III. Risk Assessment

A critical component of developing a plan to mitigate the effects of major wildland fires is a comprehensive risk assessment. Assessing risk involves analyzing all of the factors that contribute to the loss of assets during wildland fires. Assets are those things that residents of San Luis Obispo County value. Examples include residences, businesses, utility infrastructure, road systems, rangeland, plants, wildlife, and watersheds. The factors that contribute to the loss of those assets during wildland fires include fuels, topography, weather, infrastructure, and firefighting capabilities. CDF/County Fire assesses risk by conducting a county wide "Assets at Risk" assessment. This assessment identifies and rates areas as having low, medium and high assets at risk. The identification and rating of these areas assists in focusing attention on and prioritizing prefire prevention programs and fuel treatments. Using the "Asset at Risk" assessment along with input from firefighting personnel, CDF/County Fire has developed a prioritized list of target areas. A significant number of the target areas are communities and rural areas. Communities and rural areas usually have an extensive list of factors that increase their risk to wildland fire. CDF/County Fire staff have developed a comprehensive risk assessment that will be utilized over the next year to assess these communities and rural areas. This assessment will identify risk factors and identify projects and programs to mitigate the risks. CDF/County Fire staff will then work with residents to develop a plan to prioritize and implement those mitigations. By utilizing a standard risk assessment, results from individual communities can be compiled and compared on a county wide basis. This information will then be used to devise countywide fire prevention programs, fuel treatments and develop planning recommendations.

A. CDF/County Fire Assets at Risk Analysis

As part of the Fire Plan, CDF/County Fire has developed a methodology for analyzing Assets at Risk (AAR). For each AAR, geographic areas will be ranked based on the potential impacts of a large fire event. This provides a series of displays of spatial rankings to assist in the identification of "high value" areas. Additional data related to fuels, weather, and CDF level of service are used to rank areas in terms of the likelihood of a large fire event. This data provides the basis for identification of "high value/high risk" areas. The analysis serves as a pointer to where pre-fire projects might have the highest benefit in terms of reduction of potential damage. Geographic Information Systems (GIS) are utilized to perform this analysis. GIS is a computer mapping and data analysis program.

1. Identifying Assets at Risk

Assets are those things that residents of San Luis Obispo County value. The following table lists all of the assets at risk analyzed in our GIS program:

Asset at Risk	Location and ranking methodology
Hydroelectric power	1) Watershed area up to 20 miles upstream from run of the river power plants, ranked based on plant capacity; 2) cells adjacent to reservoir based plants (Low rank); and 3) cells containing canals and flumes (High rank)
Fire-flood watersheds	Watersheds with a history of problems or proper conditions for future problems (South Coastal Plain, field/stakeholder input), ranked based on affected downstream population
Soil erosion	Ranking of post-fire erosion potential based on weighted combination of fuel characteristics, soil k-factor, slope, and peak rainfall.
Water storage	Watershed area up to 20 miles upstream from water storage facility, ranked based on water value and dead storage capacity of facility
Water supply	1) Watershed area up to 20 miles upstream from water supply facility (High rank); 2) grid cells containing domestic water diversions, ranked based on number of connections; and 3) cells containing ditches that contribute to the water supply system (High rank)
Scenic	Four mile viewshed around Scenic Highways and 1/4 mile viewshed around Wild and Scenic Rivers, ranked based on potential impacts to vegetation types (tree versus non-tree types)
Timber	Timberlands ranked based on value/susceptibility to damage
Range	Rangelands ranked based on potential replacement feed cost by region/owner/vegetation type
Air quality	Potential damages to health, materials, vegetation, and visibility; ranking based on vegetation type and air basin
Historic buildings	Historic buildings ranked based on fire susceptibility
Recreation	Unique recreation areas or areas with potential damage to facilities, ranked based on fire susceptibility
Structures	Ranking based on housing density and exposure (potential for structure loss in a large fire event)
Non-game wildlife	Public and NGO land holdings specifically for protection of non-game wildlife habitat, ranked based on fire susceptibility.
Game wildlife	Omitted due to lack of methodology/available data
Infrastructure	Infrastructure for delivery of emergency and other critical services (e.g. repeater sites, transmission lines)
Ecosystem Health	Ranking based on condition class, potential for ecological damage from a severe fire event due to deviation from historical fire return interval

2. Mapping and Ranking AAR

For the purposes of ranking assets at risk, the county is divided into a system of grids. The grids are utilized for analyzing and rating each of the assets at risk. The grid system boundaries are derived from USGS 7 ½ minute (1:24,000 scale) topographic quadrangles. Since they cover large areas (about 35,000 acres), quads are divided into 81 grid cells (Q81st cell), each about 450 acres in size. The size of these units was deemed appropriate for focusing in on high value/high risk areas.

Quad 81 Cell

For a given AAR, Q81 grid cells must be ranked as High, Medium, or Low based on the potential impacts from a large fire event. Rankings are developed based on the potential physical fire effects on the assets as well as the human valuation of them. For example, the air quality AAR health concerns of a large fire in brush covered lands are higher than grasslands due to production of larger volumes of smoke. The valuation of this effect will also differ based on the additional factor of how many people are potentially affected within specific air basins.

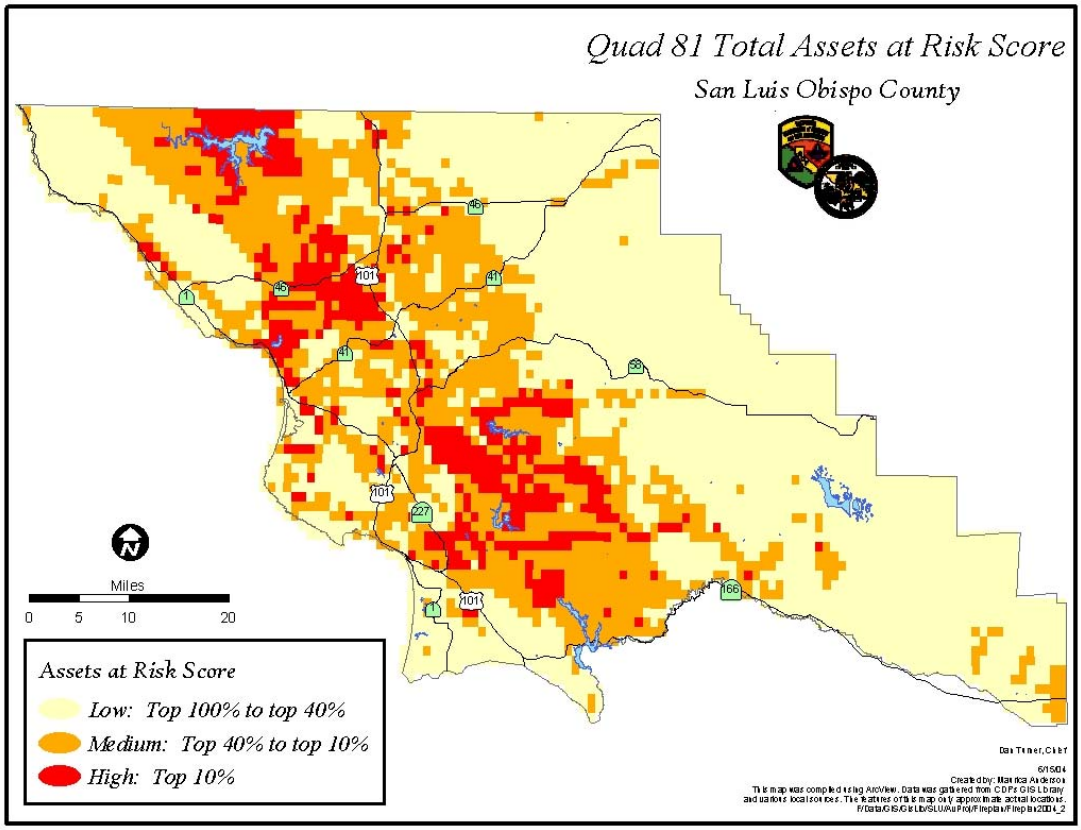
The potential physical effects of a large fire also include a susceptibility component for assets such as structures, historic buildings, or recreation that involve specific sites within a quad 81st. For example, the ranking procedure for structures involves a valuation component based on the number of housing units within a grid cell as well as a susceptibility component or exposure. The exposure measure includes site-specific factors near housing such as vegetation clearance, roof type, and accessibility.

3. Results of the AAR Analysis

The GIS computer program creates a table listing all of the Q81 grid scales for the entire county. Within each Q81 cell, individual rankings for each AAR are recorded. Ranking is based on the potential impact of a large fire event on each asset at risk. A score of 0 is used if the AAR is not present, 1 for a low impact, 2 for a medium impact and a 3 for a high impact. By combining all of the scores for the various AAR for each Q81 cell, a final score is derived. The computer program has an asset calculator tool that allows unique weighting of the various AAR in the summation process to reflect various valuation systems of different stakeholder groups.

Quad	81st	Fire-Flood	Air Qual	Water Supply	Wildlife	Erosion	Game Wildlife	Recreation	Water Storage	Hydro Power	Hist Bldg	Scenic	Range	Timber	Structures	Sum
Topo Quad	1	0	2	1	1	1	1	1	2	3	0	1	1	0	3	18
“	2	0	2	1	2	2	1	1	3	3	0	1	1	0	3	22
“	3	0	2	1	2	2	1	1	2	3	0	1	2	0	2	22
“	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
“	81	0	2	1	2	1	1	2	3	3	0	1	2	0	1	19
Topo Quad	1	0	1	1	1	1	1	1	2	0	0	2	2	0	1	14
“	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	

The final product is a map depicting areas in the county where assets are at risk. This map can then be utilized to focus prefire projects and resources.



CDF/County Fire staff analyzed the results derived from the “Asset at Risk” assessment and found that there were a significant number of areas with high assets at risk that were not being ranked correctly by the model. The Asset at Risk strategy is built on data

derived from best available sources. The overall results are based on the accuracy of this data. After analyzing the base data the following issues were discovered:

- The fuel data is not accurately displaying fuel model types found in the county. The base data was derived from satellite imagery and many brush fuel models are being displayed as a pine-grass model. Fuels are a component used in ranking the structure assets at risk.
- Under the structural analysis, housing density for some rural communities was being underestimated.
- Housing density is derived from the 2000 census data and there are some areas where housing density is incorrect.
- The historical buildings data layer has not been completed.
- Recreation, non-game wildlife, game wildlife, and infrastructure layers need to be updated.

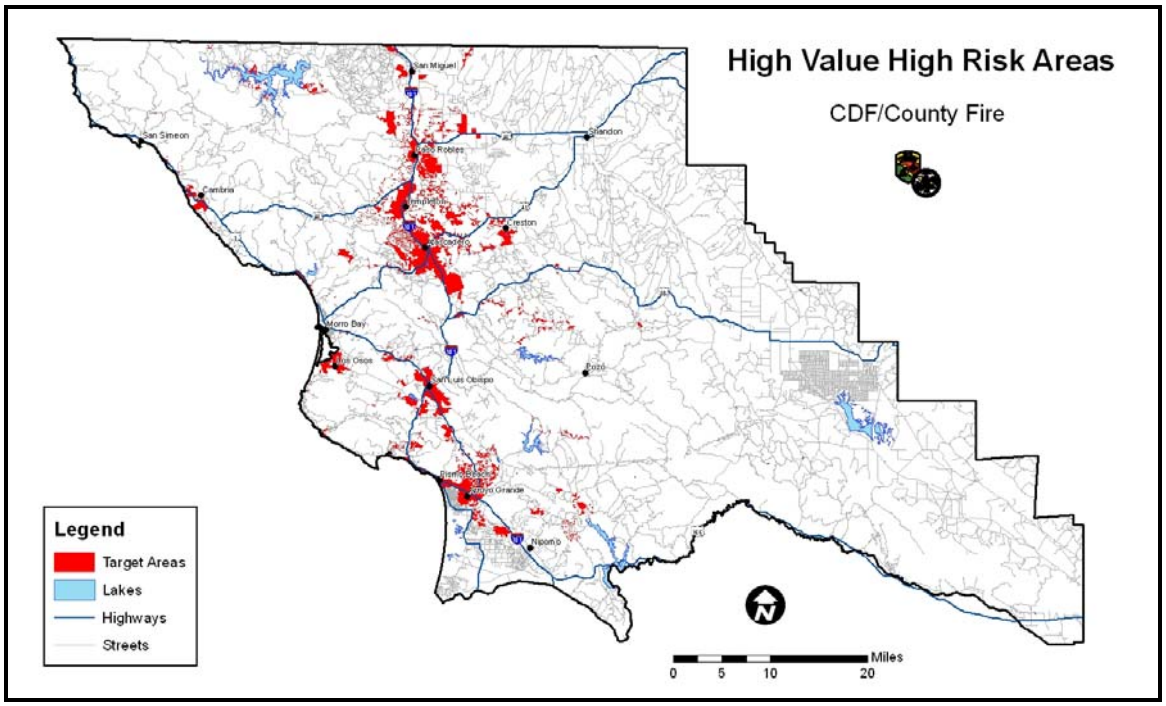
Updating data is a continual process. CDF/County Fire staff is working on improving the data for use in identifying assets at risk. Since this process takes a considerable amount of time, but the results are needed now, CDF/County Fire staff has developed an alternative method for capturing assets that are at risk as discussed below.

4. Target Areas

To mitigate the deficiencies in our “Asset at Risk” assessment, CDF/County Fire staff have augmented the original assessment with expert input from local CDF/County Fire Battalion Chiefs. The County of San Luis Obispo is divided into 5 battalions. Each battalion is administered by a Battalion Chief. Each battalion chief was asked to identify assets that would be at risk during wildland fires due to the following factors:

- Fuel loading
- Topography
- Weather
- Structural Ignitability
- Emergency Response
- Access
- Signage
- Water Supply

The identified assets were then grouped geographically into target areas. These target areas were then prioritized. The final product is a detailed map and list of areas that will be used to focus fire prevention activities and fuel treatments.



Battalion 1 Target Areas (listed in order of priority)

1) Santa Rita WUI
2) Morro Toro WUI
3) Cambria WUI
4) Hearst Castle
5) Communication Sites
6) Los Padres FS Botanical Gardens
7) Bishop Peak Recreational Site
8) San Luis Mountain Recreational Site
9) Laguna West WUI
10) Morro Bay WUI
11) Los Osos WUI
12) Montana De Oro State Park Campground
13) Whale Rock Reservoir
14) Cayucos WUI
15) Perfumo Canyon WUI
16) San Simeon State Park
17) Ragged Point WUI
18) San Luis V.O.R.
19) El Chorro Regional Park
20) San Simeon Acres WUI

Battalion 2 Target Areas (listed in order of priority)

1) Suey Creek WUI
2) Upper Lopez Canyon WUI
3) Blue Fox WUI
4) East Arroyo Grande WUI
5) Huasna WUI
11) Edna Valley Foothills WUI
12) Ranchita Estates WUI
6) Reservoir Canyon WUI
7) Nipomo Mesa/Dale WUI
8) Lopez Lake Recreational Area
9) Nipomo Hills WUI
10) Varian Ranch WUI

Battalion 3 Target Areas (listed in order of priority)

1) West Atascadero WUI
2) South Templeton/Santa Rita WUI
3) Asuncion WUI
4) PG&E High Power Line NW of Atascadero
5) South Shore Village
6) Rancho Delargo WUI
7) Cal Shasta Boat Club WUI
8) Tri Counties Boat Club WUI
9) Running Deer Ranch WUI
10) Oak Shores WUI
11) Christmas Cove WUI
12) Heritage Ranch WUI
13) Rural West Paso Robles WUI
14) Oak Shores Campground
15) Bryson\Hesperia WUI

Battalion 4 Target Areas (listed in order of priority)

1) Parkhill WUI
2) Santa Margarita Lake Recreational Area
3) Salinas River Drainage WUI
4) Pozo WUI
5) Mount Lowe WUI
6) Black Mountain WUI
7) Wilson Corner WUI
8) Garden Farms WUI
9) Tassajara WUI
10) Upper Highway 229

Battalion 6 Target Areas (listed in order of priority)

1) See Canyon WUI
2) Davis Canyon WUI
3) Squire Canyon WUI
4) Baron Canyon WUI
5) Port San Luis Obispo/Lighthouse
6) Diablo Canyon Power Plant
7) Pismo Beach WUI
8) San Luis Obispo Bay Estates WUI
9) Avila Beach WUI

B. Communities at Risk

Many of the target areas identified are categorized as communities. Communities tend to experience the greatest amount of costs and losses associated with wildland fires. In 2000 there was an initial attempt to identify those areas within California. During the 2000 fire season wildfires burned millions of acres throughout the United States. These fires dramatically illustrated the threat to human lives and development. Under Executive Order, the National Fire Plan was created as a cooperative, long-term effort of the USDA Forest Service, Department of the Interior, and the National Association of State Foresters, to protect communities and restore ecological health on Federal lands.

A major component of the National Fire Plan was funding for projects designed to reduce fire risks to people and their property. A fundamental step in realizing this goal was the identification of areas that are at high risk of damage from wildfire. Federal fire

managers authorized State Foresters to determine which communities were under significant risk from wildland fire on Federal lands.

The California Department of Forestry and Fire Protection undertook the task of generating the state's list of communities at risk. With California's extensive wildland urban interface situation, the list of communities extends beyond just those on Federal lands.

Three main factors were used to determine wildland fire threat to wildland urban interface areas of California:

- Ranking Fuel Hazards = ranking vegetation types by their potential fire behavior during a wildfire.
- Assessing the Probability of Fire = the annual likelihood that a large damaging wildfire would occur in a particular vegetation type.
- Defining Areas of Suitable Housing Density that Would Create Wildland Urban Interface Fire Protection Strategy Situations = areas of intermingled wildland fuels and urban environments that are in the vicinity of fire threats.

The following is a list of all the communities that were originally identified in San Luis Obispo County.

- Adelaide
- Arroyo Grande
- Atascadero
- Avila Beach
- Baywood-Los Osos
- Cambria
- Cayucos
- Creston
- Cuyama
- Paso Robles
- Grover Beach
- Lake Nacimiento
- Morro Bay
- Nipomo
- Oceano
- Pismo Beach
- San Luis Obispo
- San Miguel
- Santa Margarita
- Santa Maria
- Templeton

C. Rural Areas at Risk

The original list of communities at risk included primarily densely populated urban communities. Over the past decade, there has been an influx of people moving into rural areas. The result is an increase of single family residences on large parcels distributed over specific geographical areas. These developments are not organized as communities but are referred to by the County of San Luis Obispo Planning Department as "Rural Areas". Rural areas have special characteristics that increase the risk to residents and firefighters during wildland fires. During major fire events, multiple structures can be threatened at the same time. Access to these structures can be difficult due to winding roads, one lane roads, steep road grades, and long driveways. Delay in response by emergency equipment due to access puts structures at increased risk. Also, many of the rural areas are vegetated with fuels that are associated with extreme fire behavior conditions. The density of some of the rural areas has necessitated CDF/County Fire staff to identify and manage these areas like communities at risk. The following rural areas where identified during the asset at risk target area assessment:

- Asuncion
- Baron Canyon
- Blue Fox
- Bryson\Hesperia
- Cal Shasta Boat Club
- Christmas Cove
- Davis Canyon
- East Arroyo Grande
- Edna Valley Foothills
- Garden Farms
- Heritage Ranch
- Huasna
- Laguna West
- Morro Toro
- Nipomo Hills
- Nipomo Mesa/Dale
- Oak Shores
- Oak Shores Campground
- Parkhill
- Perfumo Canyon
- Ranchita
- Rancho Delargo
- Reservoir Canyon
- Running Deer Ranch
- Rural West Paso Robles
- Salinas River Drainage
- San Luis Obispo Bay Estates
- San Simeon Acres
- Santa Margarita Lake
- Santa Rita
- See Canyon
- South Shore Village
- South Templeton/Santa Rita
- Squire Canyon
- Suey Creek
- Tassahara
- Tri Counties Boat Club
- Upper Highway 229
- Upper Lopez
- Verian Ranch
- West Atascadero
- Wilson Corner

D. Community and Rural Area Risk Assessment

Once target areas have been identified a local risk analysis must be completed to determine what mitigations would reduce the risks. Utilizing the methodology outlined in the handbook Preparing a Community Wildfire Protection Plan, CDF staff will begin creating a Community Wildfire Protection Plan (CWPP) for the identified target areas.

A part of the CWPP process is preparing a risk assessment. The development of a community or rural area risk assessment will help to effectively prioritize areas for treatment and identify the highest priority uses for available financial and human resources. CDF/County Fire Staff is in the process of developing a risk assessment matrix. This matrix will identify all of the factors that contribute to costs and losses associated with wildland fires. Factors will include:

- Fuel Hazard
- Weather
- Topography
- Risk of Wildland Fire Occurrence
- Homes, Businesses, and Essential Infrastructure at Risk
- Local Preparedness and Firefighting Capability
- Emergency Access
- Water Supply
- Building Construction
- Clearance

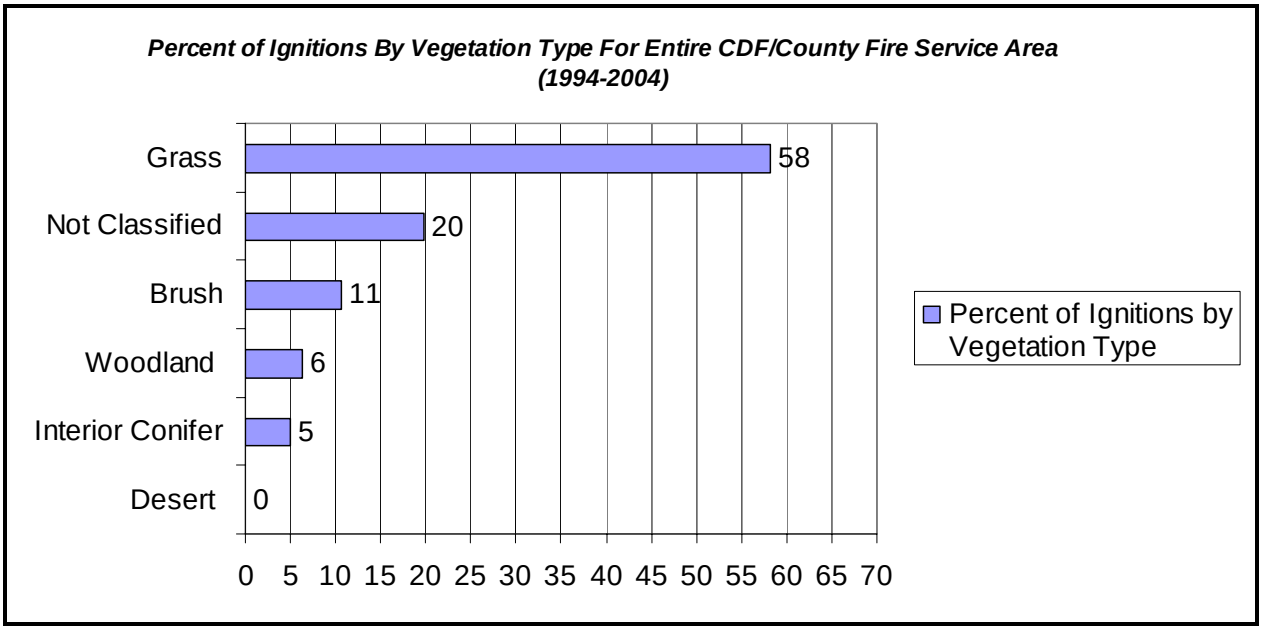
A rating system of low, medium and high risk will be used to represent the risk posed to each community. These ratings will assist in prioritizing resources and funds while developing a county wide action plan.

E. Ignitions Assessment

The following ignition data was compiled from recorded incident information for CDF/County Fire response areas from 1994 through 2004. There have been approximately 1897 ignitions during this time. This data is used to identify areas within the county that have a higher potential for costly damaging fires. CDF/County Fire Staff analyze ignitions by vegetation type and ignitions by cause.

Ignitions by Vegetation Type

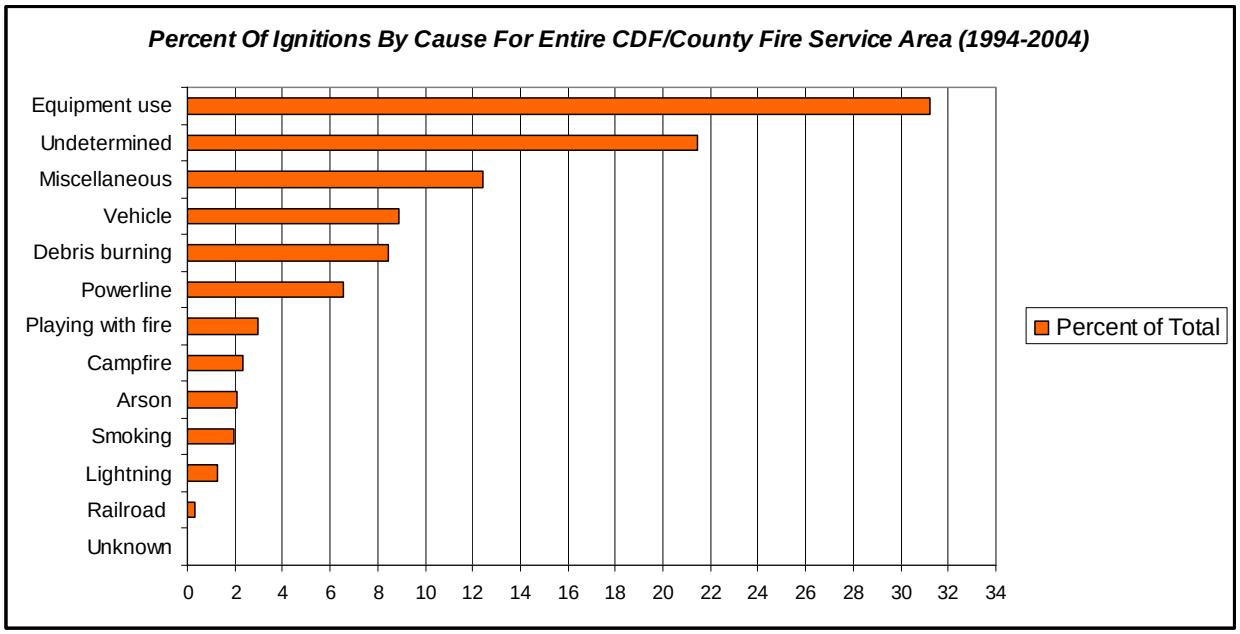
The following analysis utilizes CDF/County Fire wildland fire ignition data from 1994-2004 to determine the percentage of ignitions in the common vegetation types for San Luis Obispo County. This data can be utilized to determine cause patterns and assist in implementing fire prevention programs aimed at reducing those ignitions. Programs such as our “Mow Before 10:00” signs target ignitions that are started in grass.

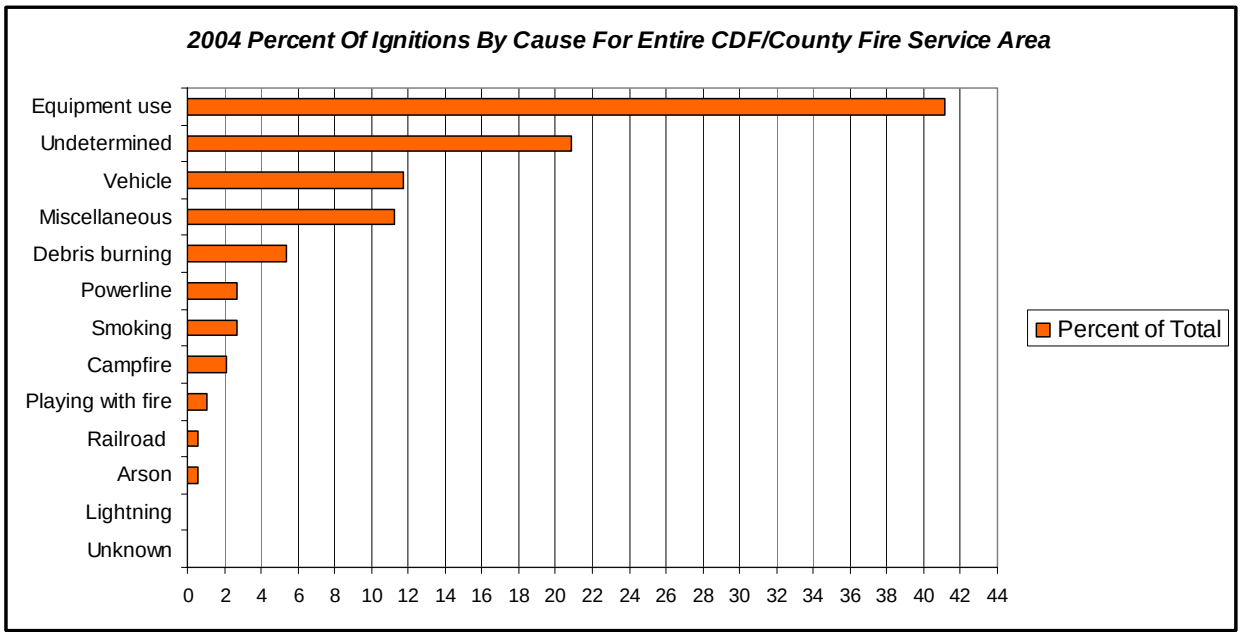


Ignitions by Cause

The following analysis utilizes CDF/County Fire wildland fire ignition data from 1994-2004 to determine the percentage of ignitions by cause for San Luis Obispo County. This analysis looked at the entire county from 1994-2004, the entire county for 2004 and each battalion from 1994-2004. This analysis can be utilized to implement fire prevention strategies aimed at reducing selected causes of ignitions. CDF/County Fire has used this data to promote fire prevention education programs for spark arrestors, debris burning, and playing with fire.

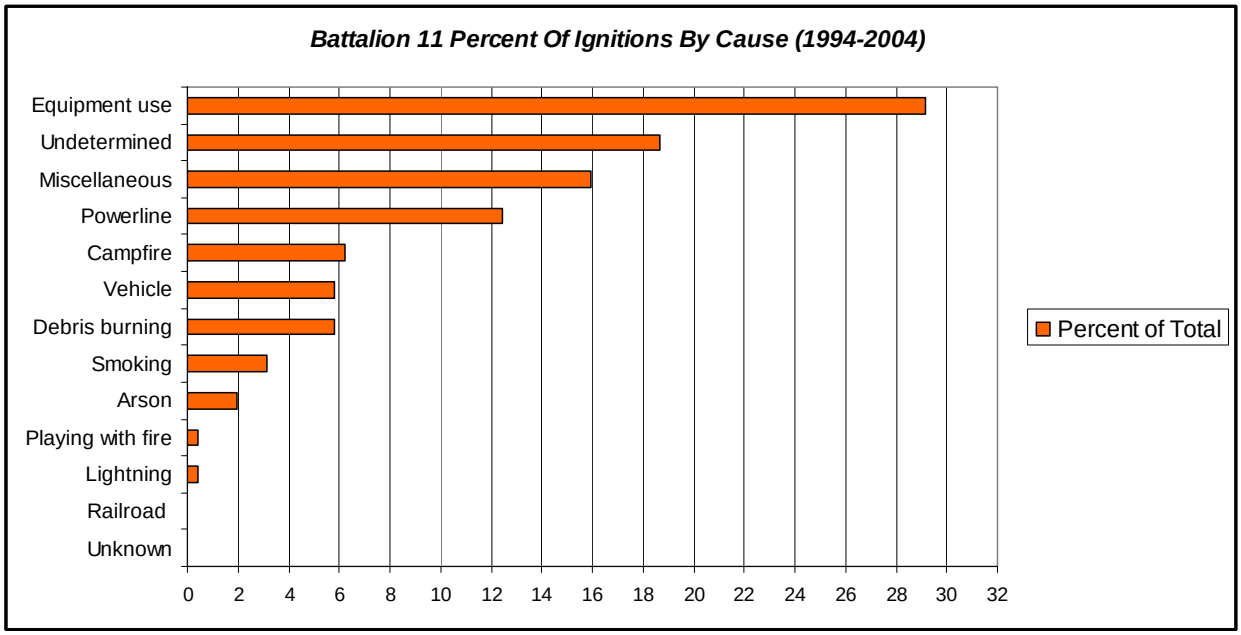
Entire CDF/County Fire Service Area Assessment





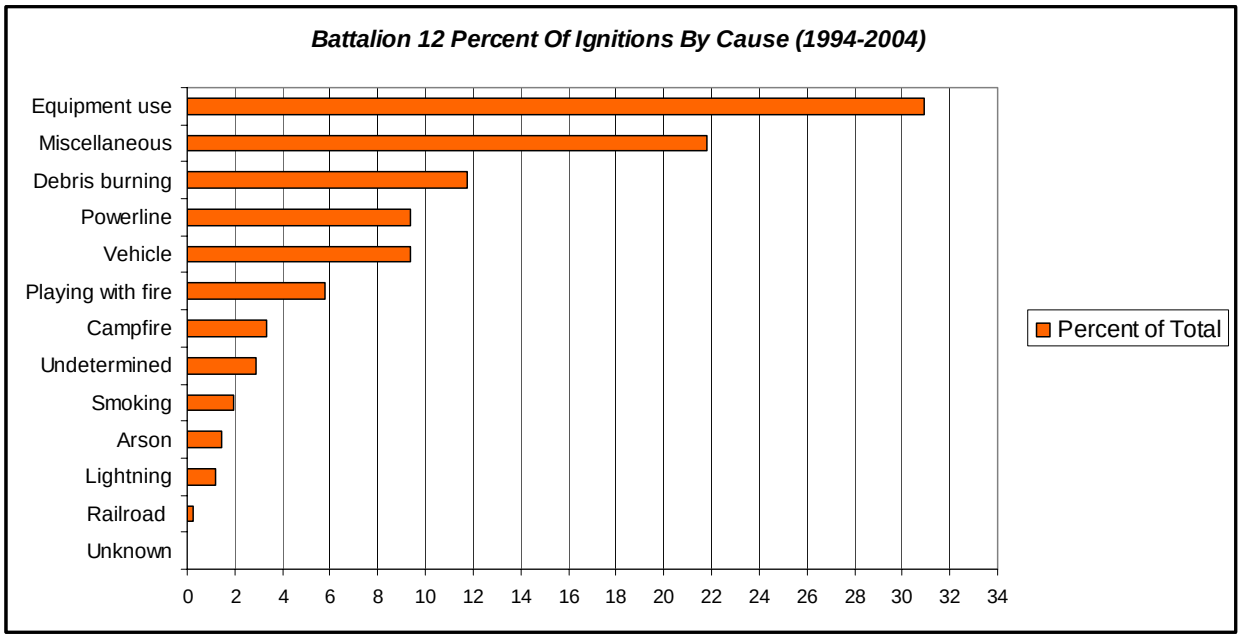
Battalion 11 Ignition Assessment

- There have been 257 ignitions in Battalion 11 from 1994-2004
- Ignitions in Battalion 11 account for 14 percent of the total ignitions from 1994-2004



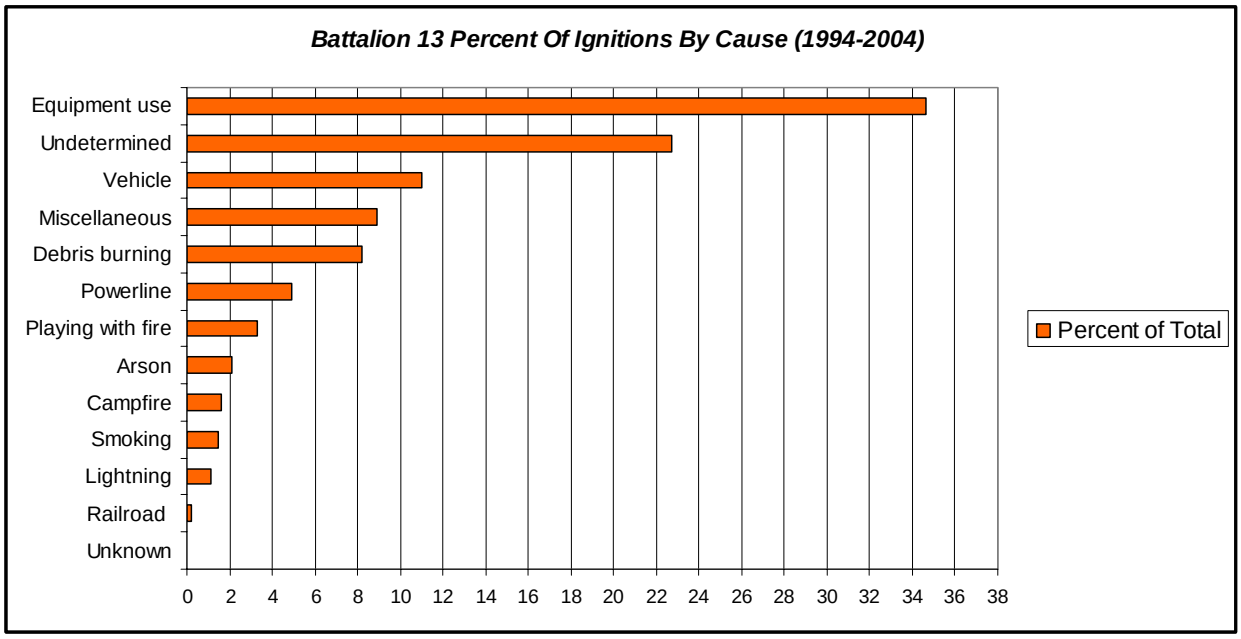
Battalion 12 Ignition Assessment

- There have been 417 ignitions in Battalion 12 from 1994-2004
- Ignitions in Battalion 12 account for 22 percent of the total ignitions from 1994-2004



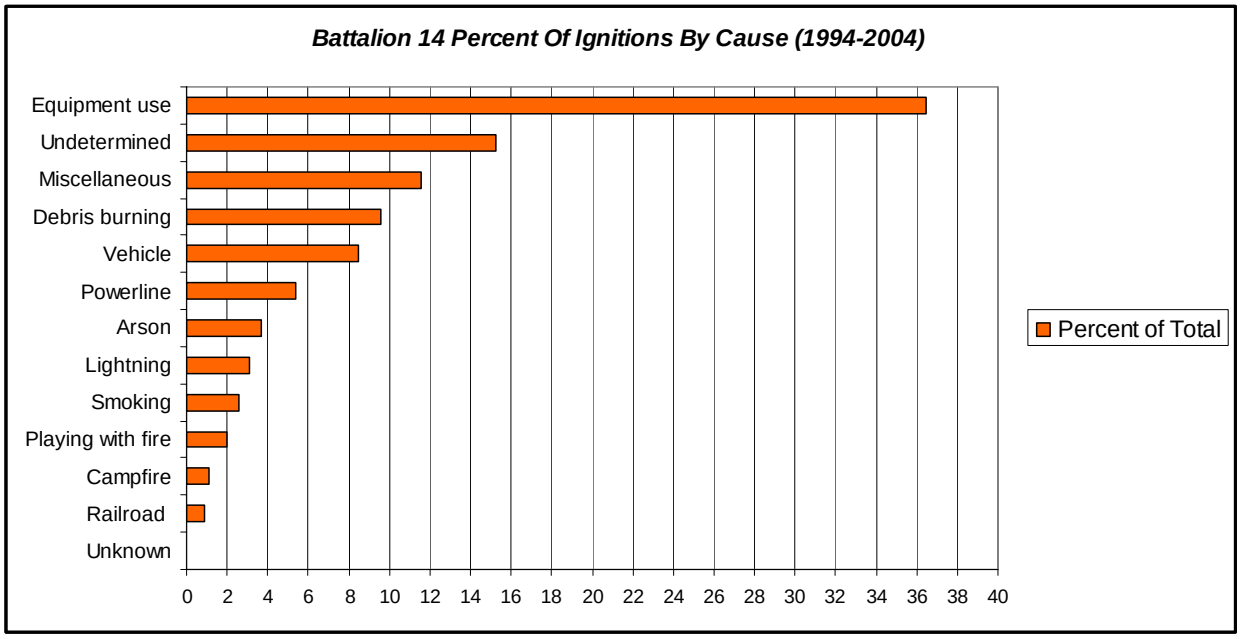
Battalion 13 Ignition Assessment

- There have been 820 ignitions in Battalion 13 from 1994-2004
- Ignitions in Battalion 13 account for 43 percent of the total ignitions from 1994-2004



Battalion 14 Ignition Assessment

- There have been 354 ignitions in Battalion 13 from 1994-2004
- Ignitions in Battalion 14 account for 19 percent of the total ignitions from 1994-2004



Battalion 16 Ignition

- There have been 49 ignitions in Battalion 16 from 1994-2004
- Ignitions in Battalion 16 account for 3 percent of the total ignitions from 1994-2004