Gap Fire area. In general, where the burn severity is moderate to high and the slopes are steep (such as in the upper and mid-headwaters of each of the creeks draining into and near Goleta), and the stream courses passing through populated and urban areas the potential for increased hazard is greatest.

Areas with low, moderate, and high potential risks to life and property from flooding, concentrated floods, sudden debris flows and/or debris torrents likely exist in the vicinity of narrow valley constriction points such as culverts, sharp changes in drainage direction, lower natural levees or graded lands, or places along stream reaches where debris dams may form and break are not included in this assessment. Assessment of all properties within or adjacent to or below all the burn areas is beyond the scope of this review. The assessment of sites not directly affected by the fire is also beyond the scope of this evaluation.

GAP FIRE COMPLEX SEAT TEAM REPORT

Need for further evaluation

Threats to life, public health or safety, infrastructure, and structures have been or are being assessed on an ongoing basis by authorities and local agencies involved with implementing the Gap Fire BAER recommendations, the Gap Fire Emergency Watershed Response Plan, and the Gap Fire Pre-Winter Storm Emergency Response Plan. As specific tasks (installation of debris or “Grizzly” racks, stream channel clearing, hydromulching, installation of Doppler radar etc.) are completed and prior to the onset of inclement weather, a re-evaluation of existing or planned mitigation measures or methods should be performed.

A series of stakeholder meetings with coordination by all parties including local, county, and State emergency response personnel, news media and public broadcasting, as well as parties from all services which might be impacted (Santa Barbara Airport, Amtrak, CalTrans, water, power, Red Cross etc.), should commence and continue throughout the upcoming rain season. Potential deficiencies that may come to light in flood mitigation, evacuation routes, and rescue and emergency shelter locations should be addressed prior to the onset of any forecasted heavy rains or as the deficiency comes to light.

At this time, due to the ongoing efforts of local, county, State, and federal agencies, it appears that a full contingent SEAT is not necessary to further evaluate the Values at Risk in and around the affected burn area of the Gap Fire because the primary objectives of such an evaluation have generally been completed.

2.) Threats to Wildlife, Botanical Values, and Fisheries

Emergency actions are not recommended for wildlife habitat and species recovery at this time but recommendations are suggested for treatments and monitoring that may be conducted to improve sensitive species habitat and document the possible effects of the fires on wildlife resources. Best Management Practices (BMPs) should be implemented upstream to minimize sediment loads. Re-vegetation efforts should be conducted where appropriate to promote native habitat recovery. Post fire surveys should be conducted for fishery species and their habitat. Species monitoring should be conducted to assess long-term population impacts from the fire. Post fire surveys should be conducted for botanical resources (rare plants) in the areas where they are known to occur.

3.) Water Quality Concerns

No specific water quality based emergency actions are recommended for the Gap Fire. However, in general, it is suggested that the State consider evaluating the need to look more closely at post fire watershed conditions. Concerns over flooding were discussed with the Goleta Sewer District and West Goleta Pumping station employees.

Over the last several years larger fires have been an increasingly common occurrence in the mountainous and forested watershed areas of California. Although three years is not a trend, with the increasing awareness of the potential for climate change and recognition that California

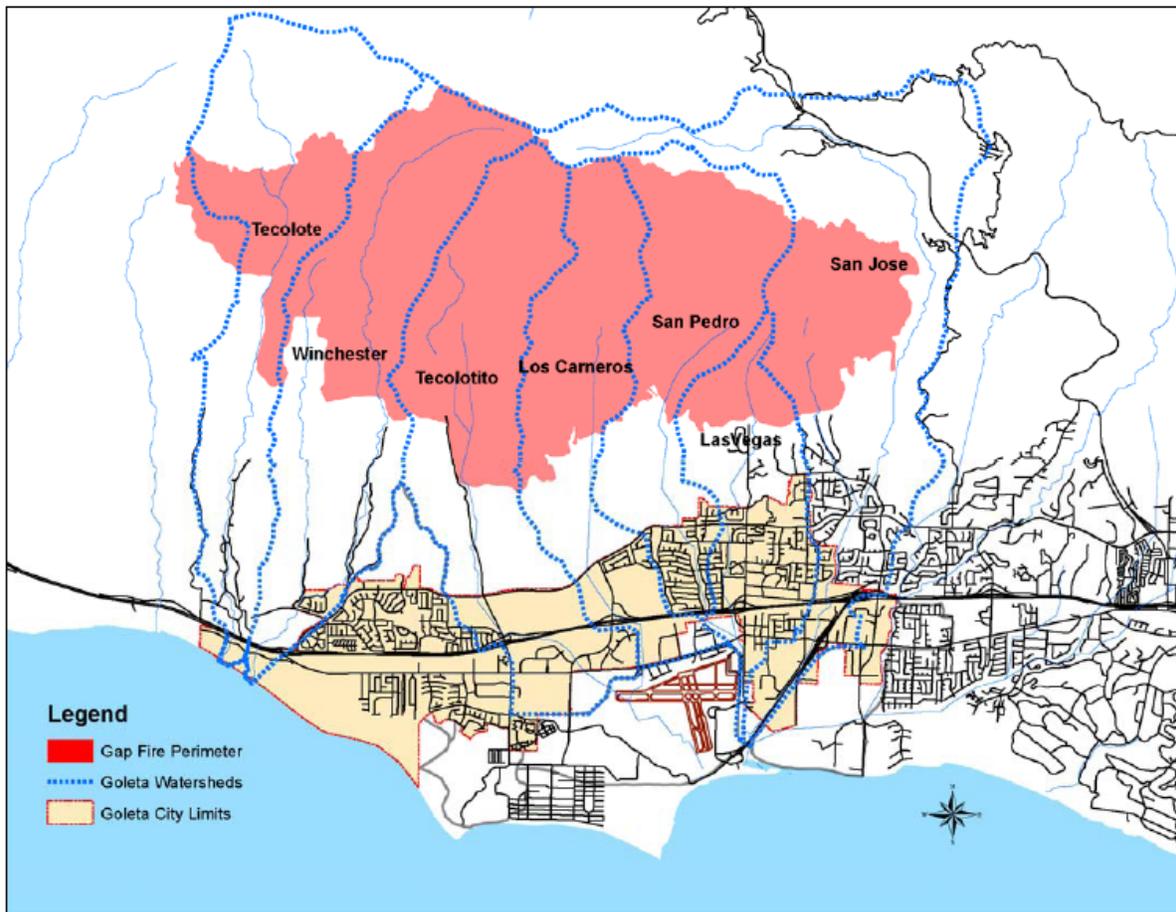
GAP FIRE COMPLEX SEAT TEAM REPORT

suffers in many areas from an increased fuel loading and a overall increase in the time between historic and present day fire occurrence regimes such consideration is likely warranted.

An additional concern warranting consideration is the Steelhead population dynamics and perhaps a more aggressive approach to in-stream fisheries population enhancement/ management that considers the fragile habitat for Steelhead. The replacement of the undersized culverts in the 101 corridor and Southern Pacific Railway and all other structures and streams should be coordinated with improving fish passage. This will provide improvement in passage for endangered fish and reduce flooding for the communities.

4.) Areas Not Assessed.

Any properties not included in this report and hazard summary table (at the end of this report) should be visited by emergency response agencies and/or community groups in an effort to provide further assessment and advise those property owners.



Resource Conditions Description

The Gap Fire burned 9,544 acres between July 1, 2008 and July 28, 2008. The fire burned approximately 4600 acres (48% of the total) on the Los Padres National Forest Service (NFS) and about 5000 acres (52%) on private lands. The Fire started near Camino Ciello Drive and was driven by shifting “sundowner” offshore winds. These lands have not burned for approximately 50 years prior to the Gap Fire. The vast majority of the chaparral and mixed forest lands were completely burned off leaving less than 20% effective vegetative cover on the vast majority of the landscape.

The fire burned mostly south facing slopes that rise steeply from 250 foot elevation to over 2600 feet; from the young alluvial plain near the Pacific Ocean to the summit of the Santa Ynez Mountains. The fire burned slopes underlain by steeply dipping sedimentary rock, predominantly sandstone, of the Vaqueros and Sespe Formations at the higher elevations, and rolling hills underlain the Rincon Shale on the lower slopes. The Santa Barbara region, including the slopes burned by the Gap Fire, is in a region that is considered to be seismically active, with the nearby Santa Ynez fault considered to be probably Holocene in activity (Jennings, 1994). Seven small watersheds drain the Gap fire along Tecolote, Winchester, Tecolotito, Los Carneros, San Pedro, Las Vegas and San Jose Creeks. These creeks are perennial/intermittent depending on location and the preceding year’s rainfall. Most of the streams were flowing in late September this year, possibly as a result of the loss of evapotranspiration from vegetation in the fire zone.

The vast majority of the south-facing slopes burned by the Gap Fire supported a mix of soft and hard chaparral that follows sedimentary formations across the landscape. Also burned were

GAP FIRE COMPLEX SEAT TEAM REPORT

mixed oak woodlands and local savanna, with, conifers along the ridge tops. The riparian corridors are very dense with sycamore and other mixed hardwood riparian stands, which contrast sharply with the nearby dry landscape. In the lower portions of the fire on private lands, avocado and citrus orchards are the dominant trees.

The ridges subject to this fire are not prone to rain- on- snow events but are very susceptible to intense rain due to orographic lift that occurs when air masses are forced from low elevations to higher ones as they move over rising terrains. As the air mass gains altitude it expands and cools the, cooler air cannot hold the existing cloud moisture and heavy rains occur. Special concern must be noted when warm storms known as Madden-Julian Oscillation (MOJO) circulations form and jet streams line up to this location. This type of pattern yields warm-wet storms along the west coast of North America, and are known for the floods that they can generate.

Post-fire Erosion and Stream Flow Conditions

This change in sediment and flow as the result of the fire has created a condition of extreme concern, The BAER Report states “This constitutes an emergency” and the SEAT field and document reviews confirm this conclusion. The calculations made by the Federal BEAR team indicate that sediment rates may increase 10 to 20 times over background or “natural” conditions in the watersheds that had a higher percentage burned. The SEAT inspected the burn area and agrees that the sediment potentials stated in the report can be expected from the “Design Storm,” but we must emphasize that they are not the limit of the potential sediment delivery from these watersheds. The moderate and high burn severity areas should be expected to have a high hydrologic response. The BAER Report states “At this smaller scale increases in peak discharge for the design storm (Q5) increases range from 3 to 7 percent for low severity watersheds including Eagle Creek and Las Vegas Creek, 28 to 32 percent for watersheds with about 20% moderate and high burn severity (San Jose Creek and Tecolote Creek), and 63 to 120 percent for those watersheds with near double peak discharge including Bell Canyon, Upper Glen Annie Canyon, Upper Carneros Creek, and Upper San Pedro Creek. These four watersheds include 75% of the burn, and the modeling indicates that a Q5 storm would react similar to a Q12 to Q25 storm. This constitutes an emergency. “

As noted by the BAER Report, “The moderate and high areas of the burn are expected to have a high hydrologic response.” This is supported by our observations of hydrophobic soils in an area identified as having burned at a moderate severity. The Burn Severity Maps show the majority of the lands (80% or more) with moderate to high burn severity. These watershed response to precipitation events is expected to be high over nearly all of the fire area due to loss of cover on steep slopes. The potential for increased flows leading to flooding and debris flows is high to very high. Runoff and sediment yield is expected to increase substantially in the first three years. Vegetation is expected to re-sprout and seed in over the majority of the burned area, with effective cover re-established within 5 years.



Burn Severity Classes (Frazier 1989) indicates that in High Severity burns hydrophobicity will repel water for over 40 seconds. Organic groundcover is less than 20%. With this in mind and the field review by the SEAT confirms that over 3/4 of the burn area is left with less than 20% ground cover and the hydrophobicity greatly exceeds 40 seconds where tested. This supports the BAER conclusion that the burn area will respond to an average storm as though it is a much larger event. Local fire and other emergency response officials were aware of these conclusions and are preparing for this winters rain with all possible caution.

The hydrophobic soils were obvious and common in most of the burn area, but it is important to note that chaparral dominated landscapes naturally contribute to some hydrophobicity in soils without fire, but the fires' effect has greatly increased the inherent hydrophobicity. The SEAT noted gopher digging in lower burn areas and the beginnings of sprouting on approximately 50% of the burned stems in the moderately burned areas, all good indicators of increased natural tilling and root viability that can aid in recovery of these lands in the future. The percent organic groundcover again is less than 20% at this time over the vast majority of the burn area except in the



Pen points to a drop of water on hydrophobic soils that never soaked in for more than 20 minutes during the site visit to a moderately burned site.

GAP FIRE COMPLEX SEAT TEAM REPORT

watercourses. The reduced fire severity in many channel bottoms is another good sign, as the remaining vegetation can help stabilize the channels and trap some debris and slide materials in the coming months.

Gap Fire area of minimal groundcover and existing unstable slopes



Within the fire perimeter the BEAR Team and SEAT found numerous other high value resources at risk including Southern California Edison power lines, the Cachuma Operations and Maintenance Board water pipeline, private reservoirs, the Corona Del Mar Water Treatment Plant and water pipelines, and roads that access these different facilities. Other values at risk within the fire perimeter are homes and access roads

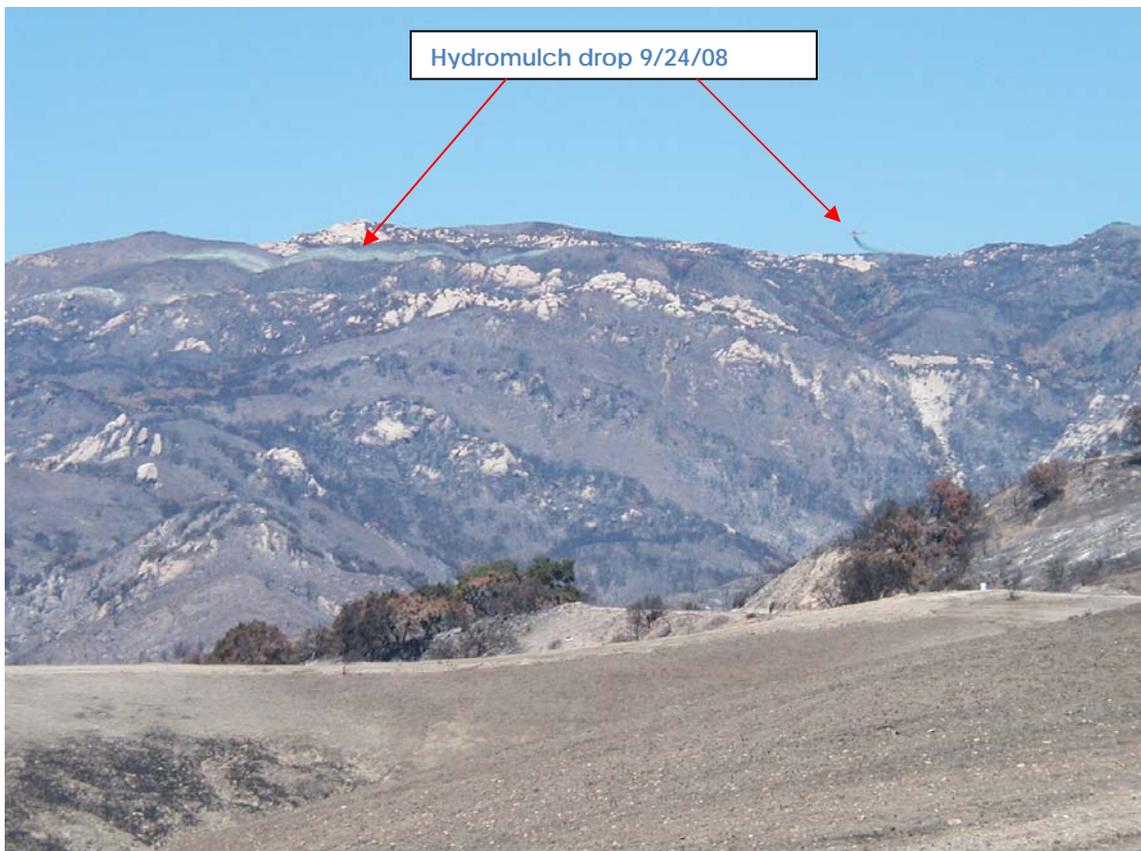
The SEAT was tasked to review the BAER Report and Federal efforts to date along with evaluation resources at risk both within the burn area and especially the area between the Federal and the local responsibility areas near the City of Goleta. This area immediately below the fire perimeter had numerous resources at risk, primarily public roads, culverts, and bridges, private homes, reservoirs, orchards, and private roads and related stream crossing structures. Within the burn area homes are few and generally located on hilltops away from the impacts of flooding, but many bridges, culverts and roads are in or near watercourses and that will experience considerably more runoff and sediment discharge than the pre-fire conditions. It is important to note that the BAER Report states and the SEAT concurs that treatments on NFS lands will help to reduce the impacts of the fire following precipitation events, these treatments will not completely mitigate the effects of the fire, nor will they be as effective without additional treatments on private lands within and downstream of the fire perimeter.

GAP FIRE COMPLEX SEAT TEAM REPORT

TREATMENTS National Forest Service Lands

The BAER Team identified concerns and potential treatment options for their lands that make up almost half of the burn area. Many options were evaluated (straw bale check dams, straw wattles, water control structures, riparian planting and channel clearing etc.), but steep terrain and access limited the effectiveness of many of these options. The Los Padres National Park boundaries are roughly across the upper ½ of the burned area. These are the steepest lands in the burn area that are often rocky and no roads exist in much of the area which make many of the treatment options impossible to apply and ineffective. This led the NPS to choose aerial application of hydromulch as their option for reducing sediment inputs. This treatment is useful on the very top of the mountain and other limited sites totaling 1,500 acres out of 4581 acres or 30% of their lands. Hydromulch is applied on lands under 60% slope and not in areas of exposed rock.

Hydromulch refers to fiber mulches and soil stabilizers that, when mixed with water and applied to the soil surface, form a matrix that helps reduce erosion and fosters plant growth. Numerous areas were identified for aerial hydromulch treatment on slopes less than 60 percent in moderate to high burn severity in the highest risk watersheds (Upper Los Carneros, Upper Glen Annie, Upper San Pedro Creek, and Upper San Jose Creek). Federal efforts are well chosen for the limited time available for covering vast areas of bare soil and limits stated to treat the debris flows effectively in the very steep mountains within the NFS lands.



GAP FIRE COMPLEX SEAT TEAM REPORT

Proposed NFS hydromulching efforts will help reduce some of the post fire impacts but this treatment will only help reduce raindrop dislodging of soils within areas treated on less than 60% slopes, equaling about 1500 acres. The County of Santa Barbara, in cost sharing with the Natural Resources Conservation Service and will hydromulch an additional 1,000 acres in the lower portions of the fire. This mitigation is not intended to mitigate debris flow sediment inputs to streams and monitoring should be conducted by the NFS to determine effectiveness. A concern by the SEAT is that hydromulch may trap moisture between hydrophobic soils and the mulch, This moisture may not be evaporated effectively in-between storms. There are many good reasons to mulch without seed as many natural seeds may still be viable after the fire. Sufficient seed action can be greatly enhanced by adding the proper seed to the mulch as seed rooting action is both effective at reducing hydrophobicity and increasing root soil binding.

This leaves the very steep slopes that are prone to debris flows as the zones that are a large contributor of sediment that are not treated. Opportunities to reduce inputs of sediment are possible in terrain that lends itself to sediment catchment. The SEAT considers the option of sediment source control as an important option, which is a primary consideration when attempting to limit damage downstream. Many sites were noted in our field investigations that were natural valley bottoms near steep slopes prone to debris flow inputs to the system. Enhancing these features is a viable option that was recognized by the BAER Team but not employed. They felt further assessment by a licensed engineer and geologist to determine if opportunities exist for installation of debris racks or other structures at the national forest boundary should be seriously considered. Additionally, the BAER report stated “Cumulatively the greatest potential to reduce impacts to downstream values would be through implementation of a variety of treatments appropriate for the site specific topography and setting.”



The percent contribution of surface soil erosion to the over 200,000 cubic yards of anticipated bedload delivered to streams has not been clearly defined. This is a concern as it is not clear if reductions in sediment contributions attributed to hydromulch efforts are included in the final

GAP FIRE COMPLEX SEAT TEAM REPORT

calculations of sediment production. The concern is brought about as the BAER Report indicates a 10 fold reduction from over 50 tons per acre to under 5 tons after mulching. This extremely generous reduction in sediment delivery is difficult to support from past experience of the SEAT. Monitoring is necessary to confirm this and to refine these assumptions in the future.

Table 1 from the BAER Report

<i>Treatment* based on ERMiT modeling. Note these are hill-slope soil erosion estimates that are not routed through the stream system. Event Sediment Delivery t/ac</i>				
Watershed	Treatment	1st Year	2nd Year	5th Year
Upper San Jose Creek	Untreated	53	34.4	3.9
	Mulched (1t/ac)	4.9	7.8	3.9
Upper Glen Annie	Untreated	54.5	36.2	3.9
	Mulched (1t/ac)	5.1	8.2	3.9
Los Carneros Creek	Untreated	56.3	36.8	4.2
	Mulched (1t/ac)	5.2	8.2	4.2
Upper San Pedro Creek	Untreated	53.6	35.5	3.9
	Mulched (1t/ac)	5.0	8.0	3.9

The hydromulch and other protective measures on Federal and private lands may not be fully effective if not followed up by additional treatments on private lands within and downstream of the burn area. As stated in the BAER Report “Cumulatively the greatest potential to reduce impacts to downstream values would be through implementation of a variety of treatments appropriate for the site specific topography and setting.”

Even though the NFS has limitations due to topography there are opportunities to store some sediment on their lands. Though also steep, the private lands do have more opportunities to store sediment inputs from the coming rain events. The SEAT has identified many locations that could potentially serve well as “temporary” sediment storage areas to reduce the anticipated debris flow inputs from visibly unstable terrain within the burn area. Many of these areas are long floodplain valleys and side canyons that have unstable headwall swales.

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Valley bottom below steep unstable slopes capable of sediment storage as seen by the existing natural storage at the top right of the picture; it may be possible to use Loose Rock Check Dams or temporary silt trapping structures in areas such as this. These wide areas are naturally drained by low gradient, small Class III Type streams (CalFire). Proper design to fit the site and monitoring after all storms is critical for success with any structure used for this purpose.

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Resources at Risk

In order of occurrence within and below the burn are roads and power lines of the Southern California Edison Company, the Corona Del Mar Treatment facility, roads and water lines of the Goleta Water District, orchards, several reservoirs, Cachuma Operations and Maintenance Board buried water pipeline, roads that access these different facilities, as well as a significant cultural resource site. In addition, the fire lies immediately upstream of the community of Goleta, Santa Barbara Airport, Highway 101, a railroad, and other high value downstream developments. These high value developments all lie within 0 to 5 miles of the fire, and there is high potential that they will be severely affected by increases in flood flows, sediment yield, and debris flow potential.

The Santa Barbara Airport flooded twice in the recent past (1995 and 1998) and a closure today would cost around \$1.4 million per closure (estimate from Airport Administration). Many culverts under and near the Highway 101 corridor are capable of passing only a 10 year storm according to County Flood Control Staff. Based on calculations by the NFS, the U.S. Geological Survey, and others, post fire runoff could easily overwhelm these existing crossings and a long term program of upgrades is called for. The difficulty is that the relatively flat areas are not far above sea level which limits the drainage capacity for most of this area as evidenced by the "Mud Flow Analysis" Mapping. The bottom-most resources at risk are the \$ 10 Million Goleta Slough Wetlands Project and the City of Goleta Sewer Plant. The wetlands project is definitely in danger of being inundated with sediment. Although near the Airport, the Goleta Sewer Plant is situated above the floodplain enough to have escaped damage in 1995 and 1998. This is also true of the West Goleta Pumping Station, but it is at a lower elevation and more at risk.

One site that our maps indicate could suffer damage during storms was reviewed by the BAER Team and their report states "East facing slopes with greater than 55% gradient and high soil burn severity have a very high risk of both landslides and debris flows." This is particularly significant in the area of the water treatment plant because slope failure could result in burying treatment ponds and can cause pipeline ruptures around the treatment plant. In addition, these landslides and debris flows could affect the Cachuma Operations and Maintenance Board water pipeline which provides water to over 200,000 (80%) clients in the area. Other specific concerns include a high risk of failure of the access road for both the powerline and Cachuma waterline due to rockfall, debris flows, and landslides. This may result in partial to complete loss of the road prism in certain locations. Loss of access to the powerline and pipeline could limit the response time to address breaks in the water line or problems with the powerline which would affect all of the downstream identified communities, airport, etc. Post fire sedimentation is also expected to reduce the capacity of several reservoirs within the burn area.

The Baer Report states "Given the predicted effects of the fire, all of the high value resources listed above are at serious risk for severe consequences should a storm of any significance rain on the burned area, particularly if antecedent moisture conditions are high." The SEAT would like to also state that if soils are dehydrated, hydrophobic and have limited vegetative cover that the risk are significant for any rain, regardless of the antecedent moisture conditions.

GAP FIRE COMPLEX SEAT TEAM REPORT

Orchards and Reservoirs



GAP FIRE COMPLEX SEAT TEAM REPORT

Resources at Risk

One example of resources at risk is the site of the Corona Del Mar Water (CDMW) treatment plant in the Upper Glen Annie Canyon watershed. This facility supplies water for the City of Goleta and while the facility itself is on stable ground, it is surrounded by slopes that were burned and are now more at risk of slope instability. SEAT members contacted staff at the facility and discussed slope stability concerns with them. SEAT Team suggested irrigation of soils prior to rains to stimulate seed sprouting and natural breakdown of hydrophobic soils. CDMW staff were aware of the slope stability problems and other problems associated with the fire. They have installed K-Rails at the most vulnerable ponds but additional work should be initiated to further protect the most threatened. The water delivery lines appear to be especially susceptible to damage from debris flows and unstable fills and slope movements that can occur for several winters.



GAP FIRE COMPLEX SEAT TEAM REPORT

Threats to life: Threats to life primarily come from increased runoff and flooding potential, debris flows, erosion and sedimentation, and landslides. Residences and business properties are at risk from flooding and sedimentation, and/or debris flows. Lives are potentially at risk in homes and businesses which are located in flood and debris flow prone areas, or on roads where flash flooding can occur. Additional funding and training for Swift Water Rescue is warranted.

The SEAT effort did identify high-risk sites as mentioned. All are associated with flooding or debris flow activity along the major streams draining from the Gap Fire.

The SEAT report concludes the need for emphasis to the following:

- the risks of post-fire floods and debris flows are high
- a 10-year return period storm could trigger the equivalent to a 100-year flood
- sites within modeled probable flood and debris flow inundation zones should be considered to be at high risk and, unless adequate mitigation measures are employed, need to be aware of evacuation procedures
- local emergency response and planning agencies are encouraged to use the data developed by the BAER Team and by Dr. Susan Cannon of the U.S. Geological Survey to identify those sites near streams that are at greatest risk for post fire floods and debris flows
- a 100-year return period storm, which is likely to occur during “mojo conditions” conditions, could potentially result in runoff that is twice the volume of a normal 100-year flood, and this would inundate a much larger area
- local emergency response and planning agencies are encouraged to identify the lands at elevations that could be inundated by a flood with a volume twice that of the existing 100-year floodplain so that people living in those areas can be warned that they are in zones that could be affected by MOJO storms.

GAP FIRE COMPLEX SEAT TEAM REPORT

SEAT TEAM OUTREACH



SEAT Team with Chris Borges- Chief Water Treatment Operator



Tour with City of Goleta - Rosemarie Gaglione



Site tour with Thomas Fayram- Deputy Public Works Director

GAP FIRE COMPLEX SEAT TEAM REPORT

PRELIMINARY EVALUATION OF POTENTIAL POST FIRE HAZARDS FOR THE GAP FIRE – SANTA BARBARA COUNTY

Gap Fire - CA-LPF-001778

Affecting watersheds in Santa Barbara County, California

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A.) Introduction

This SEAT effort is meant to compliment and extend existing assessment and mitigation efforts that have already been undertaken, are presently occurring, or are planned as upcoming work. **The agencies and personnel involved in their perspective jurisdictions should be commended for recognizing and addressing this emergency and urgent need for preparation prior to the upcoming rain season.** A preliminary post fire hazard assessment has been conducted in the Santa Barbara County area to assess the general degree of risk associated with the Gap Fire burn areas. The assessment was also conducted to evaluate the Values at Risk in around the affected burn area of the Gap Fire. Values at risk are defined as:

- On-site and downstream threats to public health or safety from landsliding, mud sliding, debris torrents, flooding, road hazards, and other fire related problems.
- Threats to watershed resources, including: excessive erosion; impaired water quality; threats to wildlife, fisheries, and botanical values; and cultural resources.

B.) Background

The Gap Fire started on July 1, 2008, and was contained on July 28, 2008. The fire burned approximately 9,544 acres within Santa Barbara County, of which 4,573 acres (48%) is National Forest System (NFS)

GAP FIRE COMPLEX SEAT TEAM REPORT

lands, and the remainder is private land. The initial Burned Area Emergency Response Assessment has been completed and addressed all National Forest System lands within the burned area.

A high percent (76%) of the burn area was rated as moderate or high burn severity, with 24% rated as low burn severity or unburned. The fire completely burned off all effective cover on the majority of the burned area with the exception of some of the riparian areas in the bottom of the larger drainages. While soil burn severity was largely moderate, watershed response to precipitation events is expected to be high over nearly all of the fire area due to loss of cover on steep slopes. The potential for increased flows leading to flooding and debris flows is high to very high. Runoff and sediment yield is expected to increase substantially in the first three years. Vegetation is expected to re-sprout in the majority of the burned area, with effective cover re-established within 5 years.

Within the fire perimeter there are multiple high value resources including but not limited to the Southern California Edison power line, Goleta Water District water treatment plant, orchards, several reservoirs, Cachuma Operations and Maintenance Board buried water pipeline, and roads that access these different facilities, as well as a significant cultural resource site. In addition, the fire lies immediately upstream of the community of Goleta, Santa Barbara Airport, the Goleta Slough, Highway 101, a railroad, and other high value developments. These high value developments all lie within 0 to 5 miles downstream of the burned area. Given the predicted effects of the fire, all of the high value resources listed above is at serious risk for severe consequences should a storm of any significance rain on the burned area within the next three years. Impacts would occur from a combination of increases in flood flows, sediment yield, landslides and debris flows (BAER Executive Summary, 08-04-2008).

C.) Information Received, Resource Setting, Geology and Landslide Review

The principal concern with the GAP Fire is an increase in the potential for in-channel floods, concentrated floods/flows, rock falls, rock avalanches, and loss of burned vegetation resulting in the formation of debris flows and debris torrents. The primary mechanisms for this are:

- Increases in runoff resulting from the loss of live vegetation,
- Reductions in infiltration due to the removal of duff and the dehydration of the soil,
- Development of hydrophobic soils,
- The simplification of surficial runoff patterns, and
- The loss of mechanical support of hill slope materials that was provided by vegetation and vegetative litter along stream channels.

The fire perimeter can be located on portions of the following U.S. Geological Survey 7.5-Minute Series Topographic Maps:

GAP FIRE COMPLEX SEAT TEAM REPORT

- Dos Pueblos Canyon Quadrangle 1995
- Goleta Quadrangle 1995
- San Marcos Pass Quadrangle
- Lake Cachuma Quadrangle

Maps generated for the Gap Fire Santa Barbara Statewide Emergency Assessment Team (SEAT) by the U.S. Forest Service, CalFire, and Governor's Office of Emergency Services included:

- Fire Severity
- Critical Infrastructure and Hydrology Overview
- Vegetation Overview
- Government Ownership Overview
- Sensitive Species Overview
- Geology Overview
- Direct Protection Overview

Additional geological information for the burn area is derived from:

- Geologic Map of the Goleta Quadrangle, 1987, by Thomas W. Dibblee Jr.
- Geologic Map of the Santa Barbara Quadrangle 1986, by Thomas W. Dibblee Jr.

Dibblee geologic maps were kindly provided by City of Goleta Capital Improvement Program Manager Rosemarie Gaglione and City GIS staff in electronic format.

Documents reviewed include:

- Gap Fire BAER initial Assessment, August 29, 2008 Redacted Version. This report also included the geologic assessment by Dr. Thomas E. Koler PG of the USFS El Dorado National Forest
- Gap Fire Emergency Watershed Response Plan, August 2008, by Santa Barbara County Public Works Department, received from Mr. Thomas D. Fayram PE, Deputy Public Works Director, County of Santa Barbara, Flood Control Water Agency
- Gap Fire Pre-Winter Storm Emergency Response Plan, September 2008, by City of Goleta – received from Mr. Steven Wagner, Director of Community Services for the City of Goleta

An additional map received by the SEAT on September 20, 2008 titled:

- Gap Fire Post-Fire Hazard Awareness Map – Draft, (September 18, 2008), by the Governor's Office of Emergency Services and United States Geological Survey (USGS). This map series is in Draft form for advisory purposes only, not for insurance rating purposes, and is not meant for distribution.

General Geology and Geomorphology

The fire area is located in the Santa Ynez Mountains within the Transverse Range geomorphic province. The burn area is situated above the cities of Goleta and Santa Barbara. The Transverse Range is a series

GAP FIRE COMPLEX SEAT TEAM REPORT

of tectonic blocks of the earth's crust which have been tilted as a result of seismic uplift. Rock formations in the burn area hill sides and mountains vary from Recent (Holocene) to Late Eocene in age. Table 1 consists of rock and formation names, and locations within the burn area.

The City of Goleta is situated on a low alluvial plain with rolling hills in the upper portion of the urban area. The areas to about elevation 150 feet above sea level are underlain by young alluvium, flood plain, and stream channel deposits. Rolling hills increasing from ~150-feet to about 500-feet elevation are generally underlain by the Rincon shale. Steep hillsides form in the Vaqueros and Sespe Formations generally between the 300 and 1,000-foot elevations. The heads of the narrow alluvial valleys all occur within these formations. A substantial change in slope steepness occurs within the lower Sespe Formation and contact with the Gaviota and Coldwater Formations. The hills steeply rise to over 2,600-foot elevation along the northerly edge of the Gap Fire perimeter.

Geologic Period	Geologic Epoch	Symbol	Formation Name	Formation Description	Location
Quaternary	Holocene	Qs	Surfacial Sediments	Beach sands	Lower most slopes, stream channels, valley bottoms extending into hills
	Holocene	Qg		Stream channel deposits	
	Holocene	Qa		Alluvium, flood plain deposits	
	Holo-Pleistocene	Qls	Landslide debris	Hillside slopes	
	Pleistocene	Qoa / Qog		Older desiccated surfacial sediments	Lower hills near urban areas
Early Miocene		Tr	Rincon Shale	Gray clay shale or claystone dipping 30° to 60° South	Mid-hills, Lower Burn Area
Early Miocene		Tvq	Vaqueros Sandstone	Thick bedded sandstone dipping 40° South	Mid-hills, Lower-mid burn area
Oligocene		Tsp	Sespe Formation	Maroon, red, gray shale and sandstone 25° to 50° S.	Mid-Steep Hills, Mid Burn area
Late Eocene		Tg	Gaviota Formation	Thick bedded sandstone dipping 60° South	Upper burn area in Carneros drainage
Late Eocene		Taw	Coldwater Sandstone	Hard bedded sandstone, dipping 8° to 57° South	Upper canyons and upper burn area to crest

Table 1. Rock types, formation ages and relation to the Gap burn area.

GAP FIRE COMPLEX SEAT TEAM REPORT

The steep hills above Goleta and Santa Barbara form a barrier to the Pacific storm belt and as a result, orographic rainfall (rising of water-laden clouds over the mountains) is common. During wet years, weak rocks and unconsolidated surficial deposits become saturated and may fail as rock falls, debris slides, and landslides. Debris flows generated during rain storms on recently burned areas have destroyed lives and property throughout the Western U.S. (Cannon, et al, 2007).

Faults and Local Seismicity

The predominate fault located near the Gap burn area which is partially mapped as having Holocene (<11,000 yrs bp) age movement is the Santa Ynez Fault (Jennings, 1994). Other faults in and near the Gap burn area indicating movement during late Quaternary time (<700,000 yrs bp) include the Santa Ynez Fault, San Jose Fault, More Ranch Fault, Lavigia East Fault, Mesa-Rincon Fault, Mission Ridge Fault, Baseline Fault, and Little Pine Fault. The San Pedro Fault, and Carneros Fault located within the burn area do not appear to indicate Quaternary movement. There may be new information concerning local faulting. The burn area is located in a relatively active seismic area of recurring earthquakes. Loose rock located on steep slopes is subject to falling, rolling, and bouncing during earthquakes. Saturated fine-grained sediments are also subject to liquefaction and slope failure during seismic events.

Landslides

The term landslide is used for “The movement of a mass of rock, debris, or earth down a slope” (Cruden, 1991). The criteria used in the classification of landslides follow Varnes (1978). In emphasizing landslide types, various criteria include:

Type of materials:

- Rock, debris, earth

Types of movement:

- Falls, topples, slides, spreads, and flows,

Activity:

- Active, reactivated, suspended, and
- Inactive (dormant, abandoned, stabilized, relict)

Distribution:

- Advancing, retrogressive, widening, enlarging, confined, diminishing, moving

Water content:

- Dry, moist, wet, very wet

And description of first and second movements:

- Extremely rapid, very rapid, rapid, moderate, slow, very slow, and extremely slow

GAP FIRE COMPLEX SEAT TEAM REPORT

Landslide definitions are then classified in this manner (e.g., Debris flows, Earth spreads, Rock falls, etc.). Activity of landsliding can be extremely slow to extremely rapid. Table 2 depicts a velocity classification related to probable destructive significance.

Table 2. Velocity classification related to Probable Destructive Significance.

Minimum Typical Velocity	Description	Velocity Class	Definition of Probable Destructive Significance of Landslides of Different Velocity Classes (in Turner and Schuster, 1996, Table 3-5, pg. 51).
>10 feet per second	Extremely rapid	7	Catastrophe of major violence; buildings destroyed by impact of displaced material; many deaths; escape unlikely
1 foot per minute	Very rapid	6	Some lives lost; velocity too great to permit all persons to escape
5 feet per day	Rapid	5	Escape evacuation possible; structures, possessions, and equipment destroyed
5 feet per month	Moderate	4	Some temporary and insensitive structures can be temporarily maintained
5 feet per year	Slow	3	Remedial construction can be undertaken during movement; insensitive structures can be maintained with frequent maintenance work if total movement is not large during a particular acceleration phase
1 foot per year	Very slow	2	Some permanent structures undamaged by movement
< 1 foot per year	Extremely slow	1	Imperceptible without instruments; construction possible with precautions

When considering rainfall intensity, duration, and location, combined with elevation change, proximity to populated areas and risk of seismic event, Velocity-Class events up to and including Class 7 can not be ruled out.

Existing and previous landslides, debris chutes, flooding courses and other mass wasting features are found within and below the Gap Fire burn area.

GAP FIRE COMPLEX SEAT TEAM REPORT

The Landslide Inventory Map of Southeastern Santa Barbara County, California (Bezore and Wills, 2000) indicates that many landslide and debris slide sites of multiple types exist within the Gap Fire burn area. Active or historic movements, and dormant slides of young to mature and old landforms are mapped.

During initial field work, the SEAT geologist made trips into accessible portions of the burn area to ground truth burn severity and locate current landslide features. Pictures of commonly seen landslide types are provided for review in Figures 1, 2, and 3.

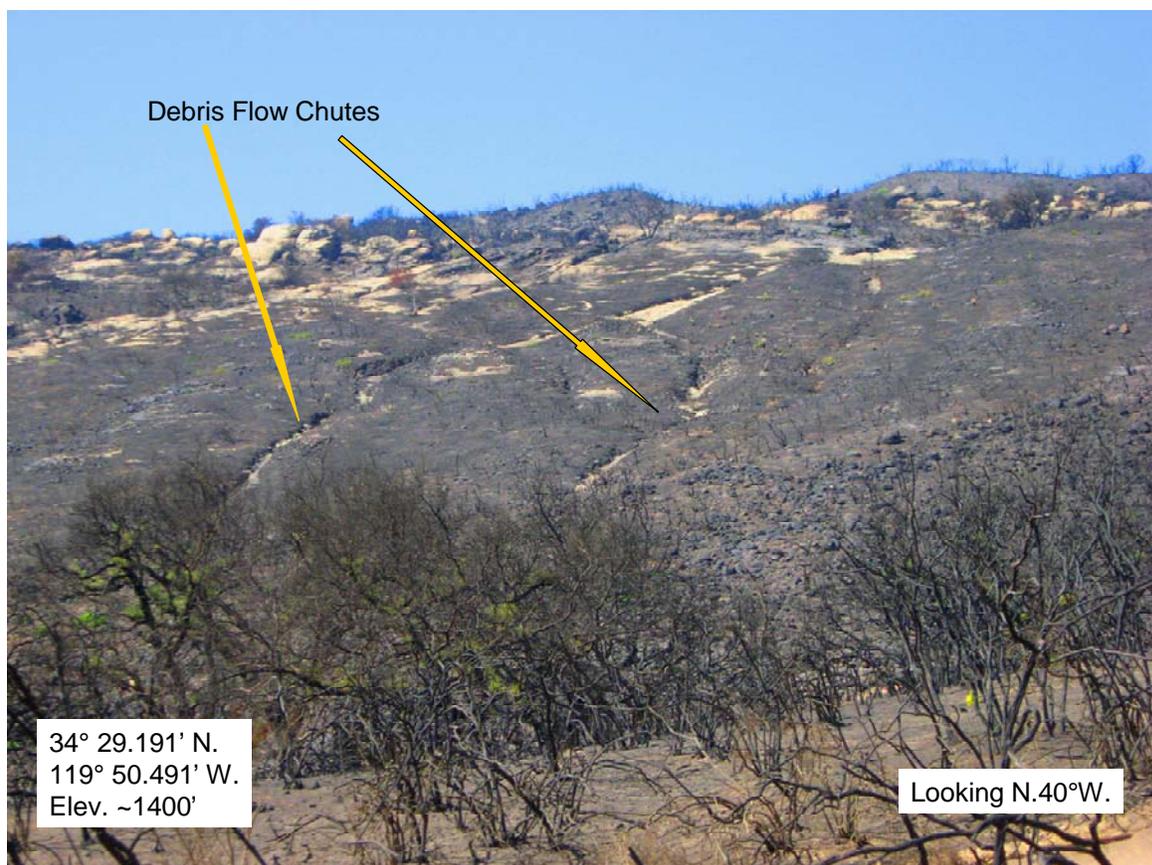


Figure 1. Example of existing and developing debris flow chutes and channels. Moderate to high burn severity occurred in this area. Bottoms of incised channels contain cobble and boulder-sized clasts.

GAP FIRE COMPLEX SEAT TEAM REPORT

Figure 3. Example of an existing advancing earth flow found within the burn area. Burn severity within the slide mass is moderate. The building is a public water conveyance structure located next to Ellwood creek. The creek bottom contains rounded boulders 2-feet to 6-feet in diameter. The boulders were deposited during high flooding and prior debris flow events.

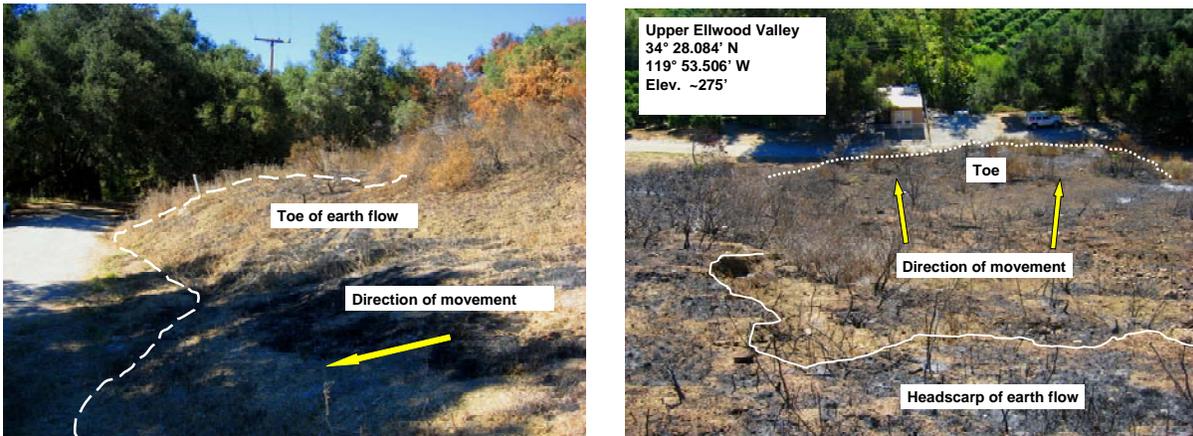


Figure 2. Example of inner gorge rock falls, debris chutes, raveling slopes, and landslides. Similar geology exists at similar elevations throughout the burn area.

Steep Inner Gorge
 Multiple active landslides
 Moderate to High Burn Severity
 Development of active rockfall chutes
 Headscarps advancing upslope
 34° 28.020' N.
 119° 53.341' W.
 Elev. ~760'



GAP FIRE COMPLEX SEAT TEAM REPORT

D.) Assessment Methods

A mini State Emergency Assessment Team (SEAT) assembled at the Santa Barbara County Fire Department Headquarters on September 17, 2008. After an introductory informational session SEAT members began to meet with local authorities and agencies. Prior work by multiple agencies had produced numerous documents including but not limited to:

- Gap Fire BAER initial Assessment, August 29, 2008 Redacted Version
- Gap Fire Emergency Watershed Response Plan, August 2008, by Santa Barbara County Public Works Department
- Gap Fire Pre-Winter Storm Emergency Response Plan, September 2008, by City of Goleta

The SEAT group was provided a tour of existing debris catchment structures (debris racks) and other debris rack locations under construction by County of Santa Barbara Deputy Public Works Director Thomas Fayram.

Areas that do exhibit moderate to high burn severity or are located upslope of identified high value features (locations that are at risk for possible loss of life and property due to in-channel floods, concentrated floods, out-of-channel floods, debris flows, debris torrents, slope-generated landslides, rock fall, rock avalanche, and other mass wasting events were visited where access was available during this preliminary assessment. In canyon areas or private lands where access was restricted due to locked gates or posting of no-trespassing signs, visitation and evaluation was not performed.

There may be locations or areas of potential danger that are at risk for possible loss of life and/or property in these inaccessible areas.

Areas that contained concentrations of homes, businesses, and public infrastructure received the greatest attention. Road, off-road with 4WD, and foot inspections were conducted in the high value/high risk areas over a number of days between September 18 and 23, 2008. Aerial transport for regional aerial review was not available for this preliminary assessment.

On September 20, 2008, the SEAT received printed copies of maps titled: Gap Fire Post-Fire Hazard Awareness Map, created by the Governor's Office of Emergency Services and USGS.

The magnitude of post-fire damage will ultimately be determined by the location, intensity and duration of storms that impact the burn area, particularly during the winter of 2008-09.

Recommendations found in this report are to serve as a supplement to prior guidelines and plans generated by the USFS Gap Fire BAER initial Assessment, the county Gap Fire Emergency Watershed Response Plan, and the city Gap Fire Pre-Winter Storm Emergency Response Plan for possible mitigation

GAP FIRE COMPLEX SEAT TEAM REPORT

to decrease to risk of damages to life and property. The following information summarizes key findings contained in the preliminary post fire assessment of the Gap fire.

E.) General Observations

1.) Gap Fire Post-Fire Hazard Awareness Map

The map titled “Gap Fire Post-Fire Hazard Awareness Map – Draft”, (September 18, 2008), by the Governor’s Office of Emergency Services and United States Geological Survey (USGS), graphically depicts the potential aerial extent of areas at risk for flooding and potential debris flow risk. Site specific accuracy of map line locations is out of the scope of this preliminary report. There may be locations or areas of potential danger that are at risk for possible loss of life and/or property which may be on the fringe or out side of the mapped areas at risk.

2.) City and County Road System, Interstate Highway 101, Amtrak Corridor, Santa Barbara Airport, Power, Water, and Wastewater Infrastructure

Water courses, stream channels and drainages descending from the Gap burn area may impact much infrastructure in the Goleta/Santa Barbara urban areas as well as many private lands. Numerous bridges, culverts, and other watercourse crossings are located along State, county and local government roads in and downstream from the burn area. Numerous privately owned and maintained bridges, private roads, and additional structures are also within the drainage areas affected by or located below the burn area.

Additionally, major infrastructure such as the Interstate Highway 101, the Amtrak rail corridor, the Santa Barbara Airport, power, water, and waste water treatment facilities may all be impacted due to in and out-of-channel flooding, concentrated floods, sudden debris flows, and/or debris torrents. The Cities of Goleta and Santa Barbara, and the Santa Barbara county Department of Public Works recognize the severity and are proactively moving forward with emergency response plans.

3.) Threats to Wildlife, Botanical Values, and Fisheries

As a result of the fire and the impacts from the loss of vegetation and burn severity, biological and fisheries habitats are at an increased risk to the threat of flooding, debris flows, and sedimentation along the creek drainages downstream from the burn area. As noted on the SEAT Sensitive Species Overview Map, habitat areas of concern exist along reaches of Tecolote Creek, Bell Canyon, lower portions of Ellwood Creek, and Las Vegas Creeks. It is understood that if the winter rain season is somewhat normal, that excessive flooding and debris flows and floods will scour out much if not all of the plant cuttings that were left in the channels. If a drought condition deepens to where very little rain occurs, the cuttings left to decay in the creeks may reduce oxygen levels to anoxic conditions for the biota.

4.) Surface Water and Groundwater Quality Concerns

GAP FIRE COMPLEX SEAT TEAM REPORT

Concerns are raised for surface water quality degradation during the initial first pulses of flooding, debris flows and/or debris torrents. Depending upon severity, duration, and location of rainfall or storm tracks, high-intensity flooding and/or debris flows or debris torrents may initiate. Unprotected surface items such as natural gas tanks or bottles, agricultural, domestic, and/or municipal chemical storage containers, or buildings may become entrained within the flooding or debris flow waters. Accidental discharge of combustible and/or toxic materials or liquids may occur. Additional items that may be entrained in the flood waters include but are not limited to: fertilizers, pesticides, petroleum products, outhouses, excavation or entrainment of dead animals, equipment, buildings, and vehicles.

Groundwater quantity and quality may become affected. Development of hydrophobic layers in the burn area may contribute to increased runoff but may also inhibit recharge of groundwater supplies. Domestic wells located down gradient from recharge areas may notice a drop in groundwater levels over time as well a change in groundwater quality. Domestic groundwater wells, wellheads and pumping equipment, agricultural wells, wellheads, pumping and storage equipment which are located within the flow paths of flooding, concentrated flooding, debris flows, and/or debris torrents may be subject to damage and loss. Unprotected, damaged, or opened wellheads may become conduits for groundwater contamination by previously listed concerns

5.) Areas Not Assessed.

Several homes, ranches, agricultural buildings and structures may exist in the interior of or below some of the burn areas. Accessibility was limited and in some areas not at all due to locked gates, or postings of No Entry and/or No Trespassing signs. It should be noted that it is beyond the scope of this preliminary evaluation to gain access to every residential structure and/or camp that may be at risk. Areas with low, moderate, and high potential risks to life and property from slope instability may exist in the vicinity and down slope of the Gap Fire. Evaluation of all properties within the all the burn areas is beyond the scope of this review. The evaluation of sites not directly affected by the fire is likewise beyond the scope of this evaluation.

F.) Specific Observations (keyed to Hazard Summary Table).

The Gap Fire Post-Fire Hazard Awareness Map – Draft, graphically depicts the potential aerial extent of areas at risk for flooding and potential debris flow risk. There may be locations or areas of potential danger that are at risk for possible loss of life and/or property which may be on the fringe of or out side of the mapped areas at risk. Additional Values-at-Risk including outdoor daily work locations (orchards and fields adjacent to drainage courses, power and water conveyance structures, homes, outbuildings, and equipment appear to be in positions where they may be affected by significant in-channel floods, concentrated floods, debris flows, debris torrents, land sliding or other mass-wasting events. At risk sites that were identified as having potential risks to lives or property are listed and briefly described below and summarized the Hazard Location Summary Sheet at the end of this report.

GAP FIRE COMPLEX SEAT TEAM REPORT

G.) Emergency Determination

An Emergency Determination is made for Values at Risk graphically portrayed in the Gap Fire Post-Fire Hazard Awareness Map. Values at Risk considered in this evaluation include the possible loss of life and property due to landsliding, debris flow, debris torrents, and concentrated flooding from increased surface water runoff. In general, the risk from landslides, debris flows and floods are possible where roads, residences or other developments are located within and/or adjacent to canyon stream channels, in narrow valleys whose valley floors have previously been sites for flooding, debris flow or debris torrent runout or on alluvial fans, urban streets located along stream channels, infrastructure which crosses natural and existing stream discharge areas, colluvial slopes and debris flow deposits.

It should be noted that these hazards are part of the natural processes in this environment, and that these risks were present to a degree under pre-fire conditions. Existing structures in the burn area and downstream of the burn area have been and will continue to be at risk from post-burn hazards. The potential for these processes to be exacerbated by fire is primarily dependent upon burn severity and slope steepness, both of which are highly variable in the Gap Fire area. In general, where the burn severity is moderate to high and the slopes are steep, (such as in the upper and mid-headwaters of each of the creeks draining into and near Goleta), and the stream courses passing through populated and urban areas the potential for increased hazard is greatest.

Areas with low, moderate, and high potential risks to life and property from flooding, concentrated floods, sudden debris flows and/or debris torrents likely exist in the vicinity of narrow valley constriction points such as culverts, sharp changes in drainage direction, lower natural levees or graded lands, or places along stream reaches where debris dams may form and break are not included in this assessment. Assessment of all properties within or adjacent to or below all the burn areas is beyond the scope of this review. The assessment of sites not directly affected by the fire is likewise beyond the scope of this evaluation.

H.) Need for further evaluation

Threats to life, public health or safety, infrastructure, and structures have been or are being assessed on an ongoing basis by authorities and local agencies involved with implementing the Gap Fire BAER recommendations, the Gap Fire Emergency Watershed Response Plan, and the Gap Fire Pre-Winter Storm Emergency Response Plan. As specific tasks (installation of debris or “Grizzly” racks, stream channel clearing, hydromulching, installation of Doppler radar etc.) are completed and prior to the onset of inclement weather, a re-evaluation of existing or planned mitigation measures or methods should be performed.

A series of stakeholder meetings with coordination by all parties including local, county, and State emergency response personnel, news media and public broadcasting, as well as parties from all services which might be impacted (Santa Barbara Airport, Amtrak, CalTrans, water, power, Red Cross etc.) should commence and continue throughout the upcoming rain season. Potential deficiencies that may come to light in flood mitigation, evacuation routes, and rescue and emergency shelter locations should be addressed prior to the onset of any forecasted heavy rains or as the deficiency comes to light.

GAP FIRE COMPLEX SEAT TEAM REPORT

At this time, due to the ongoing efforts of local, county, State, and federal agencies, it appears that a full contingent SEAT team is not necessary to further evaluate the Values at Risk in and around the affected burn area of the Gap Fire because the primary objectives of such an evaluation have generally been completed.

I.) General Recommendations:

1.) Additional Stream Channel Clearing Upstream from Significant Bridges

A major urban emergency stream channel clearing program is nearly completed. The clearing included reduction, cutting, and dropping of foliage in the inner channel of urban stream reaches.

Observation: From the safe vantage point behind bridge guard walls, rails, or by abutments, a person cannot see into the overall stream course including the inner channel, or overbank flood channel within the stream course for any distance. The stream courses are quite overgrown with invasive *Arundo* (sp), young willow trees and other foliage. Sight limitation was during a sunny summer afternoon inspection.

Recommendation: For a general distance of 200 to 300-feet upstream from all urban bridges, the overbank stream channels should be cleared sufficiently to be able see clearly and to determine the magnitude of flooding, debris buildup and the potential for out-of-channel flooding from the safety of the bridge or bridge abutment. *The need for a) a clear-view observation of the stream channel with a high-intensity spot light b) during night time hours under inclement weather conditions c) from a safe vantage point is very important and necessary for d) emergency responders to evaluate and alert the public for evacuation purposes.*

Generally, all invasive plants should be cut to ground surface. An environmentally safe herbicide (allowable within stream courses) should be applied to clear the invasive plants. Small-diameter (3-inch diameter) trees and bushes should be cut low with a stump extending about 1-foot above the ground. The roots should protect from erosion and the stumps serve to act as debris catchments. Young trees and bushes with trunk diameters of about 6-inches should be cut to about four-feet above the ground. Larger tree diameters should be left alone for continued canopy and shaded riparian habitat.

2.) Threats to Wildlife, Botanical Values, and Fisheries

Emergency actions are not recommended for wildlife habitat and species recovery at this time but recommendations are suggested for treatments and monitoring that may be conducted to improve sensitive species habitat and document the possible effects of the fires on wildlife resources. Best Management Practices (BMPs) should be implemented upstream to minimize sediment loads. Revegetation efforts should be conducted where appropriate to promote native habitat recovery. Post-fire surveys should be conducted for fishery species and their habitat. Species monitoring should be conducted to assess long-term population impacts from the fire. Post-fire surveys should be conducted for botanical resources (rare plants) in the areas where they are known to occur.

3.) Water Quality Concerns

GAP FIRE COMPLEX SEAT TEAM REPORT

No specific water quality based emergency actions are recommended for the Gap Fire. However, in general, it is suggested that the State consider evaluating the need to look more closely at post fire watershed conditions.

Over the last several years larger fires have been an increasingly common occurrence in the mountainous and forested watershed areas of California. Although three years is not a trend, with the increasing awareness of the potential for climate change and recognition that California suffers in many areas from an increased fuel loading and a overall increase in the time between historic and present day fire occurrence regimes such consideration is likely warranted.

An additional concern warranting consideration of fisheries population dynamics and perhaps a more aggressive approach to in-stream fisheries population management is the closure of the 2008 Salmon fishing season and the Endangered and Threatened listings of Coho salmon and Steelhead trout in their respective Evolutionarily Significant Units (ESU's).

4.) Areas Not Assessed.

Any properties not included in this report and hazard summary table (at the end of this report) should be visited by emergency response agencies and/or community groups in an effort to provide further assessment and advise those property owners.

GAP FIRE COMPLEX SEAT TEAM REPORT

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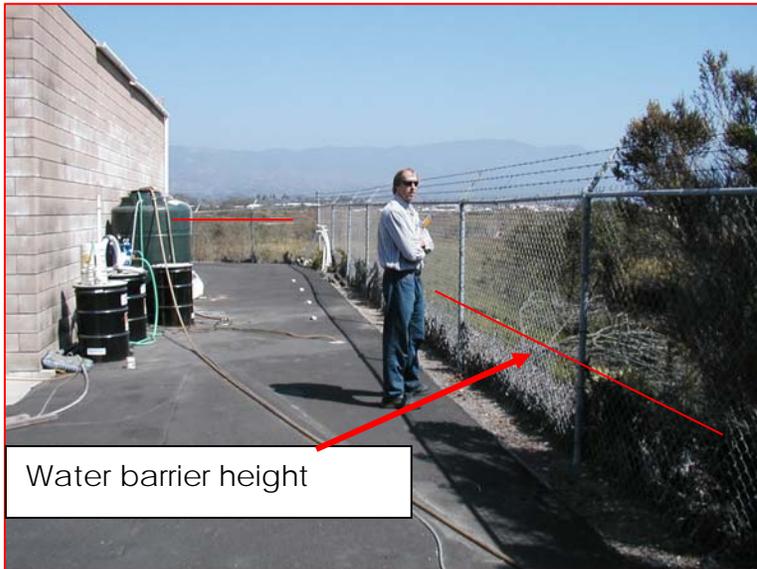
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GAP FIRE COMPLEX SEAT TEAM REPORT

SEAT OUTREACH

West Goleta Pumping- Pump station by airport. SEAT Team Suggested

“Water Barriers” at this site and primarily “Emily” pumping station due to power location.



Santa Barbara City Airport- This facility is based at lower end of 4 drainages that were severely burned. The airport was flooded in 1995 and 1998 poor drainage due to location in proximity to the ocean tidal influence (sea level) and the in the floodplain of several creeks that were diverted around the airport to create the runways.

GAP FIRE COMPLEX SEAT TEAM REPORT

Meetings With Local representatives of Resources at Risk

1. Southern California Edison - Randy Yenez - SEAT discussed road maintenance and Culvert inspections that will help limit loss of road prism and access during storms. Southern California Edison concerns include a high risk of failure of the access road for the powerline. This may result in partial to complete loss of the road prism in certain locations. Roads are the most likely “first impact” and a thorough inspection of all culverts and drainage facilities should be conducted immediately and throughout the winter following storm events. Loss of access to the powerline will impact the response time to address problems with the powerline which would affect all of the downstream identified communities, airport, etc.



GAP FIRE COMPLEX SEAT TEAM REPORT

Other Resources at Risk

State Highway 101- Limited Drainage Capacity flooded in 1995 and 1998 and other closures have blocked the road in the past due to poor drainage and location in the floodplain.

Goleta Sewer District- Fairly high above floodplain Ponds are on the San Pedro Creek. Staff Reviewed plant design, emergency preparedness and flood history with Jeff Salt the Operations Manager



West Goleta Pumping Station Santa Barbara Airport and Goleta Sewer Plant

GAP FIRE COMPLEX SEAT TEAM REPORT

Union Pacific Railroad- Same elevation as the Highway with limited drainage capacity.



Santa Barbara City Airport- This facility is based at lower end of 4 drainages that were severely burned. The airport was flooded in 1995 and 1998 poor drainage due to location in proximity to the ocean tidal influence (sea level) and the in the floodplain of several creeks that were diverted around the airport to create the runways.



GAP FIRE COMPLEX SEAT TEAM REPORT

Work that should be reviewed and completed prior to the Winter 2008.

1.Trash Rack completed on Ellwood Creek upstream of Langlo Ranch Road

This project should be evaluated by and Licensed Civil Engineer who is familiar with Protection of Drainage structures. Wingwall fills on both sides of this structure are narrow and have been eroded by uncontrolled runoff off both the orchard and a abandoned road crossing on the south side of the structure. When large storms carry sufficient debris to the trash rack flows will be elevated and erosion of both the bank above the existing rip-rap and two wingwall fills on both sides will be subjected to elevated flood flow erosion. These flows and discharge off of the road on the south side of this concrete structure have a increased potential to erode away all support for the structure and supporting hillslope for the access road. Addition of a geotextle fabric and additional rock armoring or other engineered slope protection that is sufficient to resist flood flow erosion is called for but a full review and remediation should be conducted as soon as possible, by a trained professional.



GAP FIRE COMPLEX SEAT TEAM REPORT

City of Goleta Response to the Gap Fire

- 1. Emergency Stream Clearing:** Approximately 16 miles of creek channels upstream and throughout the City of Goleta will be cleared of obstructive vegetation.
- 2. Excavation of Sediment Basins:** The existing sediment basins on Tecolotito, Los Carneros, San Pedro and San Jose creeks in and adjacent to the Santa Barbara Airport will be excavated.
- 3. Installation of Vegetation Control Structures:** Vegetation/debris control structures (trash racks) will be installed at the following locations:
 - a. Ellwood Creek upstream of Langlo Ranch Road
 - b. Tecolotito Creek upstream of Cathedral Oaks Road
 - c. Los Carneros Creek upstream of Los Carneros Road
 - d. San Pedro Creek upstream of Cathedral Oaks Road
 - e. Las Vegas Creek upstream of Cathedral Oaks Road
- 4. Emergency Protective Measures:** This project includes the placement of temporary flood walls at San Pedro Creek upstream of Calle Real and at Los Carneros Creek upstream of Los Carneros Road.
- 5. Aerial hydro mulching of selected upland areas:** This joint project between the County of Santa Barbara, City of Santa Barbara and City of Goleta is the same as stated above.
- 6. Sandbag Distribution Center:** This joint project between the County of Santa Barbara and the City of Goleta is the same as stated above.

GAP FIRE COMPLEX SEAT TEAM REPORT

Gap Fire Pre Winter Storm Emergency Response Plan

Introduction

On July 1, 2008 a forest fire was started off of West Camino Cielo above the City of Goleta. The fire, later known as the Gap Fire, grew quickly in size over the next several days as fire personnel struggled to gain control in the steep mountain terrain. By the time the fire was contained 27 days later it had burned approximately 9,500 acres of federally and privately owned lands in the coastal hills above the City of Goleta. The perimeter of the Gap Fire in relation to the City of Goleta is shown below.

The watersheds above the City had not burned for some 50 years prior to the Gap Fire. This dense vegetative cover, along with shifting winds, created extremely hot fire conditions over a majority of the burn area. When forest fires burn at high temperatures, the existing vegetation is completely burned off and the underlying soil becomes impenetrable to water. These burned watershed conditions can significantly increase the amount of storm water runoff, erosion and debris during storm events and greatly increases the chance of flooding of downstream areas.

The Gap Fire burned through portions of the Tecolote, Winchester, Tecolotito, Los Carneros, San Pedro, Las Vegas and the San Jose watersheds. Each of these watersheds drains through the City of Goleta. The amount of watershed areas affected by the Gap Fire is shown in the following table.

The Gap Fire Pre-Winter Storm Emergency Response Plan presents a comprehensive approach to watershed assessment, hazard mitigation, winter storm operations, public information and community outreach. The Plan describes in detail the steps that City staff conducted to assess the potential post-fire impacts associated with the Gap Fire burn area and identifies specific mitigation measures that will be implemented to reduce the threat of flood damage to developed properties located within the City of Goleta.

The Santa Barbara County Public Works Department has developed a similar emergency response plan that documents additional pre-winter flood mitigation measures that will be implemented within the City of Goleta, the City of Santa Barbara and in the adjacent unincorporated areas of the County. The City of Goleta's Gap Fire Pre-Winter Storm Emergency Response Plan was developed in cooperation with County Public Works Department staff and is meant to supplement the County's Emergency Watershed Protection Plan.

Post-Fire Impact Assessment

Since the Gap Fire originated on Forest Service lands the United States Forest Service (USFS) took a lead role in directing the overall fire suppression activities. While the fire was still burning the USFS assembled a Burned Area Emergency Response (BAER) team, which is a multi agency group of specialists in a variety of disciplines. The focus of the BAER team was to compile information on the burned watersheds and assess potential impacts to downstream developed communities. Staff from the County of Santa Barbara, City of Santa Barbara and City of Goleta participated in several BAER team meetings to assist in this process. A BAER Report summarizing the information compiled by the BAER team was developed.

GAP FIRE COMPLEX SEAT TEAM REPORT

A copy of the draft Gap Fire BAER report is included as an attachment to this plan (Attachment 1). The BEAR report identifies threats to life and property from increased runoff, flooding, debris flows, erosion, sedimentation and landslides in the burn area and downstream in the City of Goleta.

Given the findings of the BAER report and increased potential for debris flows and flooding during winter storm events, City staff conducted field inspections of all affected roadway bridges and culverts located downstream of the burn area. Photos were taken to document the existing conditions and data was collected relating to each bridge structure (opening size, inlet and outlet configuration, sedimentation levels, vegetation, scour etc). The locations of the affected bridges inspected during this process are shown below.

A Qualitative Risk Analysis Matrix was then developed to determine the relative risk levels and recommended pre-winter mitigation measures at all affected roadway bridges and/or culverts. The risk matrix took into account watershed burn severity, risk of plugging, risk of damage, and sediment loading.

A copy of the risk matrix is included as an attachment to this plan (Attachment 2). Staff also reviewed County Flood Control reports on previous flood events to determine which areas within the City are likely to be impacted due to the increased runoff associated with the Gap Fire. A map showing the Federal Emergency Management Agency's (FEMA's) 100 Year floodplain areas subject to flooding is shown below.

City of Goleta Pre-Winter Storm Mitigation Measures

The City of Goleta is responsible for the maintenance and operation of all City roadway bridges and culverts over the creek corridors and channels. As such, the City's pre-winter storm mitigation measures are primarily related to its bridges and culverts.

Based on the information gathered from the BAER report, historical flood reports, bridge inspections and the bridge structure risk analysis described above, the following pre-winter storm mitigation measures are recommended:

1. **San Pedro Creek Culvert at Calle Real:** This project includes the following culvert modifications:
 - a. Extend the existing concrete splitter wall at the upstream face of the culvert to divert debris flows and reduce the potential for plugging during storm event.
 - b. Remove the existing concrete bridge rail/parapet wall at the upstream face of the culvert and replace it with an open steel pipe guard rail to improve overland flow paths onto Calle Real.
2. **Calle Real from Valdez Avenue to Vega Drive:** This project includes the lowering of the roadway on Calle Real between Valdez Avenue and Vega Drive in order to improve the overland escape conditions associated with the San Pedro Creek Culvert at Calle Real.

GAP FIRE COMPLEX SEAT TEAM REPORT

3. **Las Vegas Creek at Stow Canyon Road:** This project includes the construction of a concrete splitter wall at the upstream face of the culvert to divert debris flows and reduce the potential for plugging during storm events.

4. **Winchester Canyon Creek at Winchester Canyon Road:** This project includes the placement of large rock rip rap at the downstream end of the culvert for erosion control.

5. **Aerial Hydro Mulching in Selected Upland Areas:** This project consists of the aerial application of hydro mulch on selected hillsides above the City of Goleta. This is a joint project between Santa Barbara County, the City of Santa Barbara and the City of Goleta. The project is funded through the Natural Resources Conservation Service (NRCS) in a 75% federal, 25% local funding split.

6. **Sandbag Distribution Center:** Sandbags will be made available to the public at Fire Station No. 14 on Los Carneros Road. This is a joint effort with the County of Santa Barbara.

GAP FIRE COMPLEX SEAT TEAM REPORT

County of Santa Barbara Pre Winter Storm Emergency Response Measures

The County Flood Control District is responsible for the maintenance and operation of all major flood control facilities located within the City of Goleta. This includes, but is not limited to, all creek corridors and flood control channels.

The County's Emergency Watershed Protection Plan identifies the following pre-winter storm mitigation measures to reduce the risk of flooding:

1. **Emergency Stream Clearing:** Approximately 16 miles of creek channels upstream and throughout the City of Goleta will be cleared of obstructive vegetation.
2. **Excavation of Sediment Basins:** The existing sediment basins on Tecolotito, Los Carneros, San Pedro and San Jose creeks in and adjacent to the Santa Barbara Airport will be excavated.
3. **Installation of Vegetation Control Structures:** Vegetation/debris control structures will be installed at the following locations:
 - a. Ellwood Creek upstream of Langlo Ranch Road
 - b. Tecolotito Creek upstream of Cathedral Oaks Road
 - c. Los Carneros Creek upstream of Los Carneros Road
 - d. San Pedro Creek upstream of Cathedral Oaks Road
 - e. Las Vegas Creek upstream of Cathedral Oaks Road
4. **Emergency Protective Measures:** This project includes the placement of temporary flood walls at San Pedro Creek upstream of Calle Real and at Los Carneros Creek upstream of Los Carneros Road.
5. **Aerial hydro mulching of selected upland areas:** This joint project between the County of Santa Barbara, City of Santa Barbara and City of Goleta is the same as stated above.
6. **Sandbag Distribution Center:** This joint project between the County of Santa Barbara and the City of Goleta is the same as stated above.

The County's pre-winter mitigation measures are more fully described in the County's Emergency Watershed Protection Plan.

Winter Storm Monitoring and Operations

There will be close coordination with National Weather Service, County of Santa Barbara (both Office of Emergency Services (OES) and Flood Control) and the City of Goleta this winter. City staff will monitor affected bridges during winter storm events whenever runoff is occurring.

GAP FIRE COMPLEX SEAT TEAM REPORT

Given that even a small amount of rain could trigger debris flows and flooding this winter, the City of Goleta, County of Santa Barbara and City of Santa Barbara have established a Unified Incident Command System (ICS) organization to respond to a widespread flood emergency. City Hall will serve as the emergency operations center (EOC) for the City of Goleta and the new Community Services Department Corporation Yard facility located at the Cabrillo Business Park will operate as a department operations center (DOC).

If bridge plugging and associated flooding does occur, contract forces will be mobilized to remove debris and sediment as required. Emergency contracts with qualified firms will be awarded prior to the beginning of winter. The County's planned vegetation debris racks will likely catch a significant amount of woody debris during winter storm events. As such the City will work closely with the County to identify potential stockpile areas where woody debris can be temporarily stored until it can be chipped and hauled off site.

Public Information and Outreach Strategy

A comprehensive public information program is central to the City's pre-winter storm preparations. Making sure that our community is aware of the challenges that we face this winter is important. Reaching out to the residents and businesses in high risk areas and providing them with the informational tools they need to plan for the rainy season will be a key measure of the successful implementation of our plan. To this end, the City is working closely with the County of Santa Barbara, the City of Santa Barbara, the Forest Service, FEMA, Office of Emergency Services and other state and federal agencies to coordinate public information activities.

The public information program will utilize a number of different tools and strategies to inform the community about the upcoming winter storm season:

Community Meetings: Kicking off the public information campaign will be the September 11, 2008 Community Forum on Gap Fire and Winter Storm Preparation that is being hosted by Supervisors Wolf and Firestone. The forum is being held on Thursday, September 11 from 6 P.M. – 8 P.M. at San Marcos High School and will be televised on local cable stations. The forum will be held in the auditorium with display and information tables staged in the adjacent cafeteria.

While the specific agenda is still being formulated, it is expected that representatives from SB County Fire, Sheriff, County OES, Forest Service, County Flood Control, and FEMA will speak on the Gap Fire and Winter Storm preparations. The City of Goleta will have an information table with maps, City of Goleta contact information and resources, Goleta City Alert information, and basic flood preparedness tips for homeowners. In addition, it is expected that representatives from the City of Goleta will have an official role at the forum.

The City of Goleta anticipates holding a community wide meeting following the September 11 forum at a City location such as the Goleta Valley Community Center, Goleta Valley Junior High or Dos Pueblos High School in order for Goleta City officials, County Flood Control, and FEMA officials to specifically target City of Goleta issues and concerns regarding the upcoming

GAP FIRE COMPLEX SEAT TEAM REPORT

winter rainy season. The scheduling of this meeting is somewhat dependent on the turnout of the September 11 community forum. If there is good turnout at this event by City residents, staff may choose to forego a community wide meeting and instead focus on smaller neighborhood meetings in high risk areas near creeks and flood channels.

Neighborhood Meetings: City staff anticipates holding 3-4 small neighborhood meetings on a weekend or week day evening. These meetings may be held at a church, home, and business or on a neighborhood street corner. The goal of these meetings is to directly target neighborhoods that are more likely to be affected by winter rains. These meetings will be held during October.

Targeted Mailers: City staff intends to do a direct targeted mailing to residents and businesses in high risk areas. These mailings will include flood preparation information, key contacts, and dates for neighborhood meetings.

Media Outreach: In addition to media releases, City staff will write columns for Noozhawk and the Goleta Valley Voice on winter storm preparation. City Staff will also pursue radio and television appearances to promote preparedness information.

Goleta TV Channel 19: The City's Channel 19 is already being used to promote the Sept. 11 forum. The event will be taped live and replayed on Channel 19 on Thursdays and Fridays at 10am and 5pm following the event and throughout the months of September and October.

There has also been some discussion about producing a 15 minute segment on flood preparation to run on Channel 19. This is budget dependent.

In addition, City staff is looking into purchasing equipment that will allow messages to "crawl" during live or broadcast programs. Presently, when an emergency message from the National Weather Service, is broadcasted, FCC rules require the information to be broad to cover the viewing area of that channel. However, Goleta TV Channel 19 can run a live crawl with specific information to Goleta that City staff generates. The cost of this type of equipment is approximately \$3,000. If Council authorizes the purchase of the technology to use this tool remotely, the cost is approximately \$6,000 more.

City Website: The City website will have a specific section on all winter storm preparation information. There will be links to pertinent agencies, flood preparation, maps, key City info and other resources. This will be in place prior to the Sept. 11 forum.

Goleta City Alert: City staff intends to utilize Goleta City Alert to notify residents and businesses about neighborhood meetings as well as to notify if there is an emergency. Given the very quick nature of flooding, Goleta City Alert is an invaluable tool as it can reach thousands of residents and businesses in a matter of minutes.

Information Kiosks: City Staff intends to deploy information kiosks in high risk neighborhoods. The kiosks will have maps, key information, and preparedness information. The goal for deployment of kiosks will be the first week of October.

City Newsletter: The Monarch Press will reach residents the first week of October. There is an article on winter storm preparation, keys tips and directions on where to get more information.

GAP FIRE COMPLEX SEAT TEAM REPORT

Mitigation Measure Cost Estimates

Preliminary cost estimates for the proposed pre-winter storm mitigation measures and public information program have been developed and are summarized in the following table.

Estimated	
Project	Total Cost
Winchester Canyon Road Culvert Repair at Winchester Canyon Creek	\$200,000
Calle Real Culvert Modifications at San Pedro Creek	\$30,000
Calle Real Overland Escape Improvements from Valdez to Vega	\$75,000
Stow Canyon Road Culvert modifications at Las Vegas Creek	\$15,000
Hydro Mulching of Selected Upland Areas	\$70,000
Public Information Program	\$10,000
Sand Bag Distribution	\$5,000
Totals	\$405,000

The costs associated with debris removal following winter storm events will be dependent on magnitude and frequency of debris removal operations.

SUMMARY

The Gap Fire burn area poses a significant threat to the City of Goleta. Increased storm water runoff, debris production and erosion during winter storm events are expected to occur. City staff has worked closely with Santa Barbara County and City of Santa Barbara staff to develop a comprehensive pre winter emergency response plan to reduce the flood threat associated with the Gap Fire burn area. Although implementation of the proposed mitigation measures identified in the City of Goleta's and County of Santa Barbara's emergency response plans will reduce the flood threat associated with the Gap Fire burn area, it will not completely eliminate the threat. In the coming months City staff will continue to work closely with other agencies to inform the public how they can best prepare for the coming winter rainy season.

Attachments:

1. 2008 Gap Fire – Burned Area Emergency Response Report
2. Qualitative Risk Analysis Matrix

GAP FIRE COMPLEX SEAT TEAM REPORT

GAP FIRE Natural Resource Conservation Service

Damage Survey Reports

The Santa Barbara County Flood Control & Water Conservation District requested Federal assistance under provisions of Section 403, Agricultural Credit Act of 1978, to protect habitable structures in the City of Goleta, City of Santa Barbara, and the incorporated area of the County of Santa Barbara.

NRCS has evaluated the fire effects and recommended treatments, the following measures are being taken for the protection of these properties from the damage associated with excess runoff:

DSR NO. 01-08-3640

Drainage Name: Tecolote

Reach: Tecolote Creek

Tecolote watershed is 3,613 acres containing 980 burned acres. There is a moderate to risk of property damage and flooding to residences, orchards and roads, due to increased runoff and heavy debris form burned areas.

1. Clearing and snagging - Hand Labor - 2.2 miles

DSR NO. 02-08-3640

Drainage Name: Bell Canyon

Reach: Winchester & Ellwood Creek

Bell Canyon watershed is 3,908 acres containing 3,908 burned acres. There is a moderate to risk of property damage and flooding to residences, orchards and roads, due to increased runoff and heavy debris form burned areas.

1. Clearing and snagging - Hand Labor - Winchester - 1.3 miles
2. Clearing and snagging - Hand Labor - EllWood - 1.9 miles
3. Pipe Trash Rack - Instream with riprap
4. Aerial Hydromulch - 200 Acres

GAP FIRE COMPLEX SEAT TEAM REPORT

DSR NO. 03-08-3640

Drainage Name: Tecolotito

Reach: Tecolotito & Glen Annie Creek

Tecolotito watershed is 3,382 acres containing 1,888 burned acres. There is a high to very risk of property damage and flooding to SB airport, residences, orchards and roads, due to increased runoff and heavy debris form burned areas.

1. Clearing and snagging - Hand Labor - Tecolotito - 1.42 miles
2. Clearing and snagging - Hand Labor - Glen Annie - 1.22 miles
3. Pipe Trash Rack - Instream
4. Aerial Hydromulch - 500 Acres

DSR NO. 04-08-3640

Drainage Name: Los Carneros

Reach: Los Carneros

Los Carneros watershed is 2,577 acres containing 1,500 burned acres. There is a high to very high risk of property damage and flooding to the Santa Barbara airport, residences, orchards and roads, due to increased runoff and heavy debris form burned areas.

1. Clearing and snagging - Hand Labor - Los Carnerso - 1.53 miles
2. Aerial Hydromulch - 250 Acres
3. Sediment removal - Los Carneros Basin - 2,500 Cubic Yards
4. Pipe Trash Rack - Instream
5. Debris Barrier @ California Highway Patrol Office

DSR NO. 05-08-3640

Drainage Name: San Pedro

Reach: San Pedro

San Pedro watershed is 2,079 acres containing 1,524 burned acres. There is a high to very high risk of property damage and flooding to the Santa Barbara airport, residences, orchards and roads, due to increased runoff and heavy debris form burned areas.

1. Clearing and snagging - Hand Labor - San Pedro - 1.53 miles
2. Aerial Hydromulch - 500 Acres
3. Sediment removal - San Pedro Basin & Airport - 4,250 Cubic Yards
4. Pipe Trash Rack - Instream
5. K-rail Flood Barriers - Upstream to Calle Real - 1,200 Lineal Feet
6. Box Culvert Modification - Splitter Wall & Modification of Parapet Wall

DSR NO. 06-08-3640

GAP FIRE COMPLEX SEAT TEAM REPORT

Drainage Name: Las Vegas

Reach: Las Vegas

Las Vegas watershed is 1,820 acres containing 249 burned acres. There is a low to moderate risk of property damage and flooding to the Santa Barbara airport, residences, orchards and roads, due to increased runoff and heavy debris form burned areas.

1. Clearing and snagging - Hand Labor - Las Vegas - 1.43 miles
2. Aerial Hydromulch - 200 Acres
3. Pipe Trash Rack - Instream

DSR NO. 07-08-3640

Drainage Name: Lower San Jose

Reach: Lower San Jose & Fremont

San Jose watershed is 5,509 acres containing 1,307 burned acres. There is a low to moderate risk of property damage and flooding to the Santa Barbara airport, residences, orchards and roads, due to increased runoff and heavy debris form burned areas.

1. Clearing and snagging - Hand Labor - San Jose - 1.49 miles
2. Clearing and snagging - Hand Labor - Freemont - .65 miles
3. Concrete box culvert - Structural modification / rebuild
4. Aerial Hydromulch - 30 Acres
5. Sediment removal @ Goleta Slough Basin - 2,200 Cubic Yards