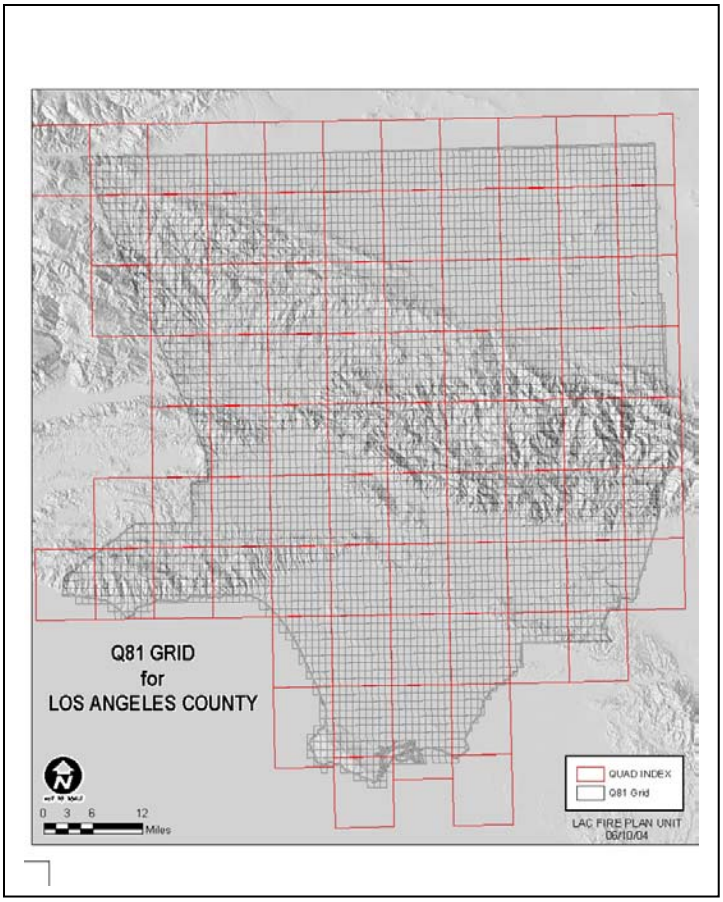
General Description of Current Fire Situation



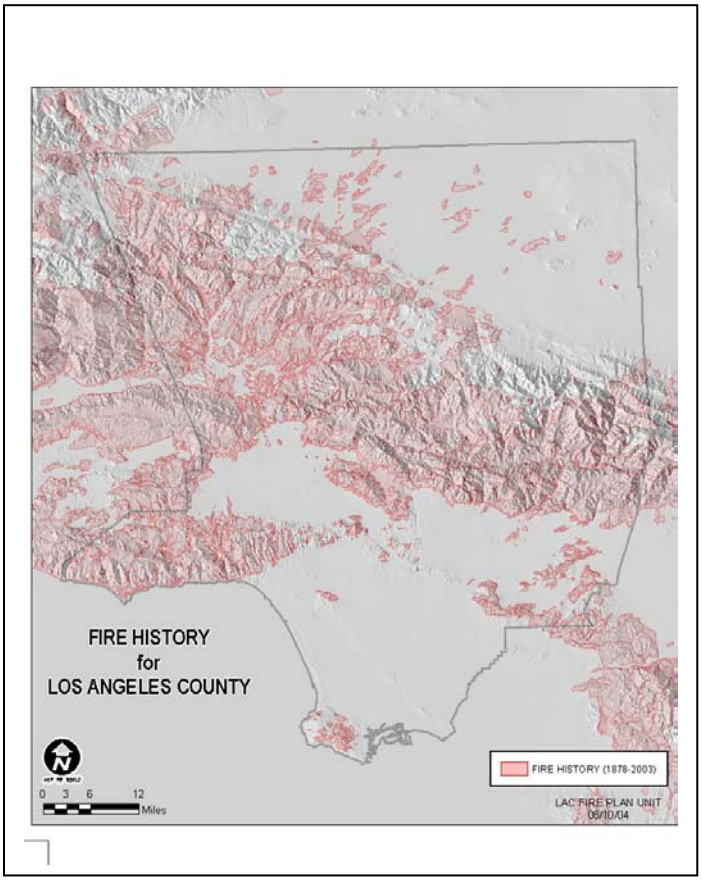
Determining the wildfire problem in Los Angeles County involves assessing the interrelated results of chaparral covered, fire dependent ecosystems, the resulting weather of a Mediterranean climate, the values at risk, and the fire protection system's ability to deal with the occurrence of wildfire (levels of service). A major element of the California Fire Plan is an extensive assessment process, that graphically depicts fuels, weather, level of service and assets at risk data, in a computer based Geographic Information System (GIS). The GIS thematic layers are then continually field-validated and used to identify the wildland urban-interface/intermix fire problem. The CDF Fire and Resource Assessment Program (FRAP) has built a methodology of assigning fire hazard ranks to the diverse landscapes of California using United States Geological Survey (USGS) 7.5 minute quadrangle maps, which are partitioned, nine by nine, into 81 cells. Each cell is approximately 450 acres and is referred to as Q81st cells.

It is a commonly accepted concept, that fire is a necessary part of the natural life cycle of the chaparral ecosystem in Los Angeles County. Without fire, the chaparral-covered terrain of Los Angeles County reaches an unhealthy state where the ratio of dead material to live plant structure becomes unbalanced. As the chaparral ages, more and more decadent growth adds to the fuel load (expressed in tons per acre), which contributes to the high intensity, costly, large loss wildfires. Historically, fires occurred naturally as a result of lightning and were introduced by native inhabitants. Native Americans, during the late 18th century, were said to have purposefully burned the native vegetation to promote the growth of certain plant resources.

The occurrence of fire on a regular basis whether natural or introduced tended to promote ecosystem health and reduced the number of large acreage, high intensity fires. As the County continues to grow in population, values at risk are encroaching on and intermixing with the wildlands. Consequently, wildfires threaten the values at risk and are seen as bad and should be extinguished promptly. Suppression efforts are quite successful, but result in the eventual, unnatural build-up of fuel for fire, making wildfires more intense and more destructive. Although the fire protection system has become more efficient, those fires that do escape initial attack efforts can quickly overwhelm the available suppression resources. Wildfires under certain severe fire weather conditions, such as a Santa Ana wind event, can prevent initial attack resources from suppressing the fire, while still small, and can spread so quickly and threaten so many values at risk that suppression resources cannot arrive quickly enough to prevent a majority of the damage.

Fire History

The County of Los Angeles and the State of California have experienced many large damaging and costly wildfires. A historical look at the damaging and costly wildfires indicates that all other threats to life, property and the economy pale in comparison. In one wildfire incident, the "Paint Fire" in Santa Barbara, more structures were lost at a higher cost, than individual structure fires occurring in a ten-year period (1991-2000). Considering that the County has experienced many catastrophic fires of this nature, it is evident that addressing the wildfire problem needs to be a top priority of the County of Los Angeles Fire Department.



SIGNIFICANT FIRES IN CALIFORNIA

Fire	Year	Lost Homes
Bel Air	1961	505
Oakland/Berkeley	1991	3,403
Painted Cave	1991	600
Kinneloa	1993	157
Old Topanga	1993	388
Southern California	2003	over 3,000

The Wildfire Environment

A cursory understanding of the wildfire environment is helpful in understanding the fire problem in Los Angeles County and what projects and programs are most effective in preventing large loss incidents. The wildfire environment can be regarded as the conditions, influences, and modifying forces that control the fire behavior. Firefighters become skilled at recognizing the status of the three components that make up the wildfire environment. The nature and or condition of fuels, weather and topography dictate the likelihood of a fire starting, the direction and rate of spread a fire takes and the intensity at which a fire burns.

FUEL

Wildland fuel is the vegetation layer that covers the topography. Fuel provides the thermal energy source upon which fire behavior relies.

WEATHER

Weather is the most variable component of the fire environment and can change rapidly in space and time. Weather represents such elements as temperature, wind, relative humidity, cloud cover, precipitation, and atmospheric stability.

TOPOGRAPHY

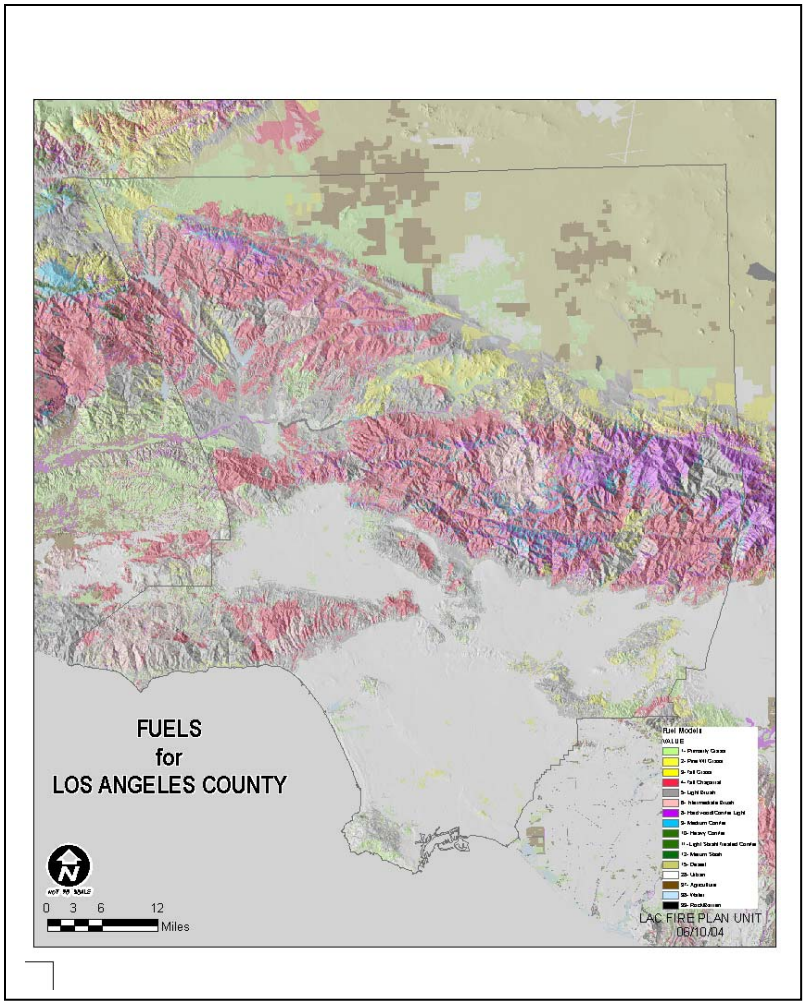
Topography includes such elements as slope, aspect, elevation and configuration or lay of the land. In relation to time, topography can be considered static, for the forces that change it generally work very slowly. In horizontal space, however, topography can change quickly, particularly in mountainous country.

HAZARDOUS FUELS

Los Angeles County has 515,817 acres of state responsibility area, the bulk of which is covered with fire prone vegetation. Additionally, there are 778,427 acres of federal responsibility area (FRA) and 847,768 acres of local responsibility area (LRA) within the County.

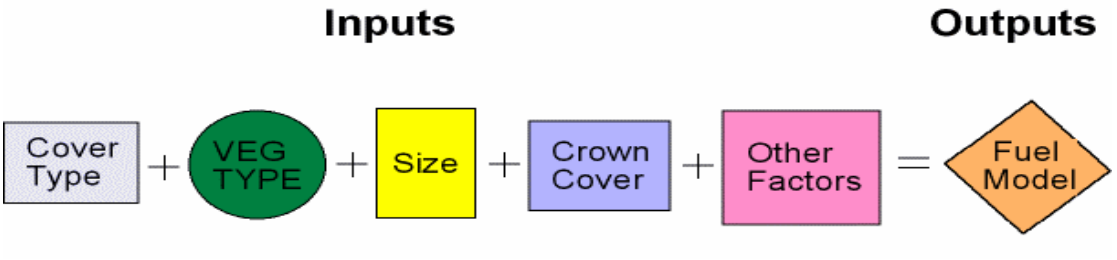
Chaparral provides the most widespread wildland threat in Los Angeles County. It can be found on the slopes of the Santa Monica Mountains throughout the San Gabriel Mountains. This chaparral community is characterized by woody shrubs of chamise, ceanothus, and sugar bush, which dominate dry rocky slopes and provide erosion control and watershed protection. Numerous grasslands and fields are found throughout the County, especially in the Antelope Valley, and present the potential for fast moving wildland fires that can transition into heavier fuel and tree canopies.

The first step in the hazard assessment process is development of a land/ vegetation coverage map for the County from the most recent and detailed vegetation composition and structure information. Vegetation data from a variety of sources are patched together to provide a complete, albeit heterogeneous, surface fuel coverage map for the County. The various vegetation types (fuels) found in Los Angeles County, have specific characteristics that allow them to be categorized according to how they burn.



Translating the variety of vegetation data into stylized fuel characteristics models used to predict fire behavior develops the surface fuel map. This process, known as "cross walking", translates information on plant species, crown cover and tree size into 13 standard fuel models. The crosswalk process uses other factors, such as watershed boundaries; slope, aspect and elevation, to further refine vegetation/fuel model relationships. The system used to categorize these fuels is documented in the National Wildfire Coordinating Group (NWCG) document NFES 1574 "Aids to Determining Fuel Models for Estimating Fire Behavior" by Hal E. Anderson. These fuel models are commonly referred to as the Fire

Behavior Prediction System (FBPS) fuel models. The assessment process further creates four additional custom models to represent non-wildland fuels: (28) Urban Fuels, (97} Agricultural Lands, (98) Water and (99) Barren/Rock/ Other. This method produces a fine-grained portrayal of surface fuel conditions.

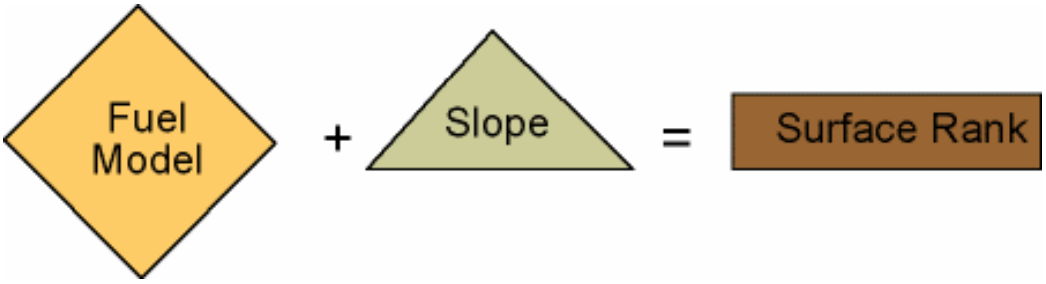


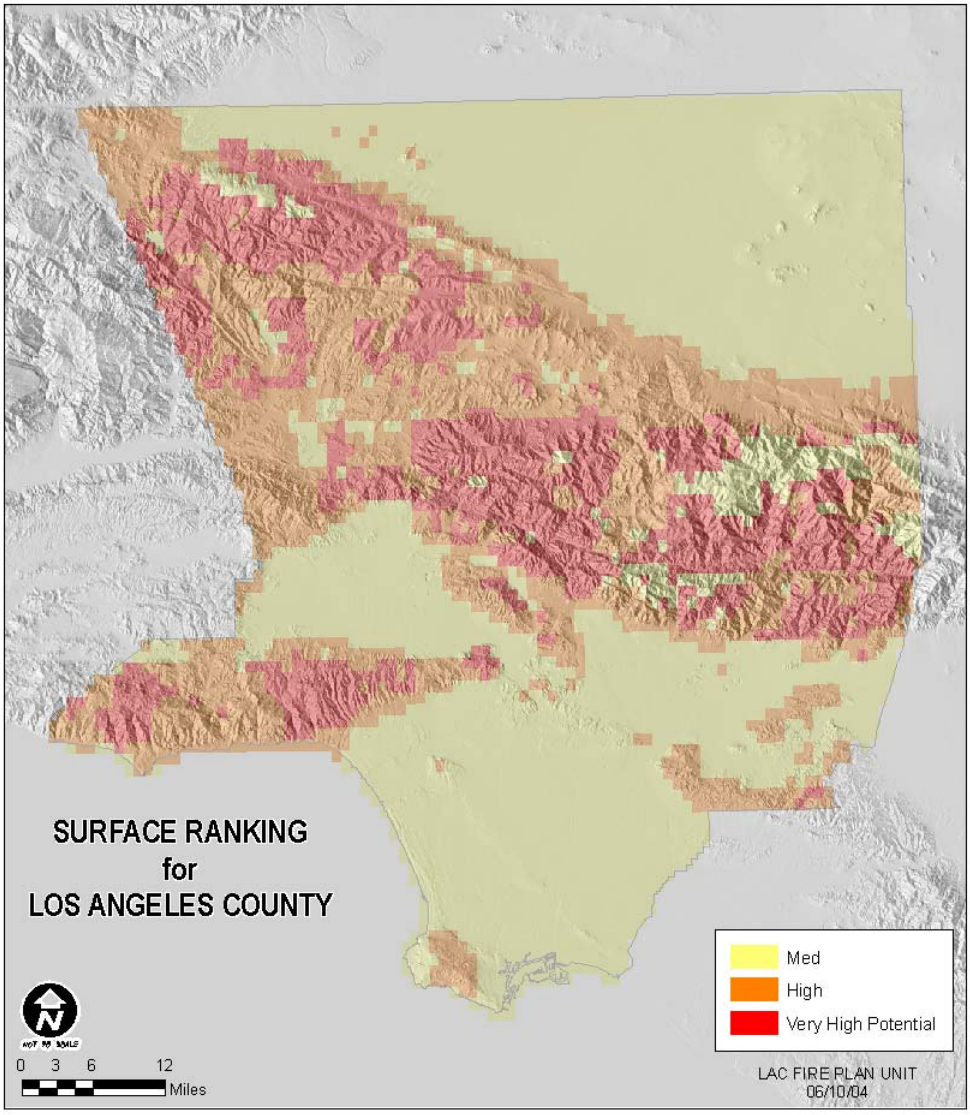
The second step is to assign a surface fuel ranking, which introduces topography into the fuels ranking equation. The method first calculates the fire behavior to be expected for unique combinations of topography and fuels under a given weather condition. BEHAVE (Fire Behavior Prediction and Fuel Modeling System - Andrews 1986) provided estimates of fire behavior under standard severe fire weather conditions for FBPS fuel models located on six slope classes: on flat ground and at the midpoints of the five National Fire Danger Rating System (NFDRS) slope classes (USDA Forest Service,1983). Surface ranks were assigned according to the rate of spread and heat per unit area associated with each unique fuel model-slope combination. The table below shows the surface rank, from Moderate to Very High, for unique combinations of surface fuel model and six different slope classes (0-10%, 11-25%, 26-40%, 41-55%, 56-75%, > 76) as derived from USGS 7 -1/2 minute Digital Elevation Models (DEM).

Fuel Model		Slope		Fuel Hazard Ranking
1	Grass	<10%	=	Moderate
1	Grass	>10%	=	High
2	Woodland	<40%	=	High
2	Woodland	>40%	=	Very High
6	Brush	<75%	=	High
6	Brush	>75%	=	Very High

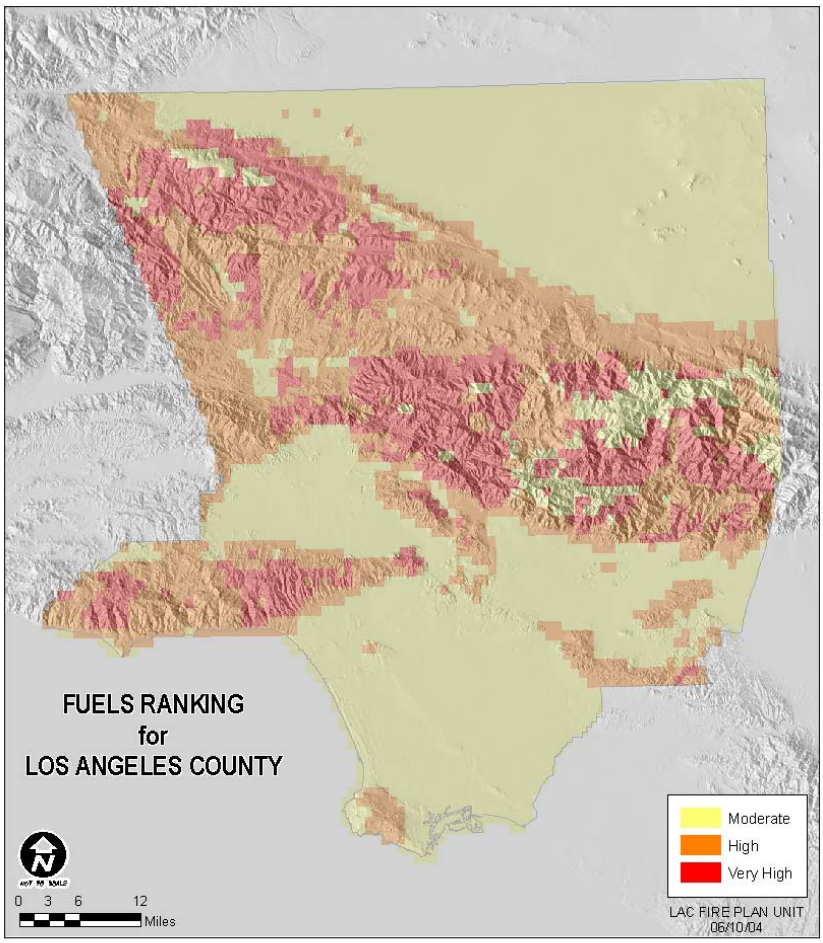
Finally, fire perimeter data are used to update fuel model characteristics based on "time since last burned," to account for both initial changes in fuels resulting from consumption by the fire and for vegetation re-growth. The fuels assessment process includes both current and historic fuel conditions. The historic fuels are those that existed in the climax or mature state before the occurrence of fire or other fuel modification process. After a fuel modification event, such as a fire, the re-growth process goes through a succession of fuel types on its way back to its climax fuel type. This succession is called the "Fuel Dynamic Pathway" (FDP).

The FDP is intended to account for growth rates, rainfall, elevation, aspect and other factors that influence an area's rate of growth.

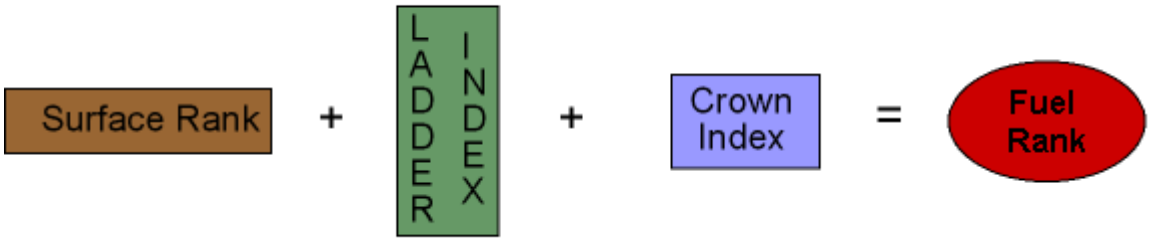




Total fire hazard includes not only hazard posed by surface fire, but also hazard posed by involvement of canopy fuels. The hazard ranking method includes this additional hazard component by adjusting the surface hazard rank according to the value of the ladder and crown fuel indices. Specifically, the surface hazard rank increases a maximum of one class in all situations where the sum of the ladder and crown fuel indices is greater than or equal to two. Otherwise the final fuel rank is identical to the initial surface rank.



For instance, lodge pole pine types modeled as fuel model 8 have a moderate surface rank on all slopes. However, the presence of ladder fuels in areas of dense canopy cover would result in a final fuel rank one class higher than the surface rank (high instead of moderate) in such areas. Estimates of ladder and crown fuels support assessment of crown fire potential. The ladder and crown fuel indices estimate the relative abundance of these fuels. These indices measure in a rough manner the probability that individual tree torching and/or crown fire would occur if the stand experienced a wildfire during extreme weather conditions. The indices take values ranging from 0 to 2, with 0 indicating "absent," 1 representing "present but spatially limited," and 2 indicating "widespread." CDF has determined that there are no "low" hazard fuels in California. Consequently, fuels are ranked medium, high or very high. Fuel models 4 (mature brush) and 10 (timber) are always ranked very high regardless of slope.



Fuel hazard ranking in Los Angeles County, 34% of the Q81st are ranked moderate, 36% high and 30% very high. Thus two thirds of the County has high ranked fuels. 66% of the County is ranked high to very high due to fuels.

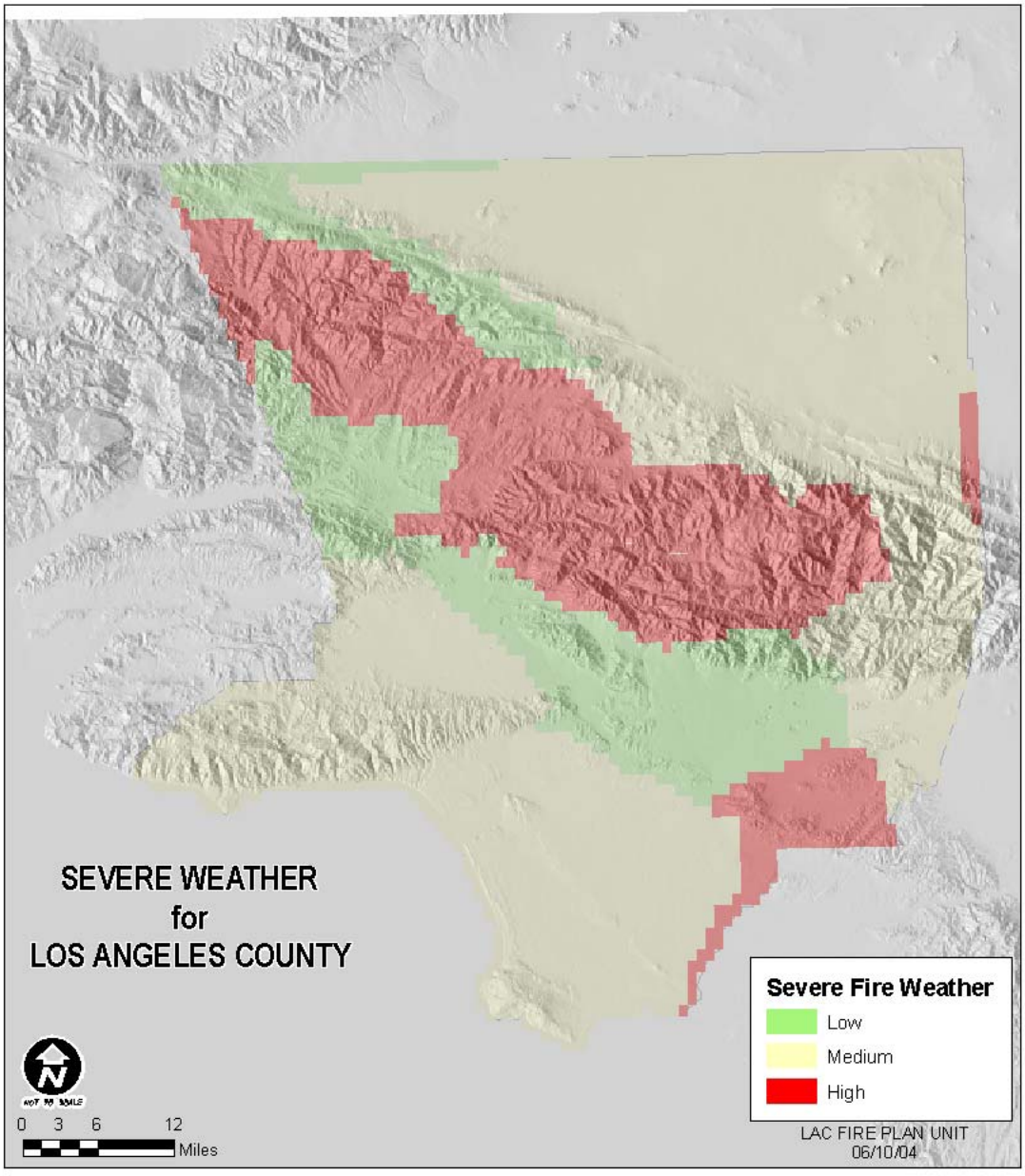
SEVERE FIRE WEATHER

Fire behavior is dramatically influenced by weather conditions. Large costly fires are frequently associated with severe fire weather conditions. High temperatures, low humidity, and strong surface winds typify fire weather. The weather assessment considers the different climates of the County, from the foggy coastline to the hot, dry interior valleys, to the cooler windy mountains, and to the arid and windy upper deserts. Each of these local climates experiences a different frequency of weather events that lead to severe fire behavior (severe fire weather). The weather assessment uses a Fire Weather Index (FWI) developed by USDA Forest Service researchers at the Riverside Fire Lab. This index combines air temperature, relative humidity, and wind speed into a single value index. This index can be calculated from hourly weather readings such as those collected in the Remote Automated Weather Station (RAWS) data collection system. The FWI does not include fuel moistures or fuel models.

The FWI includes topography only to the extent that RAWS station weather readings are influenced by local topography. Each quad 81st (Q81) in the County has a weather station assignment in order to establish a link between Q81s and weather data. This link enables the calculation of the number of days of severe fire weather for each Q81, and eventually a link will be established between CFIRS/NFIRS ignitions and Q81s, that will be used to determine the burn indices (from weather data) for each CFIRS/NFIRS ignition, which will be used as part of the Level of Service (LOS) calculation. Weather stations are assigned to Q81s based on local knowledge, completeness of weather data, proximity, and similarities in the weather environment such as elevation, landforms (e.g., within the same basin or ridge), and coastal influence.

Ideally the best weather station assignment is the closest weather station that is within the same fire weather forecast zone and has a complete stream of weather data. Because many zones have no weather stations, and some weather stations may have incomplete data, both the amount of data available for each station, and the similarity in weather environment of the weather station and Q81s will be considered. To the extent possible, weather stations are picked that have enough observations to adequately represent ignitions during the peak

fire season, and are in a physical setting that experiences similar weather conditions as the Q81s being validated.



FIRE PROTECTION LEVEL OF SERVICE

IGNITION/WORKLOAD ANALYSIS

Before discussing what constitutes an initial attack success or failure, we must first concede that our fire prevention efforts have failed or a natural event, such as lightning, has occurred. Once a fire starts, success is defined as the ability of the fire protection system to limit damage and costs within an acceptable level. Determining what an acceptable cost or damage amount is ultimately defining the level of service desired by the stakeholders involved.

Although the County of Los Angeles Fire Department management, working with stakeholders, must define and provide a particular level of service, the County Fire Department (as the California Department of Forestry and Fire Protection's agent in Los Angeles County) must, at a minimum, deliver a fire protection system that provides an equal level of protection to lands of similar type in State Responsibility Area (SRA). The legislature has charged the State Board of Forestry and CDF with providing this equal level of protection to lands of similar type (PRC 4130) in SRA.

To evaluate this, the Department is initially using both a performance-based fire protection planning system and a prescription based fire protection planning system. The performance-based approach is used on a limited basis since the dataset collected from the California Fire Incident Reporting System (CARS) needs to have fire intensity data attached. Another limiting factor is that the CDF uses an agency specific data collection system called Emergency Activity Reporting System (EARS) that is not consistent with CARS. Consequently the CARS data will need to be reviewed to categorize low, medium, and high fire intensity and will need to be exported to EARS. Once this is accomplished the CDF Level of Service (LOS) calculator can be used.

The performance based approach uses planning belts that group lands of similar type, along with a Level of Service Rating (LOS). The process measures the relative impact of fire on the various assets at risk and produces a level of service rating that is used to compare one area of the State with another, recognizing that the assets at risk may be quite different.

The level of service ranking is expressed as the percentage of incidents where initial attack effort succeeds. Successful initial attack is defined in terms of the amount of resources needed to suppress the fire and of fire intensity. It is that effort which contains the fire within an acceptable level of resource commitment, acceptable suppression cost and minimal damage to assets at risk.

$$\frac{\text{Number of initial attack successes}}{\text{Total initial attack workload}} = \text{Percent LOS rating}$$

A matrix is used to define and display successful initial attacks in this framework. The matrix axes, represents fire sizes and intensities. The body of the matrix contains the fire activity workload for each planning belt. The shaded portion of the matrix indicates fires that would be expected to exceed budgeted suppression costs. The non-shaded portion indicates successful initial attack suppression, fires that are normally contained within allowable suppression cost. The successful initial attacks represented in the non-shaded portion would also represent wildfires that are managed without either adversely affecting the initial attack system's ability to respond to other incidents, or expending significant unallocated resources.

Assuming that the prescription based planning fire protection system is properly applied, an appropriate and timely response, with properly equipped and trained firefighters based on fire danger, the matrix can provide wildfire managers with a simple tool to determine where the suppression system would be expected to fail. For example: a medium size, high intensity wildfire might overwhelm a "high" level initial attack response, even if an equal level of protection were provided statewide. This might be the threshold where wildfire managers decide to focus intense pre-fire mitigation projects in order to bring initial attack efforts back into the successful range. On the other hand, a large fire of low intensity where initial attack fails may indicate an un-equal level of protection or some other weakness in the prescription based system.

The prescription based approach focuses primarily on the reasons for an initial attack success or failure. Unfortunately, the prescription based approach makes it difficult to integrate the interrelationships of various fire protection programs, such as the value of fuel reduction programs in reducing the level of fire suppression effort required. The prescription-based approach is useful for establishing initial attack fire suppression standards on those fires that don't exceed expected suppression costs, as identified in the performance based approach, assuming an appropriate initial attack effort is applied.

Several factors influence the determination of what constitutes an appropriate initial attack effort. Detecting a wildfire in its incipient stage is vital if initial attack resources are to be successful. Response time for the initial attack resources to arrive at and begin taking suppression action on an incident is paramount to success. A response tailored to the incident potential increases the degree of success by applying appropriate reinforcement and resource type. For example, engine companies are usually the closest resource dispatched to a wildfire and are typically the measuring stick for response times.

However, an engine company that encounters an incipient wildfire with intensity beyond its ability might only be successful with resources such as water-dropping helicopters and bulldozers included in the initial attack response. The Fire Characteristics charts are useful guidelines for understanding initial attack resource capability. Staffing levels, training and physical fitness are also important elements of wildland fire company success.

Ignitions Workload Analysis Matrix

Unit: LAC

Planning Belt: B (brush)

FIRE SIZE

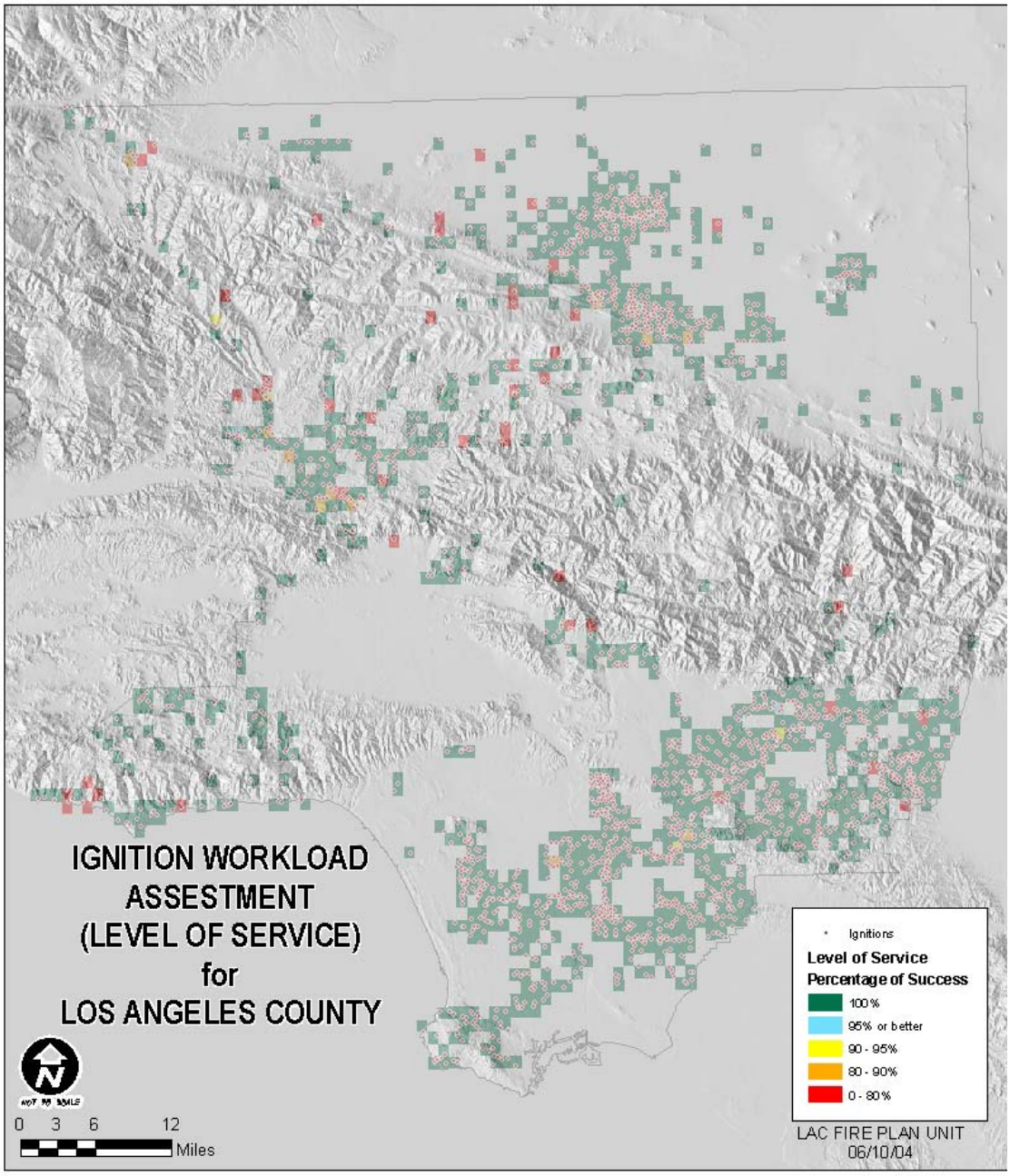
FWI

	Spot	Small	Medium	Large	Escape
LOW	186	25	17	3	4
	49	3	0	1	1
HIGH	27	4	1	1	1
UNMATCHED	273	40	17	7	14

Planning Belt ID: B (brush) **Unit ID:** LAC Refresh Matrix

Success: 93 %

Fire Size class Cutoffs for brush planning belt	FWI Index Intensity Cutoffs
Spot: Less than 1 acre(s)	Low: less than 15
Small: 1 - 5 acres	Medium: 15 - 30
Medium: 5 - 25 acres	High: greater than 30
Large: 25 - 100 acres	Unmatched: no weather observation available
Escape: greater than 100 acres	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(LEVEL OF SERVICE)
for
LOS ANGELES COUNTY
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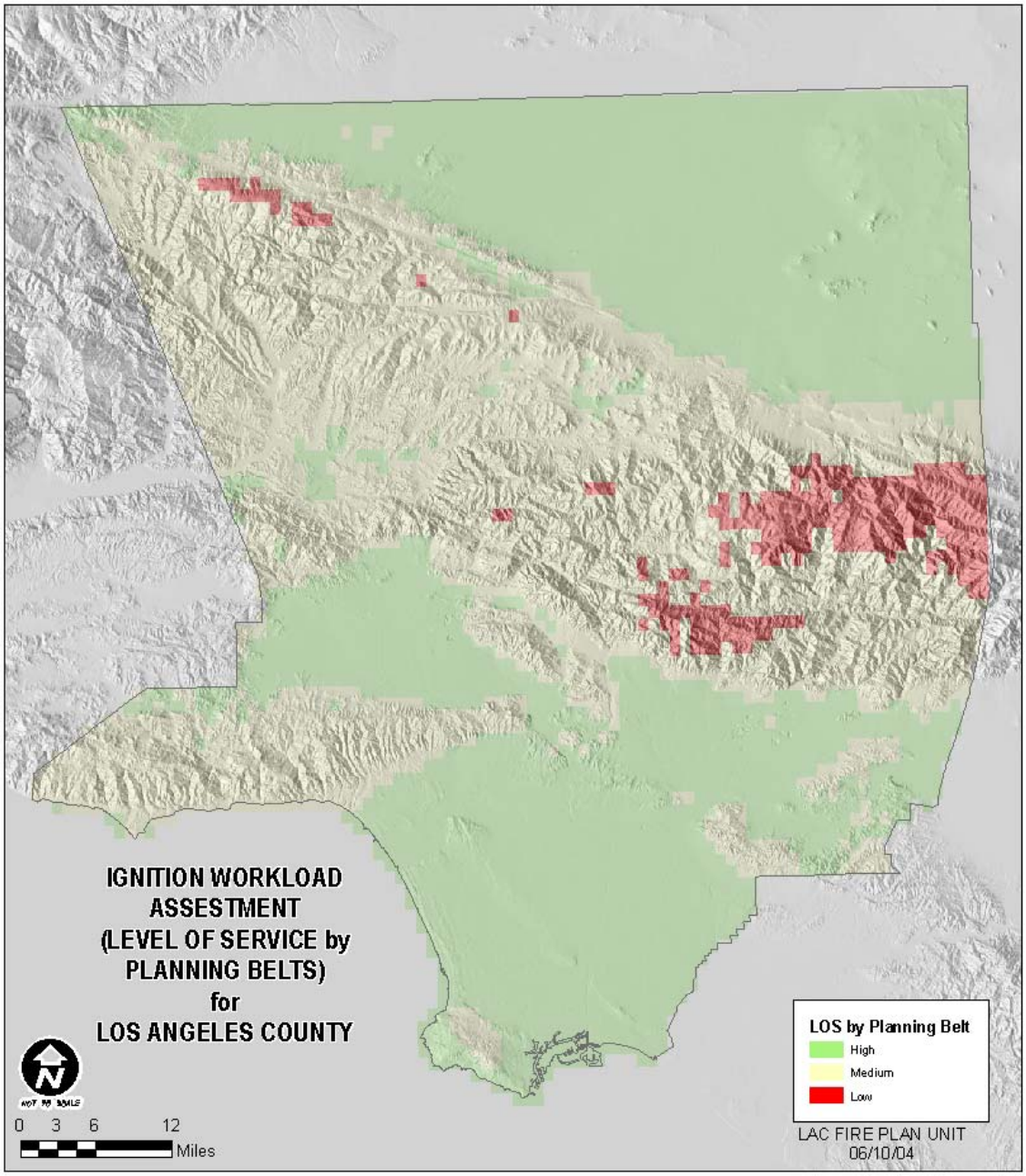
Miles
Ignitions
Level of Service
Percentage of Success
100%
95% or better
90 - 95%
80 - 90%
0 - 80%
LAC FIRE PLAN UNIT
06/10/04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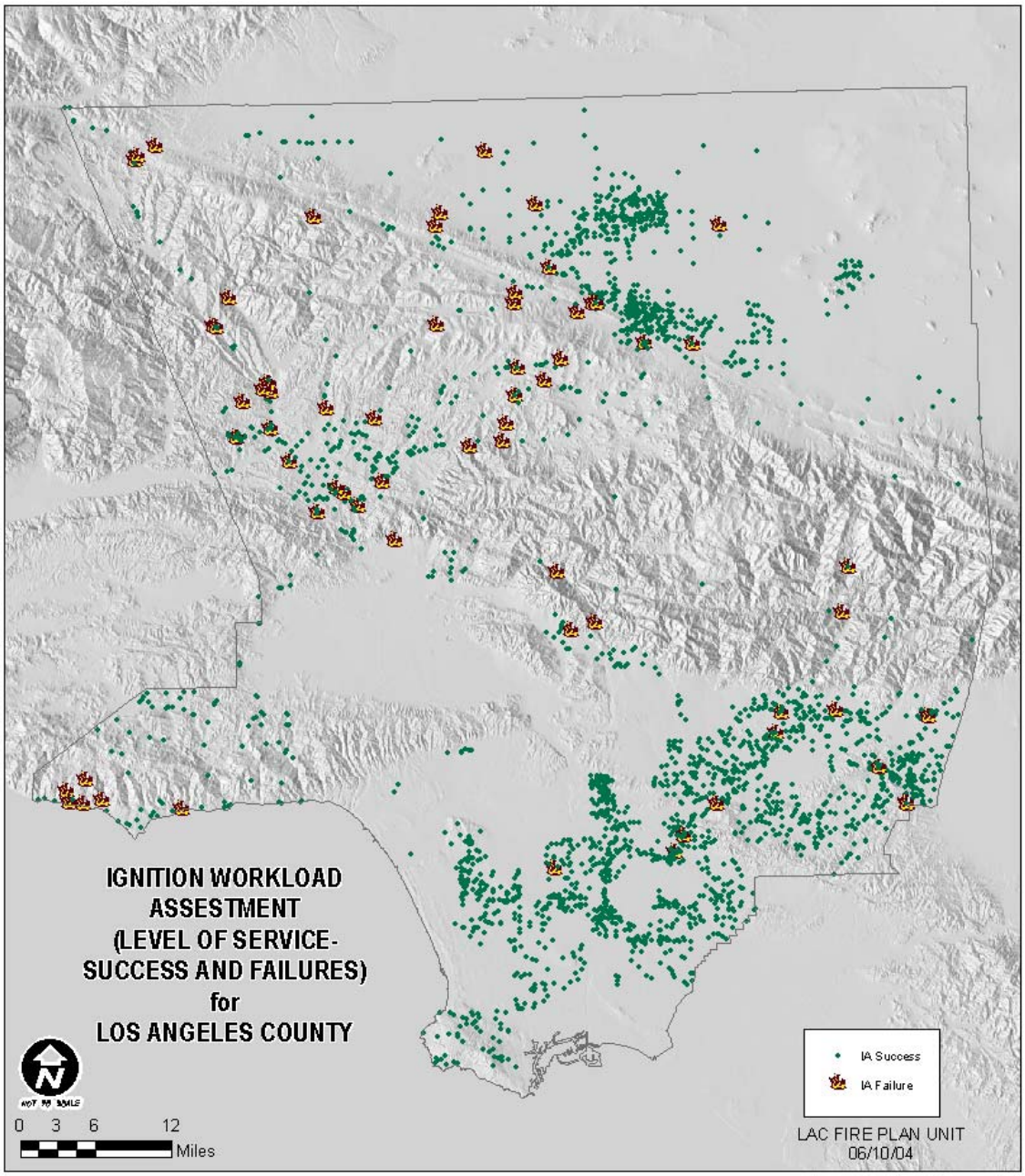
LAC FIRE PLAN UNIT
06/10/04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FIRE SUPPRESSION PHILOSOPHY

As mentioned in other areas of this document, "initial attack" is the focus of all wildfire suppression activities for the County of Los Angeles Fire Department. With so much emphasis placed on quickly extinguishing all wildfires, it might seem that all fire in the wildland is a bad thing. Quite to the contrary, fire is absolutely a necessary element in the County's ecosystem. Since too many assets are at risk to allow the natural occurrence of wildfire, prescribed or controlled burns must take the place of naturally occurring wildfire.

The human element is always the number one priority for all fire suppression efforts. Many rules and guidelines have been developed to stress firefighter and public safety during wildfires. These rules and guidelines can be helpful for the layperson to understand why firefighters may say or do certain things related to wildfire. Some of these rules and guidelines are: "The Ten Standard Firefighting Orders," "The Eighteen Watch out Situations," "Common Denominators of Fire Behavior on Tragedy and Near-miss Forest Fires," "LCES - Lookouts, Communications, Escape Routes, Safety Zones," "Look Up, Look Down, Look Around." With all wildfires, certain strategic and tactical actions must take place. From the time of alarm to the abandonment or closure of a wildfire, one single unified entity must be in command of the incident. To accomplish this, all fire agencies in the County and in the State, for that matter, use the Incident Command System (ICS). Tactically all wildfires must be anchored, which means that a secure starting point is established from which all other strategic and tactical decision-making can build upon.

Once a wildfire grows beyond the initial attack stage where there are assets at risk, particularly in the wildland/urban interface/intermix, two additional dimensions are added to the already complex nature of wildland firefighting. In addition to anchoring and flanking the fire, to narrow the flame front, firefighting resources must also be committed to protecting assets out in front of the fire and resources must be left to protect assets from residual embers and fire after the fire passes through.

THE FIRE PROTECTION SYSTEM

Although fire is a necessary component of the local ecosystem, in most cases, unchecked wildfire is no longer a viable fire/fuel management option in Los Angeles County. Mostly because of population growth, assets at risk have interfaced and intermixed with the wildlands to such an extent that uncontrolled fires must be quickly extinguished. Therefore, at the heart of the wildfire protection system in Los Angeles County is an aggressive initial attack firefighting strategy.

The County of Los Angeles Fire Department actually has a dual fire protection role. The County of Los Angeles Fire Department provides structural fire protection and rescue services to the Los Angeles County unincorporated areas and contract cities.

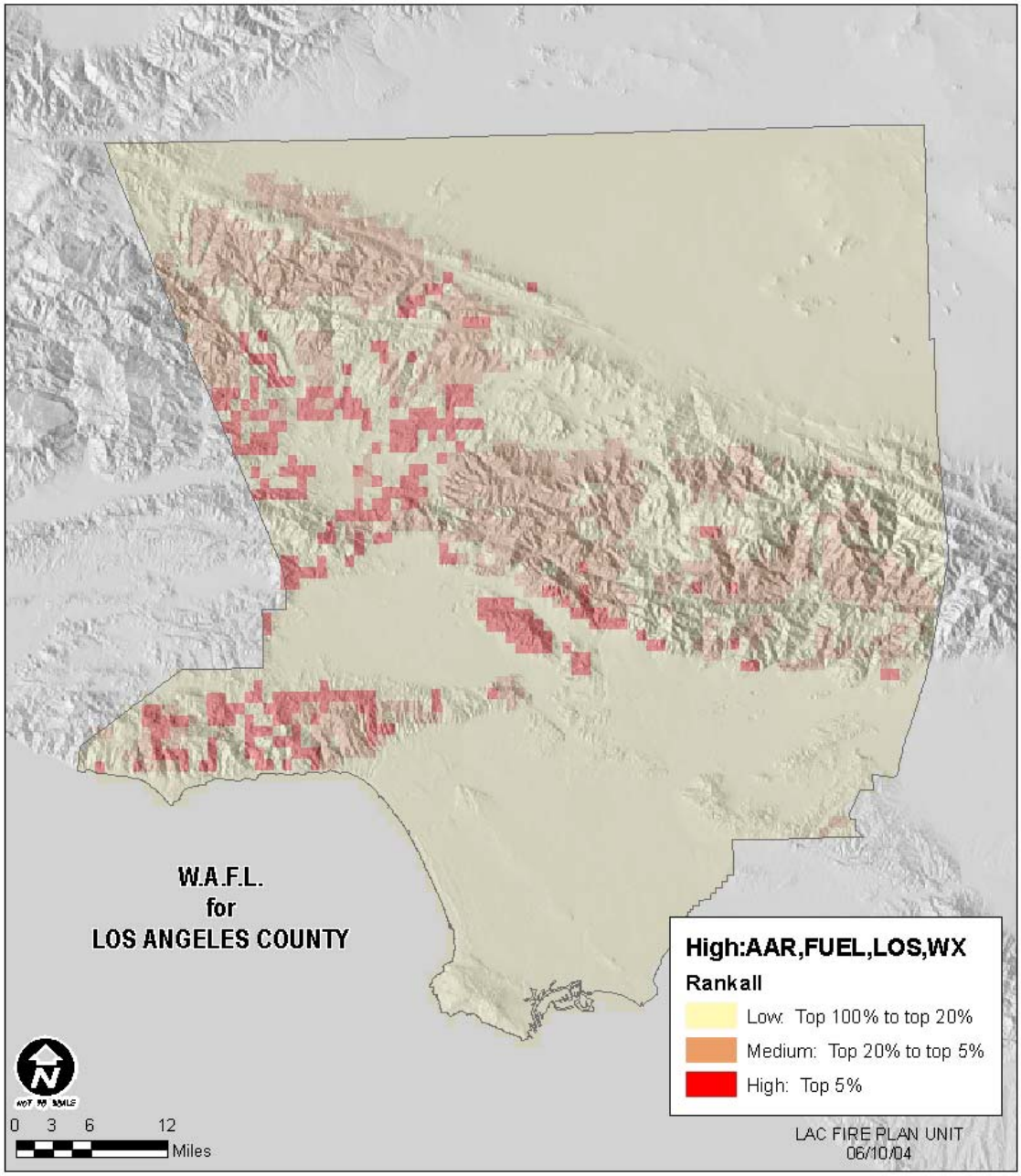
The Los Angeles County Fire Department is also one of six contract counties, which has executed a contract with the State of California to provide wildland fire protection on state responsibility area (SRA). The SRA within the jurisdiction of the County of Los Angeles Fire Department is 515,817 acres.

PRIORITY AREAS

The fire plan assessment process utilizes a W.A.F.L. calculator to combine the four fire plan assessments (weather, assets at risk, fuel & level of service) in to an aggregate score which can be used to help target critical areas and prioritize projects. The W.A.F.L. score, however, does not take in to consideration subjective factors critical to achieving on the ground fuel reduction. Fire plan assessments aside, it is extremely difficult if not impossible to achieve fuel reduction on the ground without community involvement, whether that be in the form of a community fire safe council, homeowners association or other organized forum. With that said, the W.A.F.L. score, with its science-based approach is evaluated in conjunction with other intangibles to arrive at a "reasonable" assessment of the needs and likelihood of accomplishing a project. A simple glance at the W.A.F.L. score map below indicates that there is a significant need throughout the foothills, especially in the urban interface areas of Los Angeles County for hazardous fuel reduction.

Each of Department's battalions are consulted for pre-fire projects they consider important to achieving their goals of reducing the potential and impact of catastrophic fire. Projects are assigned a relative ranking by combining the four fire plan assessments, fuel hazard ranking, severe fire weather, level of service (workload), total assets at risk, with subjective factors including fire history and community involvement. Values are assigned by looking at the fire plan assessment maps and interpolating the assessment output which best represents each project.

Theoretically, the project with the highest score would have the first priority for funding of any given project or other pre-fire program. However, there are a number of circumstances where other then the highest priority would be given preference to a project. Circumstances when this might occur include the following: the Department's current commitment to an existing pre-fire project, community participation necessary to complete a project, preparatory work and ease of instituting the project, project type and match for grant funding and simply sharing the wealth and commitment toward pre-fire projects between the Department and communities. The Fire Plan Unit acts to coordinate countywide projects, and projects occurring between battalions, and provides direction in the planning of pre-fire projects.


W.A.F.L.
for
LOS ANGELES COUNTY
High:AAR,FUEL,LOS,WX
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Low: Top 100% to top 20%
Medium: Top 20% to top 5%
High: Top 5%
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