

III. Wildland Fire Protection Assessment in the Fresno-Kings Unit

Assessment Process

The Fire Plan process for assessing wildland fire protection involves collecting data, validating the data with input from stakeholders and then assembling the data into an easy to use format. The four components to the Fire Plan assessment process are Level of Service, Assets at Risk, Fuels and Weather. The data for the four components is obtained from CDF's Fire and Resource Assessment Program (FRAP), computer databases and Unit level archives. Once the data has been reviewed and validated it is assembled and assigned to a land area. To arrive at a common land area unit to assemble the assessment data, U.S. geological Survey 7.5 minute quadrangle maps are divided by a 9 by 9 grid, forming 81 equal area blocks of land. Each block of land contains approximately 450 acres and is referred to as a quad 81st. The entire data for the Unit has been compiled down to the quad 81st. When the data is viewed in the form of a map, problem areas are easily identified and can be addressed by prioritizing the areas for prefire projects. The prefire projects can range from on the ground fuel load reduction to public awareness campaigns.

Even though the Fire Plan assessment process has not been completed for the Fresno-Kings Unit, the Unit is pressing forward with the information that is available since it is an immediate priority to implement projects that address the threat of wildfire in our communities. The use of "on the ground" knowledge, Geographic Information Systems (GIS) information, FRAP data, local data and input from the Highway 168 Fire Safe Council has allowed the Unit to begin making well-grounded decisions in prefire management. The Fire Plan assessment process will continue and as data is reviewed and validated it will be incorporated into the Unit Prefire Management Plan. When the Fire Plan assessment is completed it is anticipated that the data will validate the decisions that have been made in the Unit in regards to Prefire Management up to that time.

Stakeholders

Stakeholders are defined as any person, agency or organization with a particular interest – a stake – in fire safety and protection of assets from wildfires. The process of identifying and involving stakeholders in the Fresno-Kings Unit is an ongoing effort. Early in the Fire Plan implementation process the Fresno-Kings Unit determined the need for a forum to meet and involve stakeholders in the Fire Plan process. Local Fire Safe Councils act as a forum for stakeholders to share and validate fire safety and fire planning information.

The Fresno-Kings Unit initiated a local Fire Safe Council in 1998. The Fire Safe Council called the Highway 168 Fire Safe Council has become an outstanding forum for stakeholders in Northeastern Fresno County to meet and share their thoughts and concerns related to fire management. The Highway 168 Fire Safe Council has empowered local citizens and encouraged interagency cooperation and teamwork. The Highway 168 Fire Safe Council hired a coordinator and has established an office in Prather. Overall the Highway 168 Fire Safe Council has been popular and a true success story. *See Appendix B for a list of the current stakeholders represented in the Highway 168 Fire Safe Council.*

A side benefit to the Highway 168 Fire Safe council has been the opportunity to meet and work with CDF's cooperators such as the U.S. Forest Service. The Fresno-Kings Unit has been able to develop a cooperative working relationship with the Sierra National Forest. This relationship has led to shared information and area planning for prefire projects. This cooperative working relationship will help the Highway 168 Fire Safe Council in future federal grant funding opportunities.

Some of the key issues that are being addressed by the stakeholders in the Highway 168 Fire Safe council are public awareness/education and funding sources for prefire projects. The Council has been actively working with CDF and the US Forest Service to develop public awareness and education projects. Currently the Council is working on a second mailer insert that will be mailed to all foothill and mountain residents addressing fire safety and fire hazard reduction. The Council is currently working with CDF, and Sierra National Forest on grant funding for several new projects related to fire hazard reduction.

In March of 2005 the Fresno-Kings Unit initiated an additional local Fire Safe Council in the Southeastern portion of Fresno County. This new Fire Safe Council is called the Oak to Timberline Fire Safe Council and has rapidly developed into an energetic group of varied stakeholders. The Oak to Timberline Fire Safe Council has been meeting with representatives from other local Fire Safe Councils in both Fresno and Tulare Counties to glean information and develop ideas for getting organized and developing projects.

Ignition Workload Assessment (Level of Service)

Fire Protection in the Fresno-Kings Unit is a cooperative effort. Interagency and Master Mutual Aid Agreements allow the various fire protection agencies to work together and accomplish the goal of providing fire protection in the most efficient manner. Keeping this in mind, the Level of Service Assessment is really an assessment of fire protection in the SRA of Fresno and Kings Counties and not an actual assessment of the fire protection provided by just CDF alone.

Public Resources Code Section 4130, directs the Board and CDF to "classify all lands within SRA into types of land based on cover, beneficial use of water from watersheds, probable damage from erosion and fire risks and hazards; to determine the intensity of protection to be given each such type of land. A plan for adequate statewide fire

protection of state responsibility areas shall be prepared by the board in which all land of each type shall be assigned the same intensity of protection and the estimated cost of such intensity of protection shall be determined.” The Board’s approach was to develop the California Fire Plan. The Level of service looks at the initial attack success and major fire failure rates.

Success Rate =

$$\frac{\text{Annual number of small fires that were extinguished by initial Attack}}{\text{Total number of fires}} * 100 = \text{Success rate in percent}$$

The Emergency Activity Reporting System (EARS) database has been validated back to 1981 for SRA fires. While calculating the Level of Service for the Unit, it has been determined that all fires, not just the SRA fires need validation. The LOS validation will be completed by mid to late 2004. An in depth explanation of the level of service rating and process can be found in the California Fire Plan. *The California Fire Plan can be downloaded at the CDF FRAP website: http://frap.cdf.ca.gov/fire_plan/*

Assets at Risk

The primary purpose of wildland fire protection in the Fresno-Kings Unit is to protect the wide range of assets found in the Unit from the effects of wildfire. Table 1 lists the identified assets at risk that are found throughout the State of California as well as their asset value basis, level of disaggregation and level of value. All of the assets at risk in Table 1 are also found throughout the Unit. The California Fire Plan recommends that the limited fire protection resources should be allocated, at least in part, based on the value of the assets at risk. A detailed explanation of the quantification and valuation approaches for each asset may be found in the California Fire Plan.

Currently the Fresno-Kings Unit is reviewing and validating the base Assets at Risk data. Maps are going to be created to show the current preliminary value of the assets as high, medium or low. Stakeholder input is critical to determining which assets at risk are present and what value they have. The maps created will be presented to various forums, such as the Highway 168 Fire Safe Council, to help validate the data. If representatives of the various assets at risk such as Southern California Edison, Pacific Gas & Electric Company (PG&E), Army Corps of Engineers, Bureau of Reclamation and the Department of Fish and Game are not present at the Highway 168 Forum, attempts will be made to meet with them individually in order to get their input in the validation process. Involving the various stakeholders in the validation process has the additional benefit of educating them about the problem and issues at hand. In the case of the Highway 168 Fire Safe Council, they will then be aware of the problem and will be more likely to help seek grant funding to address the problem.

Table 1. Assets at Risk Framework Summary

Resource	Asset Value Basis	Level of Disaggregation	Levels of Value*
Life and safety	Non-economic values are not quantified	By population density	National, state and local
Air quality	Average dollar impact from particulate matter (PM10) emitted per acre burned; non-commodity assets also exist	Air quality basins (13) and basic fuel types (2)	National, state and local
Range	Dollar cost of replacement feed per acre of rangeland burned	Values by regions (8), cover types (9) and ownership classes (5)	State and local
Recreation on public wildlands	Average dollar loss per acre burned; non-commodity assets also exist	Statewide average by public ownership categories (5)	National, state and local
Structures	Average dollar loss per home burned; non-commodity assets also exist	Statewide average	State and local
Timber	Average dollar loss per acre burned	Values by regions (6) and ownership categories (4)	National, state and local
Water and watersheds	Range of economic impacts per acre for value of increased water yields; cost of sediment removal; loss of reservoir capacity; effects on hydroelectric generation; costs of watershed rehabilitation; non-commodity assets also exist	Statewide ranges of economic impacts	National, state and local
Wildlife, habitat, plants and ecosystem health	Qualitative discussion of the tradeoffs in fire impacts	Statewide	State and local
Other resource assets, cultural and historic resources, unique scenic areas	These non-commodity assets cannot be quantified adequately; descriptive enumeration only	Statewide (generically) or place-specific	National, state and local

*May or may not be cumulative.

Communities at Risk

During the spring of 2001 a field validation process was conducted in the Fresno-Kings Unit to identify and validate communities at risk. This process was conducted based on a request from Congress, through the FY 2001 Appropriation Bill, that called for a list of "...all urban wildland interface communities, as defined by the Secretaries, within the vicinity of Federal lands that are at high risk from wildfire, as defined by the Secretaries". The following criteria were provided to help identify communities at risk:

- The *Interface* exists where humans and their development meet or intermix with wildland fuels.
- A *community* is a defined area where residents live and are provided services such as fire protection, water, law enforcement, etc.
- *Vicinity* of Federal lands is defined as within the range in which fires can travel.
- *High-risk* exists where there is land condition that is characterized by high-risk fire regimes.

After receiving input from the USDA Forest Service and National Park Service the following communities in Fresno and Kings Counties were identified as *Communities at Risk* and were placed on the National list in the Federal Register.

Auberry	Friant	Pinehurst
Avenal **	Hume *	Prather
Big Creek *	Lakeshore *	Shaver Lake
Dinkey Creek *	Meadow Lakes	Squaw Valley
Dunalp	Piedra	Tollhouse

* located in Federal Direct Protection Area

** Located in Local Responsibility Area

The significance of a Community at Risk designation has become apparent recently with most Federal grant proposals for wildfire protection requesting information about Communities at Risk in the area of the proposed grant project to help rank the proposal.

Fuels

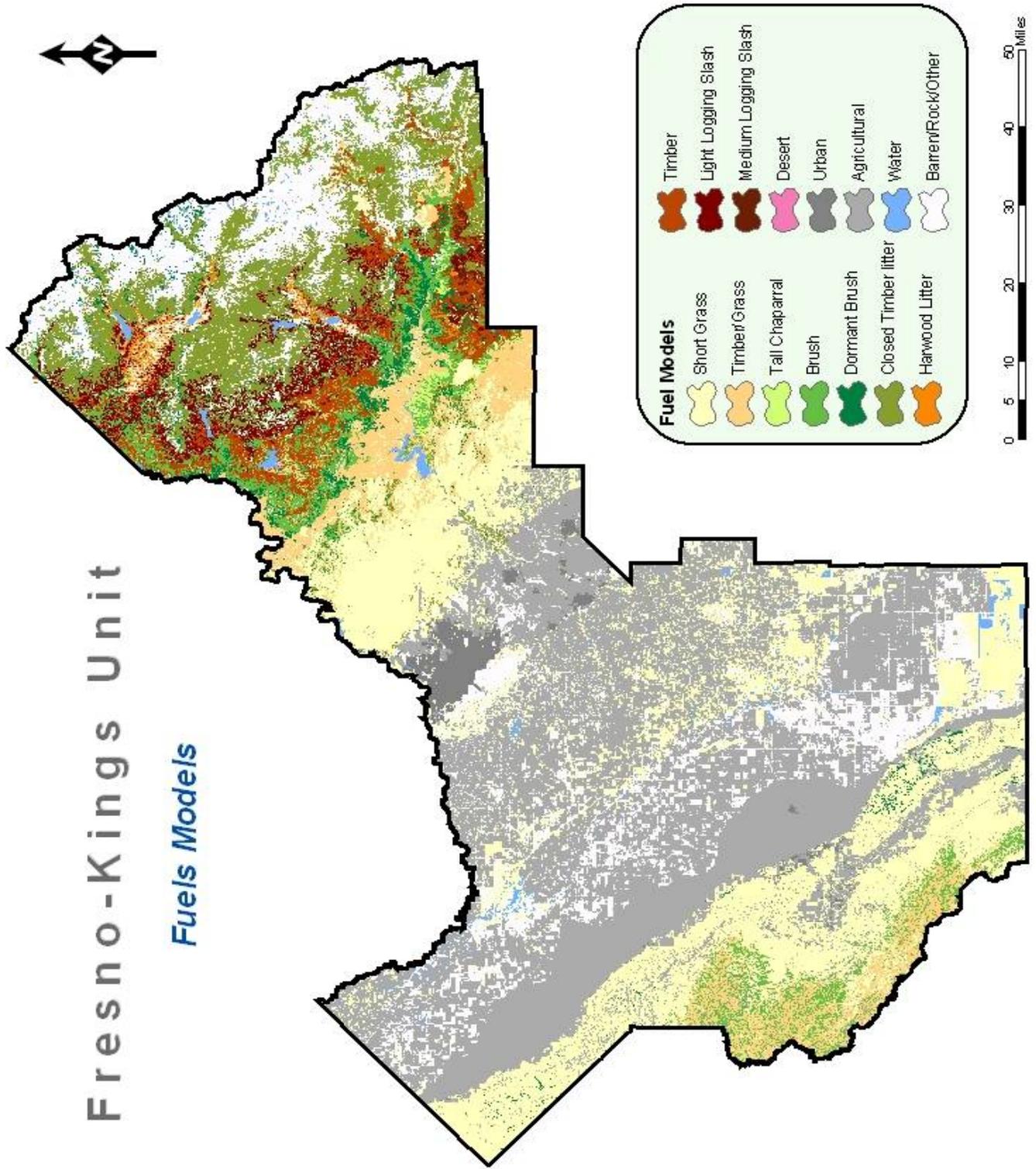
The term “fuels” refers to the vegetative cover on the landscape. We are concerned with fuels because of their significant influence on wildland fire behavior. The more extreme the wildland fire behavior the greater the threat to the assets at risk.

Fuels are commonly classified based on their expected influence on fire behavior. Factors such as fuel moisture, fuel loading (the mass of fuel per unit area), fuel depth, heat content of fuel, and the fuel particle density all affect the behavior of fire and therefore the classification of the fuels. The fuels validation process used by CDF classifies fuels into thirteen (13) fuel models that were initially established by the Fire Behavior Prediction System (FBPS). In addition to the standard thirteen (13) FBPS fuel models, six (6) custom fuel models are used to describe special circumstances. Table 2 lists fuel model classes (FBPS) and a general description of the vegetation types that typically fall into each class. These fuel models are based Hal Anderson's "Aids to Determining Fuel Models for Estimating Fire Behavior" (April 1982) published by the National Wildfire Coordinating Group.

Table 2 - Fuel model classes (FBPS)

Fuel Model Classes (FBPS)	
FBPS	Description
1	Short Grass
2	Timber/Grass
3	Tall Grass
4	Tall Chaparral
5	Brush
6	Dormant Brush
7	Rough
8	Closed Timber Litter
9	Hardwood Litter
10	Timber
11	Light Logging Slash
12	Medium Logging Slash
13	Heavy Logging Slash
14	Plantation/Burned last 15 years
15	Desert
28	Urban
97	Agricultural Lands
98	Water
99	Barren/Rock/Other

Map 3 – Fuel Models



Fire history plays an important role in modifying fuel model assignments in recently burned areas. Once an area burns during a wildfire the fuels are at least initially partially consumed and/or changed. Over time the vegetation re-grows and eventually returns to its state prior to the fire. Some fuel types return more quickly than others to their prior state before the fire. After a wildfire and while the fuels are regenerating their flammability characteristics are significantly different than when they are fully mature. These characteristics affect the fire behavior if a fire was to return to the area. This variation in the way fuels affect fire behavior is accounted for in the validation process by assigning a different fuel model to some fuels as they re-grow. The process for accounting for this change in fire behavior is called the “Fuel Dynamics Pathways”. The fuels can then be updated annually based on the fire history and the Fuels Dynamics Pathway. *Additional information about this process can be found on the CDF Fire and Resource Assessment Program website at:*
http://frap.cdf.ca.gov/data/fire_data/fuels/fuelsfr.html.

Once the fuel types have been determined and validated by the local Unit, a fuel ranking process is started. CDF has developed a Fuel Rank assessment methodology that considers the current fuel model, slope class, ladder fuel, crown closure component, and difficulty of control rating to derive the fuel hazard rank for each quad 81st. The fuel rank process produces a map of the Unit that indicates areas of moderate, high and very high fuel ranking. CDF has determined that there are realistically no low hazard fuels in California. *Additional information about the fuel rank assessment methodology can be found at the CDF Fire and Resource Assessment Program website at:*
http://frap.cdf.ca.gov/data/fire_data/fuel_rank/index.html.

Currently, the Fresno-Kings Unit has completed the fuels assessment and validation and is in the process of validating the fuel ranking process. The next page is a map of the draft fuel ranking for the Fresno-Kings Unit.

Fire History

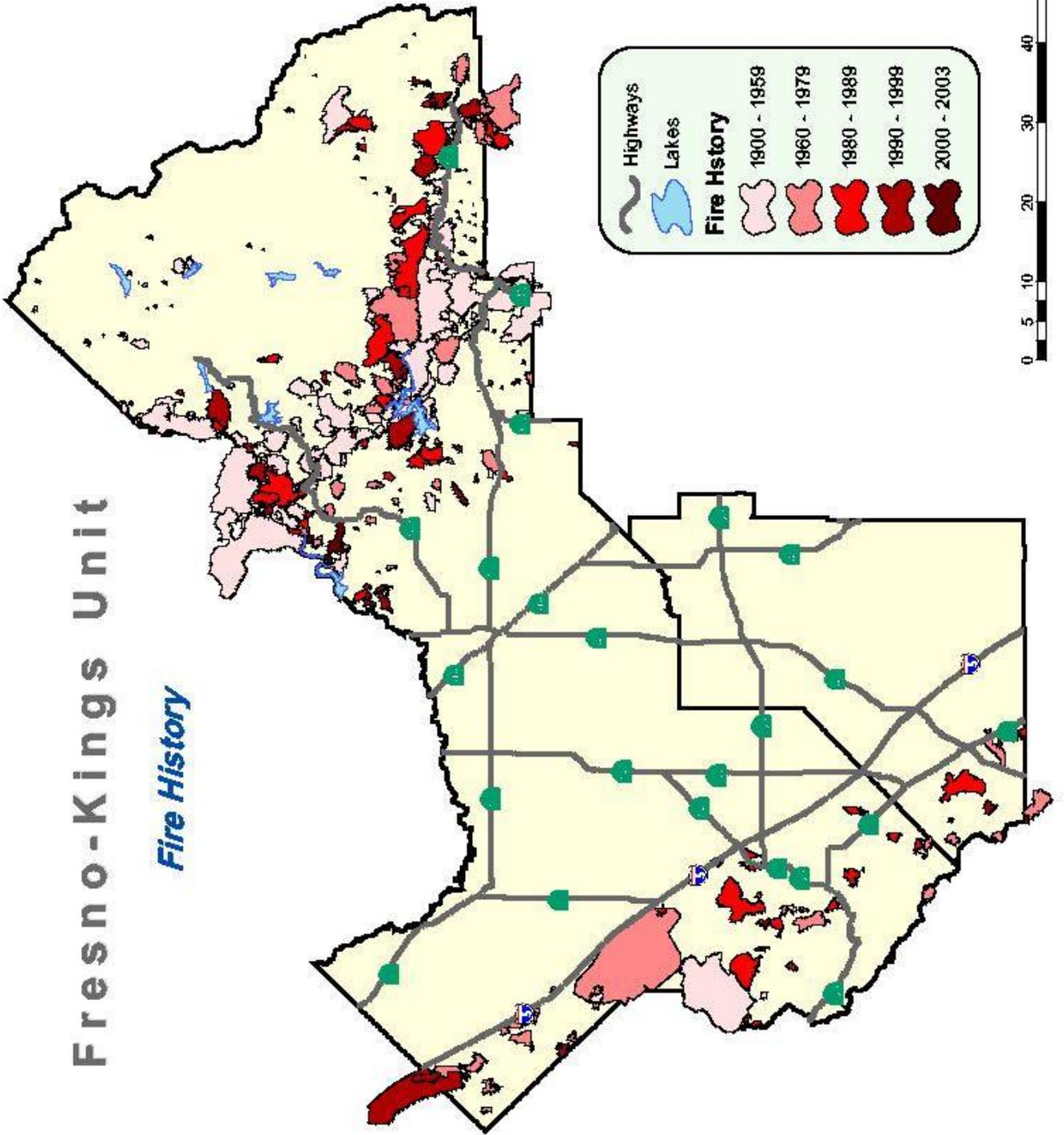
As described above, fire history is an important part of assessing the fuels and ultimately the fuels ranking in the Unit Fire Plan Assessment. The fire history for the Fresno-Kings Unit has been validated in the field with the cooperation of the Sierra National Forest. The Unit has developed fire history collection criteria similar to Sierra National Forest's criteria. The Unit now collects fire perimeters for all fires 10 acres and larger. For fires less than 10 acres, a point of origin location is collected using latitude and longitude coordinates. This criteria will allow the Unit to easily share and analyze fire ignition and perimeter data with Sierra National Forest. To facilitate the collection of fire history in the field the Unit has purchased handheld Global Positioning System (GPS) receivers and mapping software for all of the State Fire Engines and Battalion Chiefs. This equipment and software has allowed the field personnel to collect fire perimeters and/or points of origin. These perimeters and points are then forwarded to the Prefire Engineer for inclusion in the annual fire history layer. The collection of the fire history by field personnel has allowed them to maintain their fire history for local planning purposes. The plan for collecting, storing and analyzing the fire history data has been completed and adopted as a Standard Operating Procedure for the Fresno-Kings Unit. *For additional information about the fire history data collection process see Appendix C - the Fresno-Kings Administrative Procedures Manual, revision #100, 7100-01, Fire Protection Plan "Fire Plan", May 1998.*

Map 5 – Fire History



Fresno-Kings Unit

Fire History



Frequency of Severe Fire Weather

Weather has a significant influence on fire behavior. It is a very dynamic variable and it can be very hard to assign a weather value to a land unit. In the Fire Plan analysis past weather data is used to calculate and assign a severe fire weather ranking to each quad 81st. The past weather data is obtained from Remote Automated Weather Stations (RAWS). Each quad 81st is assigned a RAWS to represent the local weather. There are several problems with this process. The first problem is the distribution of RAWS throughout the State. Some areas have a good distribution and others do not. The other problem is that many of the RAWS have incomplete historic weather data. In order to obtain useful data often times the quad 81st is assigned a RAWS that is a significant distance away and may not provide representative data for the quad 81st location.

The Fire Plan analysis of the frequency of severe fire weather has not been completed for the Fresno-Kings Unit. The Unit is anticipating a new methodology that is being developed by CDF to assist in the Fire Plan assessment. No time frame for completion can be provided at this time. Recently the Panoche RAWS in western Fresno County was relocated. This RAWS has been out of service for several years and the new site will provide a more accurate reading of weather in an area of the Unit that experiences a high frequency of severe fire weather.