A: UNIT DESCRIPTION

The Unit has a unique wildland fire environment owing to its Mediterranean climate, highly combustible fuels, frequent wildland-urban interface (WUI) zones, and the complexity of its terrain. Fires burn with greater intensity in this environment and are more costly and difficult to control, creating a greater risk of loss of life, property, and resources.

The Unit's Direct Protection Area (DPA[1]) on the west slope of the Central Sierra Nevada Mountain Range is experiencing explosive population growth. Most of this growth is occurring outside of the incorporated cities - the same areas that contain the most hazardous fuels and most difficult terrain. Most of the man-made values at risk from wildfire are also located in these areas.

The fire environment in the Unit is conducive to large destructive wildfires as shown by the fire history map (www.fire.ca.gov) Also, as seen in the Vegetation Type Map (Exibits page 92), the majority of AEUs DPA contains high to very high hazard fuels (brush and timber). These areas contain steep, rugged river canyons making access difficult, and fighting fires with bulldozers difficult, if not impossible in some locations.

Key Issues:

- Increasing life, property, natural resources, and ecological losses.
- Inadequate community ingress/egress routes.
- Difficulty of fire suppression, increasing safety problems for firefighters.
- Longer periods between recurring fires in many vegetation types increasing volumes of fuel per acre.
- Increasing fire intensities.
- Increasing taxpayer costs and asset losses.
- More people are living and recreating in wildland intermix areas, which adds to the increases in ignition sources, resulting in more fires.
- The loss of funding for the two lookouts has significantly decreased the early detection ability of fires in AEU.

[1] DPA are lands that CAL FIRE has contractually agreed to protect. These are usually federal lands where the federal government is fiscally and legally the protection agency but CAL FIRE resources are better positioned to provide protection. Federal agencies provide direct protection to SRA lands where the situation is reversed.

Fire History

The Unit's fire history is one of numerous small fires with large fires occurring every thirty to forty years. The last large fire was the Rancheria Creek Fire in 1961(34,104 ac.) However, over the past twenty years population growth and development in the wildland have placed many additional homes and businesses at risk - now small fires often create WUI fire protection problems previously only found in the most densely populated areas of southern California. In 2008, CAL FIRE updated its fire mapping requirements to include mapping grass fires 300 acres and over, brush fires 50 acres and over, and timber fires 10 acres and over, and wildland fires destroying three or more residential dwellings or commercial buildings.

.Most large fires are aligned east to west. This is particularly evident in Amador County. This orientation is due to two factors, prevailing winds and terrain. El Dorado and Sacramento Counties are more likely to experience fires which run from the north to the south - especially at the lower elevations. However, the historical large fires in El Dorado County follow the same east to west orientation as those in Amador County.

Fire Weather &Terrain

The Wildland Fire Triangle consists of fuels, weather, and topography. The most variable component is weather and the most stable of the three is topography. These components of the fire environment can't be altered by humans to affect the potential outcome of wildland fire occurrence, however the contribution to fire behavior by both require significant analysis to meet the objective of mitigating wildland fire activity on State Responsibility Lands. Fuel is the only component we can alter.

Fire Weather

Fire weather for AEU is typically dominated by three general weather phenomenon; the delta push influence, north wind events, and east foehn winds caused by high pressure development in the Great Basin. All three weather conditions cause considerable increases in fire intensity and size, however the delta influence is the most common and surfaces frequently throughout summer.

Typically, high pressure systems will dominate Northern California in the summer months bringing extremely hot and dry conditions to much of the region. As these systems develop they will tend to yield near the Delta and Sacramento areas bringing the marine influence to the Unit. This is generally considered a good thing for fire behavior; slightly cooler afternoon temperatures and increases in relative humidity. The downside to a marine influence is the strong wind gusts may accompany these patterns. These winds are generally capable of overriding any benefit that may come from marine air. There is, however, an upside. This type of wind will typically subside after sundown causing fire behavior to drop off dramatically.

The other critical wind patterns experienced in AEU are very difficult to predict, are relatively rare, and often times are forecasted only the day before they occur. Northerly or easterly winds are typically warmer and drier than most other wind patterns due to air compression. These conditions provide the perfect environment for increased fire intensity and large fire growth. Fire growth is typically wind driven, however as these wind patterns recede, fire immediately returns to fuel/topography driven in opposing directions to the wind driven direction. This type of wind event is commonly referred to as a Santa Ana Wind in Southern

California, however it can manifest itself anywhere in California and are referred to as foehn or North winds.

Topography

Topography in AEU is like most other Sierra Units; flat near the valley bottom and increasingly steep as the Unit reaches higher elevations. More importantly is the relationship of vegetation change with that of topography. Fuel loads tend to increase significantly as the topography becomes more rugged. The area near the Central Valley and Delta region, which is characterized by rolling hills and flat valley bottoms, is generally dominated by grass lands or savannah. The fire behavior is generally wind driven short duration fires, typically lasting no more than one burning period. (Between 10:00 A.M. to sundown.)

As the terrain approaches the upper foothills the vegetation changes dramatically to brush and tree dominated fuel types. These areas are generally steeper and longer sloped which will tend to cause more fuel and topography dominated fire behavior. Heavier fuels over steeper slopes cause marked increases in fire intensity and fire size; this combination makes fire fighting efforts increasingly more difficult. This is primarily due to the demands that heavier fuels on steeper terrain can have on resources during active suppression and mop up operations.

Higher elevation areas of the Unit are typically steeper than that of the upper foothill region. Fuels are generally Sierra Mixed Conifer which is made up of heavy timber and significant loads of accumulated dead fuels. Fire spread is typically fuel and slope driven but winds can cause long range spotting.

A major topographic feature that can lead to increased fire spread and intensity is the canyon alignment of the major river systems within the Unit. All of the major river systems are generally aligned in an east/west direction which coincides with the general prevailing westerly wind patterns over the Unit. This alignment can have the effect of “channeling” which can increase the wind speed and turbulence along these river systems. This alignment can often cause fire to spread farther and with greater intensity.

The AEU has completed a Fire Weather Operating Plan which is used to drive much of the Units day to day fire related decision making.

Geographic/Ownership

AEU is located in the Northern Central Sierra. It includes Amador, El Dorado, Alpine and portions of Sacramento and San Joaquin counties. AEU encompasses 2,667,841 acres. AEU’s Direct Protection Area (DPA) serves approximately **895,214**. The United States Forest Service (USFS), Bureau of Indian Affairs, Bureau of Land Management, and Bureau of Reclamation manage lands that are protected by AEU. Conversely, in addition to national forest lands, the Forest Service provides direct wildland fire protection to private lands within the Eldorado and Toiyabe National Forest. Even with the USFS providing that protection the Unit is still actively engaged in pre-fire projects outside of its DPA.

Within AEU there are two all season trans-Sierra highways, State Highway 50 in El Dorado County and State Highway 88 in Amador County. Bisecting the Unit north to south is historic State Highway 49, on the west side of the Sierra and State Highway 89 in the Lake Tahoe

Basin on the east side of the Sierra. Most population growth has historically occurred along the two east-west highways. With the influx of high-tech industry in Sacramento County, growth is occurring north and south from the major population centers creating new areas of wildland-urban interface.

AEU contains all or part of three major watersheds, the Middle and South Forks of the American, the North Fork of the Mokelumne, and the Cosumnes River basin. Numerous water agencies and power companies utilize the water from these rivers and their tributaries for generation of hydroelectric power, acquisition of drinking and irrigation water.

Socioeconomic

The approximate resident population in AEU's DPA is 320,053. El Dorado County's highest population densities are found along the Highway 50 corridor from El Dorado Hills to Pollock Pines. The areas of Pleasant Valley and along State Highway 49 south of the community of El Dorado are also experiencing a rapid population growth. In Amador County, the population densities are greatest along the State Highway 88 corridor from the City of Jackson to the Pioneer area.

County	***Population***[2]
Alpine	1,175
Amador	38,091
El Dorado	181,058
Sacramento	1,418,788
San Joaquin	685,306
Unit Total	2,324,418

In addition; annually a significant seasonal population increase occurs in mid-spring and continues to gradually increase due to the influx of seasonal workers seeking employment during the apple and grape harvests in the late fall.

The easy access to the Lake Tahoe Basin, recreational areas, summer homes, and tourist attractions are also major factors that influence the population during fire season. Even though most of these areas are located within the Eldorado National Forest, visitors must travel through CAL FIRE's DPA to reach them. Since the majority of the fires are human caused, this increase in Units seasonal population usually results in more wildland fire ignitions.

The major industries that support the local economy include timber, tourism, recreation, wine and fruit production, construction, service oriented businesses and to a lesser extent, light industry. All of these industries have at one time or another been affected by wildfires. Hundreds of thousands of dollars have been lost both directly and indirectly due to wildfires. It has been estimated that a closure of Highway 50 during the summer months would result in a loss of between 1.5 and 2 million dollars a day in the South Lake Tahoe Basin (including Nevada interests). Additionally, an estimated $150,000 would be lost to west

[2] 2010 Census Data

slope communities due to a closure of Highway 50 from the west county line to Echo summit.

AEU Action Plan

The Unit's Fire Management Plan was developed to address fire safe planning and hazardous fuel reduction concerns of state, federal, local CAL FIRE agencies, as well as fire safe councils and other collaborators. The Fire Plan incorporates an across the board approach to reducing the occurrence and impact of wildland fires on communities and local resources. A coordinated effort involving, Engine Companies, Law Enforcement, and local CAL FIRE Safe Councils educate the public and enforce PRC-4291 defensible space requirements. In addition the public is educated and given the opportunity for input on community wildfire protection plans (CWPPs), community safety, evacuation planning and hazardous fuel reduction. These coordinated efforts are concentrated within the Units the WUI areas and specifically directed at the individual homeowner.

Shaded fuel breaks are also a large component of the overall fuel reduction effort with the Unit focusing on those fuel breaks that support the safe ingress of fire suppression forces and egress of the civilians in the surrounding communities.

The Unit considers collaborator support extremely important. Lack of collaborators may eliminate otherwise important projects from consideration. To gain community support, the Unit works closely with the Fire Safe Councils, local governments, and Federal agencies. Fire Safe Councils provide a forum for creating support for all kinds of projects. This resource has proven so effective that the Unit now accomplishes projects it could not accomplish in the past.

The Fire Safe Councils also closely link their projects with projects in the Unit's Fire Plan. This allows greater progress towards the ultimate goal of reducing damage from wildfire.

The key to effective fire planning is the CAL FIRE Battalion Chiefs acting as community wildfire leaders. Consequently, as community wildland leaders, the Battalion Chiefs can only achieve the Unit and Department goals with support from the community they serve.

Amador-El Dorado Unit Strategic Fire Plan Assessments

The fire plan process involves analyzing of:

- Assets at Risk (AAR)
- Ignition Workload Assessment (Level of Service)
- Fuels
- Frequency of Severe Fire Weather
- Residential Density (parcel based)

Computer based Geographic Information Systems (GIS) is used to assess and rank fire hazard and risk. GIS provides a systematic approach for determining the level of wildland fire protection service and identifying high risk, and high value areas. These are the areas with the greatest potential for large and costly wildfires. Ranking areas in terms of hazard levels allows fire managers and collaborators to focus on the most critical areas, evaluate alternatives and recommend solutions to reduce costs and losses.

The assets at risk are evaluated to the 450-acre scale within the Unit. This scale has been designated by the Department for purposes of manageability. This is based on the sectioning of a USGS 7.5 minute quadrangle map down into a grid resulting in grids of 450 acres per cell. The 450-acre cells have been designated as Quad 81st (Q81) for fire plan assessments purposes. For instance, each Q81st in the Units has a rank applied to it for Assets at Risk (AAR), Level of Service (LOS), and Fuel Hazard Ranking.

The GIS assessment tool only provides one side of the equation. Using each Battalion Chief's intimate knowledge of their area insures project development and implementation is directed at the most critical areas.

Residential Density

This data is a parcel map representing improved residential parcels. It helps planners focus on those areas where the combination of fuels, weather, and improved parcels pose the greatest potential for large damaging fires. It also provides planners and fire managers with an up-to-date view of residential density. This data is especially useful in helping Unit Battalion Chiefs establish target areas within their battalions to concentrate defensible space inspections. Utilizing parcel maps in identified target areas helps the field personnel quickly and accurately complete their inspections.

Ignition Workload Assessment (Level of Service)

The Fire Plan Ignition Workload Analysis assessment (LOS) is designed to measure the Unit's success at controlling fires before they become large and costly. The underlying assumption is that fires successfully contained in the initial attack stage are generally not as large or costly as the few fires which exceed Unit suppression organization capabilities.

CAL FIRE uses GIS to overlay a history of wildfires onto a vegetation type map and derives the average annual number of fires by size, severity of burning and assets lost. This data allows a level of service success and failure rate calculation. The number of successful initial attacks divided by the number of initial attacks will equal the level of service for the time period analyzed. This rating is expressed as a percentage of fires that are successfully extinguished during initial attack.

Success is defined as those fires that are controlled before unacceptable damage and cost are incurred.

Failures are defined as the following:

Woodland	Fires = 15 acres and above
Grass	Fires = 12 acres and above
Brush	Fires = 6 acres and above
Interior (Timber)	Fires = 3 acres and above

FUELS

Vegetation within the Unit varies widely and includes grassland, oak woodland, brush, mixed conifer, and true fir. Using the GIS database, each 450-acre planning block is ranked by age and type of vegetation. These rankings identify high-volume fuel areas with accumulations of dead fuel having the potential for costly and damaging fires. Planning blocks are ranked high, medium, or low risk based on their potential as sites of costly and damaging fires.

The hazardous fuel ranking system is based on estimates of potential fire behavior associated with the particular fuel type, and it has a direct relationship to the burning characteristics of that fuel. The fuel rank is a composite index of fire behavior indicators – rate of spread, fireline intensity, heat per unit area, etc. This index represents how a fuel complex burns under a particular set of weather conditions. The intent is to provide a basic means of stratifying the landscape into areas of moderate, high, and very high hazard as related to potential fire behavior.

The rankings were determined by using the underlying fuel models in conjunction with the BEHAVE[3] fire behavior prediction system. The various fuel models were then plotted on the fire characteristics chart commonly used to evaluate resistance to control (Rothermal, 1983), where a fuel model's rate of spread is plotted against its heat per unit area. This plot represents fire behavior calculations conducted under severe fire weather conditions, where fires are more likely to escape. The farther the flame front is from the origin, the greater the fire behavior potential, and hence, the greater the resistance to control. As these fuel models only reflect surface fire behavior, additional information regarding crown fire potential and slope was also included in the development of the ranking scheme.

Generally, only those fuel models where there is a large volume of available fuels (yielding high heat per unit area) and at least a moderate expected rate of spread under severe environmental conditions have a hazard rank of "Very High", "High" and "Moderate" ranks represent lesser fuel volumes where either heat per unit area or spread rate is expected to be lower. Heavy brush and heavy forest fuel types received "Very High" ranks. Moderate brush, pine/grass, intermediate load conifer, and light logging slash received "High" ranks. Grass and low volume forest types received "Moderate" ranks.

Weather

Weather conditions dramatically influence fire behavior. Large costly fires are frequently, though not always, associated with severe fire weather conditions. Severe fire weather is typified by high temperatures, low humidity, and strong surface winds.

Fire weather history is analyzed to determine the average number of days during fire season that severe fire weather occurs.

Severe fire weather is defined using the Fire Weather Index (FWI) developed by the USDA Forest Service Riverside Fire Lab. The FWI combines air temperature, relative humidity, and wind speed into a single score. The FWI gives wildland fire managers an index that indicates relative changes in fire behavior due to the weather (fuel and topography conditions are not included in the calculation). Severe fire weather occurs when the FWI, calculated from the hourly weather measurement, exceeds a predetermined threshold. The threshold FWI is derived from average bad fire weather of (approximately) 95° F, 20% relative humidity, and a 7 mph eye-level wind speed. Frequency of severe fire weather is defined as the percent of time during the budgeted fire season that the weather station records severe fire weather. Individual weather stations are ranked as low, medium, or high frequency of severe fire weather. This ranking can then be applied to the area on the ground represented by the weather station.

[3] Behave fire modeling system is a computer application used to predict wildland fire behavior.

Severe Weather Analysis Parameters

FWI CUTOFF	START LOW RANK	START MED RANK	START HIGH RANK
29.725	0%	5%	20%

STATION	OWNER	LAT	LON	ELEVATION	WX-SCORE	WX-RANK
Ben Bolt	CAL FIRE	38.586	-121.017	840	0	L
Esperanza	CAL FIRE	38.243	-120.514	2512	1	L
Green Springs	CAL FIRE	37.834	-120.502	1000	2	L
Pilot Hill	CAL FIRE	38.833	-120.009	1250	0	L
Mt Zion	CAL FIRE	38.394	-120.650	2960	0	L
Secret Town	CAL FIRE	39.185	-120.882	2720	0	L
Crane Flat	NPS	37.767	-119.817	6644	1	L
Tuolumne Meadows	NPS	37.867	-119.300	9200	1	L
White Wolf	NPS	37.850	-119.650	8000	1	L
Bald Mountain	USFS	39.901	-120.686	4613	0	L
Beaver	USFS	38.519	-120.328	5700	10	M
Crestview	USFS	37.735	-119.000	7518	1	L
Hell Hole	USFS	38.900	-120.683	5240	9	M
Owens Camp	USFS	38.733	-120.250	5240	7	M
Stampede	USFS	39.483	-120.075	6600	1	L

WxSCORE

[SevereWx]/[WxInSeas] The weather score is a percentage of the number of days of severe weather during the designated fire season. Non-fire season data is not considered as the fuel is not in a state in which to readily burn regardless of the severity of weather.

WxRANK

The WxSCORE intensity rating is lumped into three categories, low, medium, and high, to create a severe fire weather frequency ranking