

# FIRE DANGER OPERATING PLAN

CAL FIRE/Riverside County Fire



April 2016

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**SIGNATURES**

Riverside Unit Fire Danger Operating Plan

**RECOMMENDED BY:**

\_\_\_\_\_

PRINT NAME

\_\_\_\_\_

TITLE

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SIGNATURE

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DATE

**APPROVED BY:**

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## EXECUTIVE SUMMARY

The development of the Fire Danger Operating Plan (FDOP) is a requirement in Handbook 7842.1 for all CAL FIRE Units. The FDOP is developed by the Unit Fire Environment Working Group.

CAL FIRE has adopted the use of the National Fire Danger Rating System (NFDRS) as a tool to assist the manager in day to day fire business decisions. NFDRS provides one or more qualitative or numeric indices that reflect an area's protection needs. Fire danger ratings describe conditions that reflect the potential, over a large area, for a fire to ignite, spread and require suppression action.

The NFDRS is a national standard application that is implemented by CAL FIRE as well as the wildland fire agencies throughout the country. The qualitative value associated with fire danger are reflective numeric indices that are calculated values reflecting potential conditions associated with fuel, weather, and topography. These index values are used as a tool to support short term fire business decisions such as Dispatch Levels, Staffing Patterns, resource repositioning, etc. Longer term use of NFDRS can include seasonal preparedness, burning restrictions, etc. The application guide to support making these fire business decisions at the Unit level is the Fire Danger Operating Plan (FDOP). Implementation of NFDRS Indices and fire business decision points/thresholds used at the Unit level shall be identified in the Unit's FDOP.

The Riverside Unit (RRU) Fire Danger Operating Plan is based on a daily set of fire weather observations for two "Fire Danger Rating Zones" within the Riverside Unit boundary. The use of sophisticated fire models are used to facilitate the RRU daily dispatch levels. The dispatch level guides local operational success towards the CAL FIRE mission objective of containing 95% of all unwanted fires at ten acres or less. A fire weather based dispatch to a reported fire enhances initial attack success, while minimizing resource draw-down should a second incident occur. Additionally, "Danger Rating Adjectives" are also determined once a day for the posting on the units roadside "Smokey Fire Danger Rating" signs at the Unit's Forest Fire Stations (FFS). These adjectives are an important public and departmental information dissemination tool.

## **SECTION I: INTRODUCTION**

This operating plan is for Riverside County, it is designed to help guide the application of National Fire Danger Rating System (NFDRS) at the unit level. The Riverside Unit (RRU) Fire Danger Operating Plan (FDOP) provides a framework for a consistent thought process to apply accurate and effective scientific methods that include historical fire and weather data. The data will be assessed based on vegetation, climate, and topography in conjunction with NFDRS modeling.

Riverside County agency administrators, fire managers, dispatchers, agency coordinators, and firefighters using the RRU FDOP will be assisted in management decisions including dispatch levels, staffing levels, etc.

RRU FDOP encompasses two Fire Danger Rating Areas (FDRA), they are the Low Country FDRA and the High Country FDRA. These two geographic regions are the focus of study because each is composed of a unique combination of fuels, climate and topography.

This plan offers decision support and helps in quantifying elements that establish agency planning and response levels. Additionally, procedures for developing seasonal risk analysis and fire severity decision points are outlined with the implementation and analysis process of this plan.

Please note that the design and much of the wording of this plan and document is based on a number of Fire Danger Operating Plans which have been utilized as examples for Fire Danger Operating Plans throughout the United States. Many of the resources and information supporting this document have been referenced from the online depository of information on the CAL FIRE Intranet FDOP page under Fire Protection.

## SECTION II: OBJECTIVES

- Provide a tool for agency administrators, fire managers, dispatchers, agency cooperators, and firefighters to correlate fire danger ratings with appropriate fire business decisions in Riverside.
- Delineate fire danger rating areas (FDRAs) in Riverside County having similar climate, fuels, and topography.
- Maintain a fire weather-monitoring network consisting of Remote Automated Weather Stations (RAWS) which comply with NFDRS Weather Station Standards (PMS 426-3).
- Determine fire business thresholds using the Weather Information Management System (WIMS), National Fire Danger Rating System (NFDRS), Fire Family Plus software, and by analyzing historical weather and fire occurrence data.
- Define roles and responsibilities to make fire preparedness decisions, manage weather information, and brief fire suppression personnel regarding current and potential fire danger.
- Determine the most effective communication methods for fire managers to communicate potential fire danger to cooperating agencies, industry, and the public.
- Identify seasonal risk analysis criteria and establish general fire severity thresholds.
- Identify the development and distribution of fire danger pocket cards to all personnel involved with fire suppression activities within the Riverside Fire Danger Rating Areas.
- Identify program needs and suggest improvements for the Fire Danger Operating Plan.

## SECTION III: ROLES AND RESPONSIBILITIES

- A. Riverside Unit Chief: The Unit Chief will ensure that a Fire Environment Point of Contact is designated.
- B. Fire Environment Point of Contact (FEPOC)
  - a. The Unit FEPOC is vital to maintaining the Unit's historical fire and weather records and analyzing the Units fire danger. The responsibilities of the Unit FEPOC include:
    - b. Oversight of the Unit RAWS Network
    - c. Oversight of the Unit Fire Danger Operating Plan (FDOP)
    - d. Oversight of the Unit Weather Information Management System (WIMS)
    - e. Is the Liaison with the Region Fire Environment Point of Contact and the CAL FIRE FEPM
    - f. It is the responsibility of the FEPOC to deliver the following products:
      - g. Complete Fire Family Plus data base each year prior to May 1<sup>st</sup>
      - h. Updated FDOP, if changes were made the prior year. Delivered to the CAL FIRE FEPM and Region Fire Environment Point of Contact.
      - i. Fuel Model management to WIMS (Greenup, Freeze, etc.) as conditions warrant for each RAWS

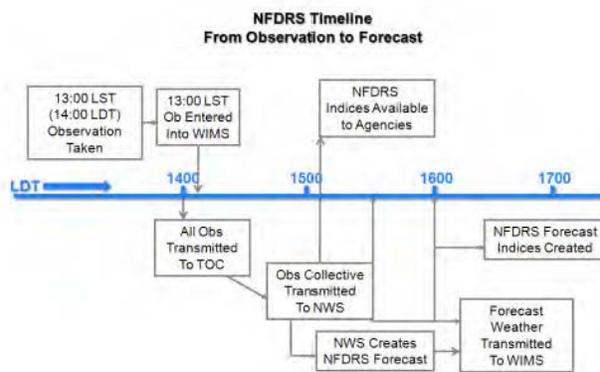
- j. Annual WIMS update to 90<sup>th</sup> and 97<sup>th</sup> percentile values for fuel models used prior to the transitional staffing period for each RAWS.
  - k. Ensure notifications are implemented as directed by the FDOP when updates occur to Dispatch Level thresholds, Fire Danger Adjectives, and Pocket Cards.
  - l. **Recommended Training**
    - i. WIMS
      - Intermediate NFDRS (S-491)
      - Advanced NFDRS
      - Intermediate Fire Behavior Calculations (S-390)  
(Fire Environment Handbook 7802.3)
- C. Fire Danger Operating Plan (FDOP): The Riverside Unit will ensure that necessary amendments or updates to this plan are completed. Updates to this plan will be made annually, and approved by the Unit Chief. A revision will be undertaken every 3 years for approval by the Unit Chief.  
(Fire Environment Handbook 7842.2)
- a. Unit Fire Danger Operating Plan Working Group (Fire Environment Handbook 7802.5):  
The FDOP Working group creates and maintains the Unit Fire Danger Operating Plan. The Group consists of the FEPOC, a representative from the ECC, a representative from the Pre-Fire Division, a person with GIS skills and a field representative as a minimum.
- D. Duty Chief: The Riverside Unit Duty Chief provides input and guidance regarding preparedness and Staffing Levels
- a. It is the Duty Chief's role to interpret and modify the daily preparedness and staffing levels as required by factors of this plan. Modifications of the preparedness and/or staffing levels must be coordinated with the Perris Unit Emergency Command Center, (ECC) and local cooperators.
- F. ECC Duty Officer: It is the ECC Duty Officers role to ensure that the daily Fire Weather Forecast (including NFDRS indices) are retrieved and that the daily preparedness, dispatch levels are calculated (at least every two hours during fire season during day light hours), distributed and stored.
- a. It is the ECC Duty Officer's role to ensure the timely editing of daily 1300 weather observations of all stations.
  - b. The ECC Duty Officer will keep CAL FIRE/Riverside County Fire and management staff updated of changes to dispatch levels during fire season. Dispatch levels are dictated by the recorded WIMS readings every 2 hours starting at the 10:00 AM and ceasing at 8:00 pm. Dispatch levels stop changing at 8:00 pm because that is when aircraft are no longer available. At this time, dispatch levels are reset to a dispatch level 1 class less than the 6:00 PM until the following day at 10:00 AM when they are re-evaluated based on WIMS records. The Riverside Unit is unique

from others, in that although the dispatch level is based on WIMS they are ultimately up to the discretion of the Duty Officer. This act of discretion is exercised also the event of a fire between 10:00 pm and the following 1:00 pm. (8100 Manual Procedure 211)

F. National Weather Service San Diego Forecast Office: Daily fire weather forecasts are developed by the National Weather Service daily for Riverside Emergency Command Center.

G. Unit RAWS Point of Contact: IT/COM Director is the point of contact for all RAWS maintenance and operational matters. (Fire Environment Handbook 7802.4)

H. WIMS Access, Daily Observations, and Station Catalog Editing:

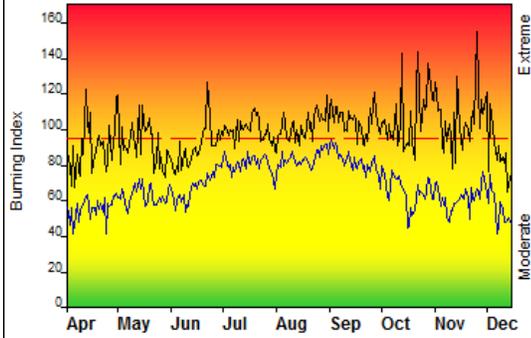


I. Fire Danger Pocket Cards: The FEPOC will ensure that Pocket Cards are prepared every other year in compliance with NWCG and/or agency standards. The cards will be published online on the Riverside SharePoint Site for distribution to all interagency, local and incoming firefighters and Incident Management Teams (IMTs). Pocket Cards will be submitted through channels to the Fire Environment Program Manager for submission and publishing on the FAMWEB Pocket Card Page <http://fam.nwcg.gov/fam-web/pocketcards/default.htm> Fire suppression supervisors will utilize pocket cards to train and brief suppression personnel.

EXAMPLE POCKET CARD:

**FIRE DANGER -- Western Riverside Co Lo Elev.**

Maximum, Average, and 90th Percentile, based on 10 years data



**Fire Danger Area:**

- ◆ Western Riverside Low
- ◆ NWS Fire WX Zone 248
- ◆ Clark, Santa Rosa Plateau
- \* Meets NWCG Wx Station Standards



**Fire Danger Interpretation:**

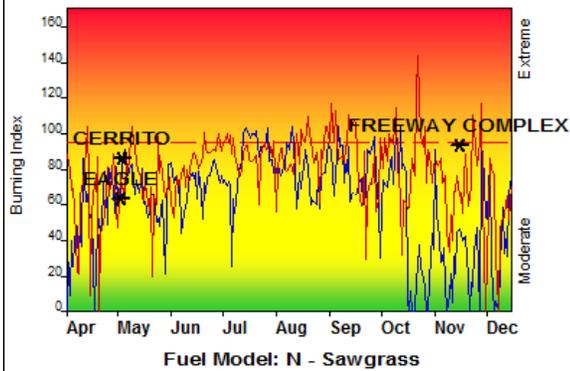


- EXTREME** -- Use extreme caution
- (Caution)** -- Watch for change
- Moderate** -- Lower Potential, but always be aware

- Maximum -- Highest Burning Index by day for 2002 - 2011
- Average -- shows peak fire season over 10 years (2577 observations)
- 90th Percentile -- Only 10% of the 2577 days from 2002 - 2011 had an Burning Index above 94

**Local Thresholds - Watch out:** Combinations of any of these factors can greatly increase fire behavior:  
 20' Wind Speed over 15 mph, RH less than 25%,  
 Temperature over 90, Burning Index over 90

**Years to Remember: 2004 2007**



**Remember what Fire Danger tells you:**

- ✓ Burning Index gives day-to-day fluctuations calculated from 2 pm temperature, humidity, wind, daily temperature & rh ranges, and precip duration.
- ✓ Wind is part of BI calculation.
- ✓ Watch local conditions and variations across the landscape -- Fuel, Weather, Topography.
- ✓ Listen to weather forecasts -- especially WIND.

**Past Experience:**

Mid summer fires tend to slow down at night when coastal influence arrives. Fall fires speed up at night. Elsinore Front Country can experience down slope winds in late afternoon. Perris-Hemet-Winchester areas experience battling winds in mid afternoon when the sea breeze comes up the Santa Margarita Drainage through the southwest county and through the Santa Ana Canyon in the northwest county.

Responsible Agency: CAL FIRE Riverside  
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Design by NWCG Fire Danger Working Team

## SECTION IV: INVENTORY AND ANALYSIS

### A. Involved Parties

This plan will affect a wide range of entities. However, they can be distinguished by three categories:

- 1) Agency: Employees of the federal, state, and local and tribal governments involved in the cooperative effort to suppress wildland fires. This includes USFS, BLM, and CAL FIRE/Riverside County Fire, local fire departments and tribal fire departments.
  
- 2) Industry: Organizations that either utilize the natural resources or have permitted activities on federal, state, or private wildland for commercial purposes. These entities include utility companies (power/phone), farmers, hazardous material disposal sites, railroads, building construction, etc.
  
- 3) Public and Industry Awareness: Individuals who use the land for recreational purposes such as off-highway vehicles (OHV) use, camping, hiking, hunting, firewood gathering, mountain biking, or general interface. Education and mitigation efforts will be implemented by agency public information officers, law enforcement officers, fire managers, and fire prevention/education/mitigation specialist based on direction provided by agency fire staff.

### B. Fire Problem Analysis

94% of all fires in Riverside County are human caused. The main sources are miscellaneous (41%) and debris burning (46%). Other main sources of human caused ignitions include train track ignitions, and equipment use. Although some on these fires may be difficult to prevent such as car and train fires, education and prevention messages can have a big impact on the remaining problem fire types. It will be essential for CAL FIRE/Riverside County Fire to develop and implement their fire prevention plan and work to keep fire mindfulness in the public eye.

The following Problem Analysis table demonstrates the differences between the target groups (Agency, Industry, and Public). The ability to regulate, educate, or control a user group will be based upon the interface method and how quickly they can react to the action taken. In addition, each action will result in positive/ or negative impacts to the user group. Consequently, the decision tool which would be most appropriate would depend upon the sensitivity of the target group to the implementation of the action. When selecting a component and/or index, several factors must be considered:

**Problem/Issue:** This is the problem specific to the area of concern and includes ignition causes. The Problem is “framed” to focus on the wildland fire management issue, such as the point when fire activity becomes a burden to the local suppression forces.

**Management Action:** This is the decision(s) which will affect the public, industry, or agency personnel. This includes fire management applications which can be used to formulate decisions regarding the potential issues which have been identified for the specific area. Management actions represent a way to link fire danger information with fire management decisions which affect specific target groups. Consider the appropriate set of decision thresholds to address the issue (i.e., Dispatch Level, Staffing Level, Preparedness Level, Adjective Rating, Public/Industrial Restrictions, etc.).

**Target Groups:** The group of people commonly associated with the problem (Agency, Industry, or Public).

**Degree of Control:** This is a general description of how much control the agencies have over these entities (high to low) and how quickly a target group can respond to management actions.

**Communication:** Forms of communication used with the user group (face-to-face, radio, telephone, email, newspaper, television, signing/posting, text-messaging, etc.). **Potential Impacts:** The potential impacts on the target group and the likely consequences of a good (or bad) decision.

**Component/Index:** Sensitivity of the NFDRS outputs should be consistent with the ability to react (or communicate) to the target group. Memory and variability of the selected component or index must be understood to appropriately match the task and user group. If a situation where control and ability to communicate with the target group is low, the appropriate component and/or index should not vary significantly over time (i.e., Burning Index).

**Historical Perspective:** Looking at all fire occurrences in Riverside County, many of the largest fires have been a function of fuels, topography, and climate. With respect to NFDRS indices however, large fires in Riverside are dependent chiefly on wind activity as displayed and proved on the High Riverside Country pocket card (see appendix B), the largest fires in Riverside County have occurred not as a function of the Burning Index but due to topography and wind. In some cases, as the wind events continue to fuel the spread of fire, the topography of the region makes accessibility to the fire head difficult. Often in these circumstances, the only viable tactic is to wait until the wind slows. The winds are not always offshore. Mid- summer large fires are driven by the sea breeze. The only major

differences are time of year and persistence of the winds overnight. It is important to recognize and take into consideration the role of wind activity in this county as a driver of large fires in conjunction with fuels, topography, and climate.

### C. Fire Problem Analysis Chart

Target Group		Ignition Cause		Degree of Control	Communication methods	Problem Definition
General	Specific	General	Specific			
Public	Recreation	Miscellaneous	Shooting	Low	Media	The Unit is experiencing a significant number of shooter caused fires.
Public	Property owners/tenants	Equipment Use	Power tools	Med	Media	Weed abatement tools causing fires
Industry	Railroad	Equipment Use	Grinding	Med	Phone/email	
Public	Homeless	Campfire	Warming cooking fire	Low	Face to face	
Public	Closures	Various	Various	High	Signs, media	The Riverside County Ordinance 787.1 Closure Areas

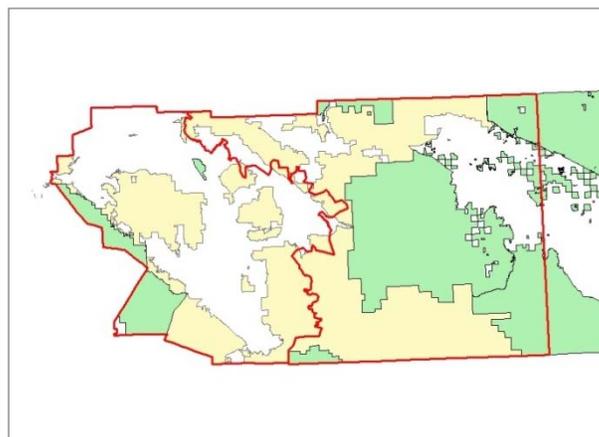
#### D. Fire Danger Rating Areas

A Fire Danger Rating Area (FDRA) is a geographic area with a relatively homogenous climate, vegetation and topography. It can be assumed that the fire danger within a region is relatively uniform. For Riverside County, two fire danger rating areas have been defined: the 'Low country' FDRA and the 'High country' FDRA. The wildland fire occurrences within these areas were subsequently identified and this set of information is used to determine the appropriate fire danger indices used to best predict when individual and large fires may occur. The operational implication of line placement for each FDRA was determined with five elements of consideration. An analysis was undertaken considering weather, climate, vegetation, terrain and demographics of Riverside County. These zones were then adjusted to accommodate operation reality and limitations. These FDRA boundaries were synced to our DPA, and our Pre Planned Response Areas (otherwise known as our atoms layer). Matching these FDRAs with our atoms layer ensures compatibility with our existing CAD system. Areas of the county that are not included in our DPA were disregarded in this analysis.

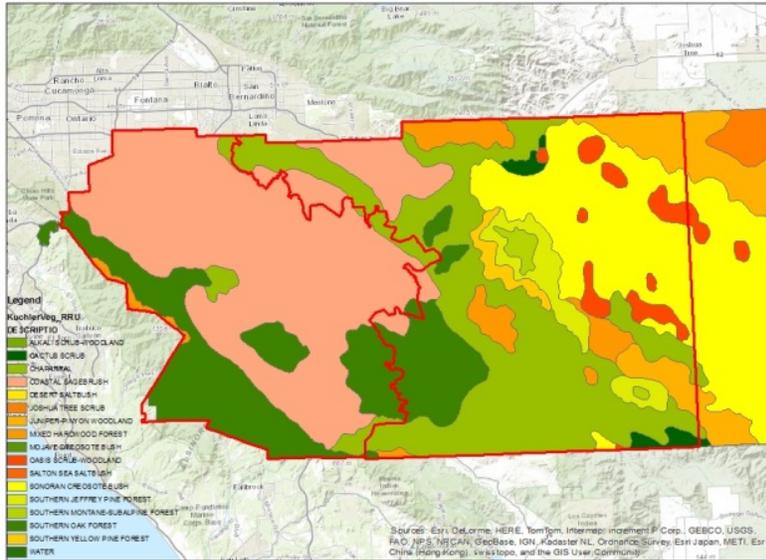


#### DPA

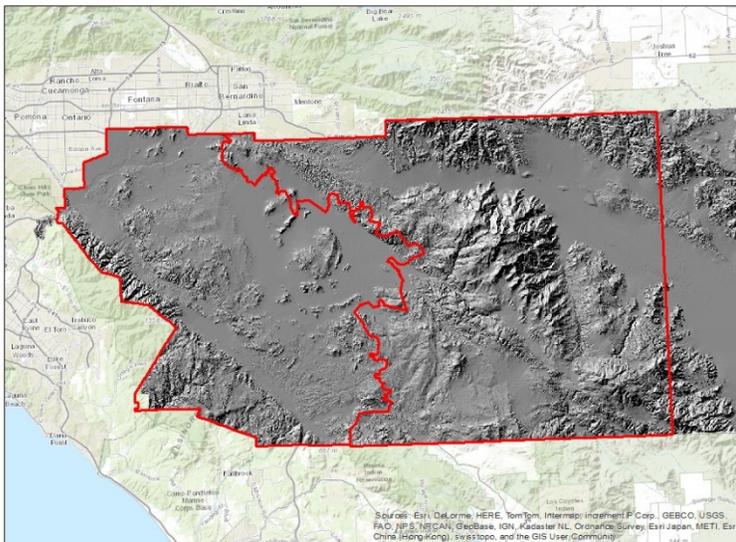
The graphic below shows the Riverside Unit FDRA's as they are covered by CAL FIRE Direct protection Area. State DPA is indicated by tan color. Federal DPA is green color. Local Responsibility is indicated by white.



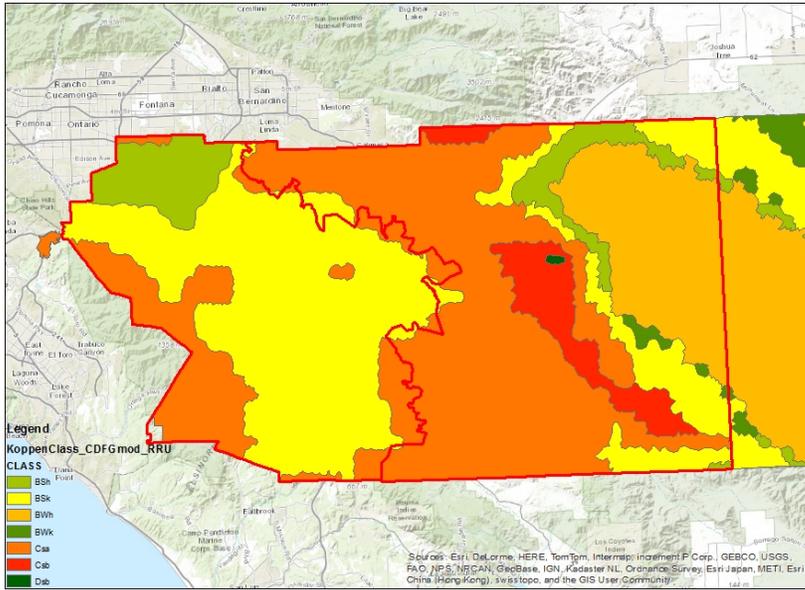
## Vegetation



## Topography

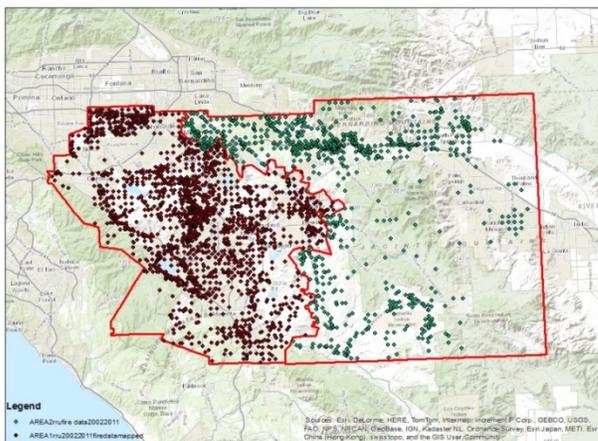


## Climate Region

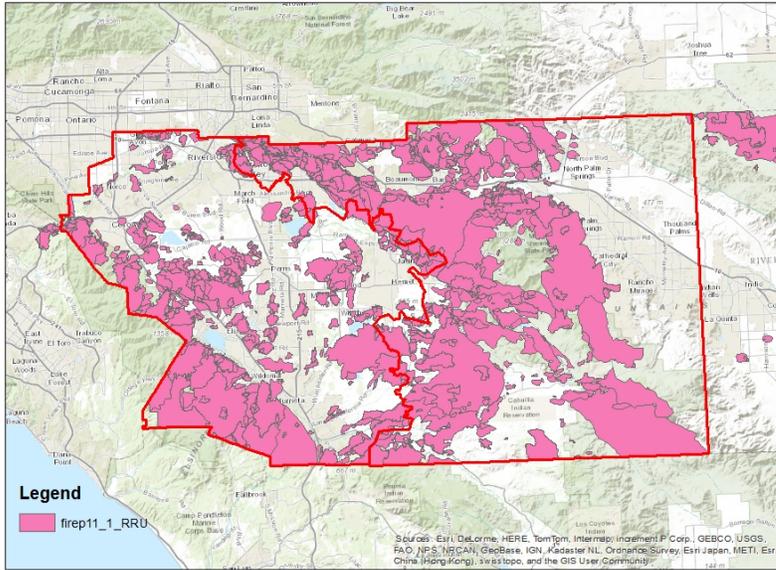


## D. Wildland Fire Occurrence within the Analysis Area

### Point of Origin

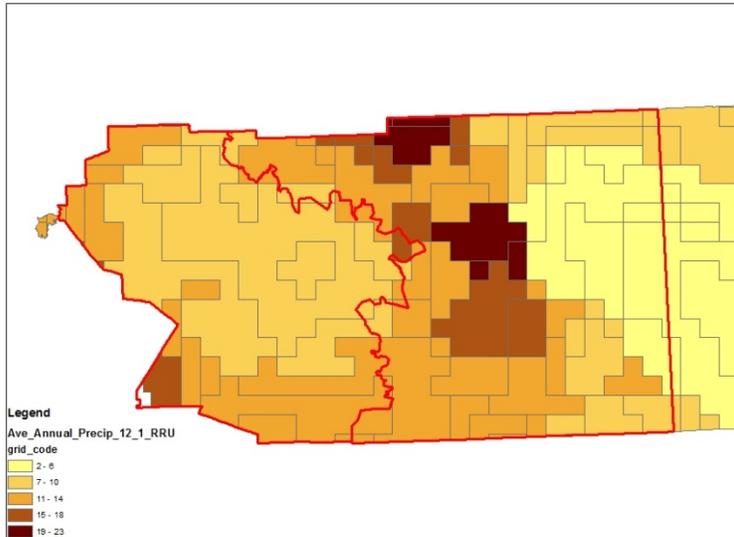


## Historical Fire Perimeters 1920-2010

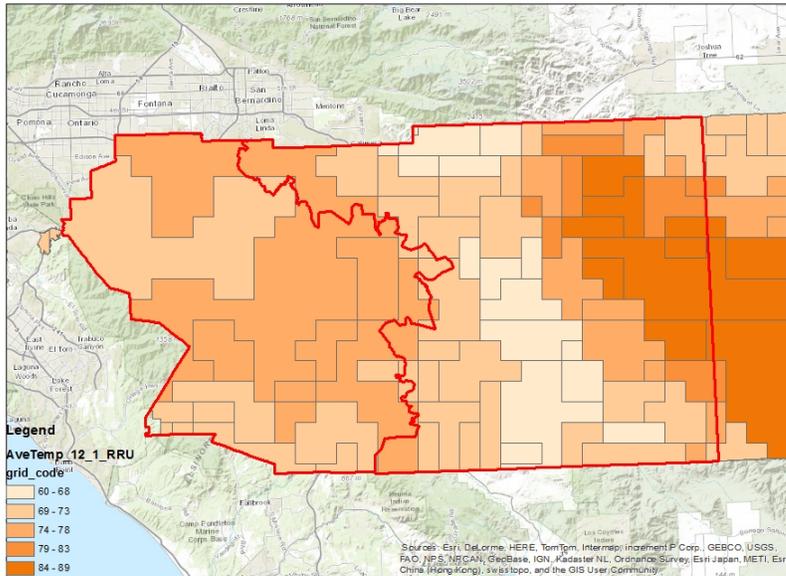


## Fire weather data

### Precipitation



## Average Temperature



## Low Country FDRA description

**Location:** Areas west of the San Jacinto Mountains below roughly 2000' MSL.

**Vegetation/Fuels:** This FDRA is dominated (in terms of area) by urban, agriculture, grasslands, coastal sage scrub, oak woodland and heavy mixed chaparral.

**Topography:** The Riverside low country is the area of lowest elevation and is separated from the other FDRA by the foothills of the San Jacinto Range.

**Climate:** The Low Country FDRA is characterized by hot dry summers with occasional widespread marine air intrusion in the spring and fall. The area also has infrequent summer thunderstorms.

The Fire Weather Coordinator will monitor spring Green Up conditions and be the only person allowed to modify climate class within WIMS. The second table shows the Climate Class that is used in the High Country FDRA.

FDRA	Climate Class	Green-Up Period
Low Country	2-sub-Humid	14 days

## High Country FDRA description

**Location:** This area consists of the San Jacinto Range in central Riverside County generally above 2000' elevation

**Vegetation/Fuels:** This FDRA is dominated grasslands, heavy mixed chaparral, coastal sage scrub, and oak woodlands.

**Topography:** This FDRA has a large variety of topographic features i.e. slope, aspect, and fuel type. This FDRA is bounded by the San Jacinto Mountain Range. The eastern boundary is relatively arbitrary and represents an area that wildland fires occur only during high rainfall years where grass occurs on the eastern slopes of the San Jacinto Range and in the Whitewater and Joshua Tree National Park areas and the Santa Rosa National Monument.

**Climate:** The High Country area is characterized by less marine layer influence in the summer and more frequent summer thunderstorms compared to the Low Country FDRA.

FDRA	Climate Class	Green-Up Period
High Country	2-sub-Humid	14 days

- **Quality control:** The quality of the data was evaluated for each FDRA. The consistency of the observations and the overall quality of the data was reviewed and edited in order to project the most accurate data set for the years 2002-2012.
- **Rationale for selection of weather stations:** The determination of what RAWS station to collect fire weather data from was based on its proximity and situation to the FDRA region.
- An analysis of the data using a Pivot Table is included in the appendices. It shows that the grouping of the weather stations in the SIGS was appropriate.

Fire occurrence analysis data set: Ten years (2002-2011) of fire occurrence data was used for statistical analysis. Fire occurrence data was obtained from the FAM-WEB fire weather data system and from the National Interagency Fire Management Information Database (NIFMID) via Kansas City Fire Access Software (KCFASST). The quality of the fire data was evaluated for all years (2002-2011). Ignitions were cross-referenced using the LE-66 Validation tool made available on the CAL FIRE/Riverside County Fire intranet. Fire Family Plus software was utilized to create statistics and graphs. The fire plan data only considers ignitions that have caused a vegetation fire.

**Cause Code Conversion Chart: CAL FIRE/Riverside County Fire Cause Code to Federal Cause Code Cause Code Converter**

CDF Cause Code	Cause Description	Federal Cause Code
0	Unknown	9
1	Undetermined	9
2	Lightning	1
3	Campfire	4
4	Smoking	3
5	Debris Burning	5
6	Arson	7
7	Equipment Use	2
8	Playing/Fire	8
9	Miscellaneous	9
10	Vehicle	2
11	Railroad	6
12	Power line	2

Low Country FDRA 10 Largest Fires

	Discovery	Acres	Cause	Fire Name	Fire Num
1	11/15/08	30,305.0	9 Miscellaneous	FREEWAY COMPLEX	99962
2	05/03/04	16,460.0	7 Arson	CERRITO	35517
3	05/02/04	8,831.0	9 Miscellaneous	EAGLE	35190
4	07/25/03	4,336.0	7 Arson	CANYON	56869
5	06/22/05	2,000.0	9 Miscellaneous	SOBOBA	52091
6	05/20/10	1,083.0	9 Miscellaneous	MCKINLEY	44545
7	05/08/07	990.0	4 Campfire	DAWSON 4	40815
8	07/03/03	850.0	9 Miscellaneous	RAILROAD	50488
9	05/12/10	850.0	4 Campfire	PEDLEY	41963
10	08/08/06	800.0	9 Miscellaneous	GOLF	67809

Of the 10 largest fires during the period 2002-2011 recorded in the Low Country FDRA, 9 occurred in the summer months of May-August. One occurred during the fall and was a Santana wind driven fire.

High Country FDRA 10 largest fires

	Discovery	Acres	Cause	Fire Name	Fire Num
1	10/26/06	40,200.0	7 Arson	ESPERANZA	91190
2	10/05/05	6,500.0	2 Equipmen	WOODHOUSE	83672
3	07/11/04	3,833.0	4 Campfire	VERBENIA	55439
4	07/17/04	3,667.0	4 Campfire	MELTON	57236
5	04/25/04	2,464.0	4 Campfire	PLEASURE	32913
6	10/21/03	2,397.0	7 Arson	PASS	81407
7	07/22/03	2,020.0	9 Miscellane	LOCAL	56005
8	08/18/03	1,898.0	4 Campfire	LOCUST	63401
9	05/12/04	1,845.0	5 Debris Bur	COTTONWOOD	38418
10	07/04/03	1,700.0	4 Campfire	STAGE	50865

Of the 10 largest fires recorded in the High Country FDRA, 1 occurred in April, 6 occurred during the summer months of May-August, 3 occurred in the fall and were Santana wind driven fires.

Historic Fires for Reference and Insight Depicted on the Costal FDRA Pocket Card

Low Country FDRA

High Country FDRA

Cerrito

Esperanza

Freeway

Woodhouse

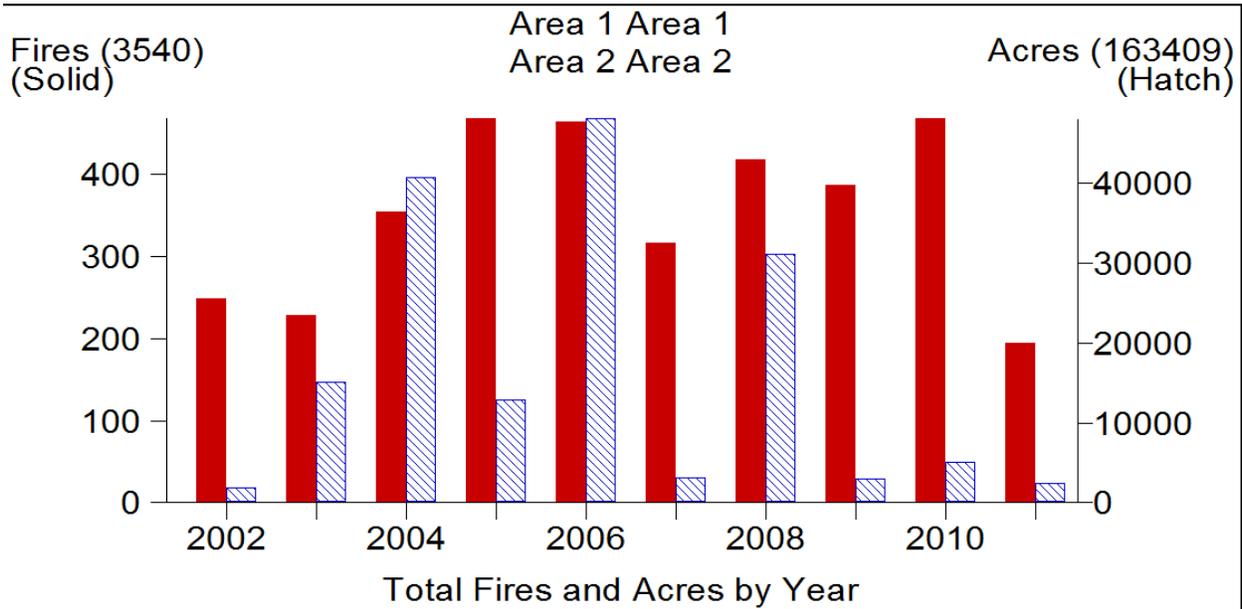
Eagle

Verbenia

Size Class Codes

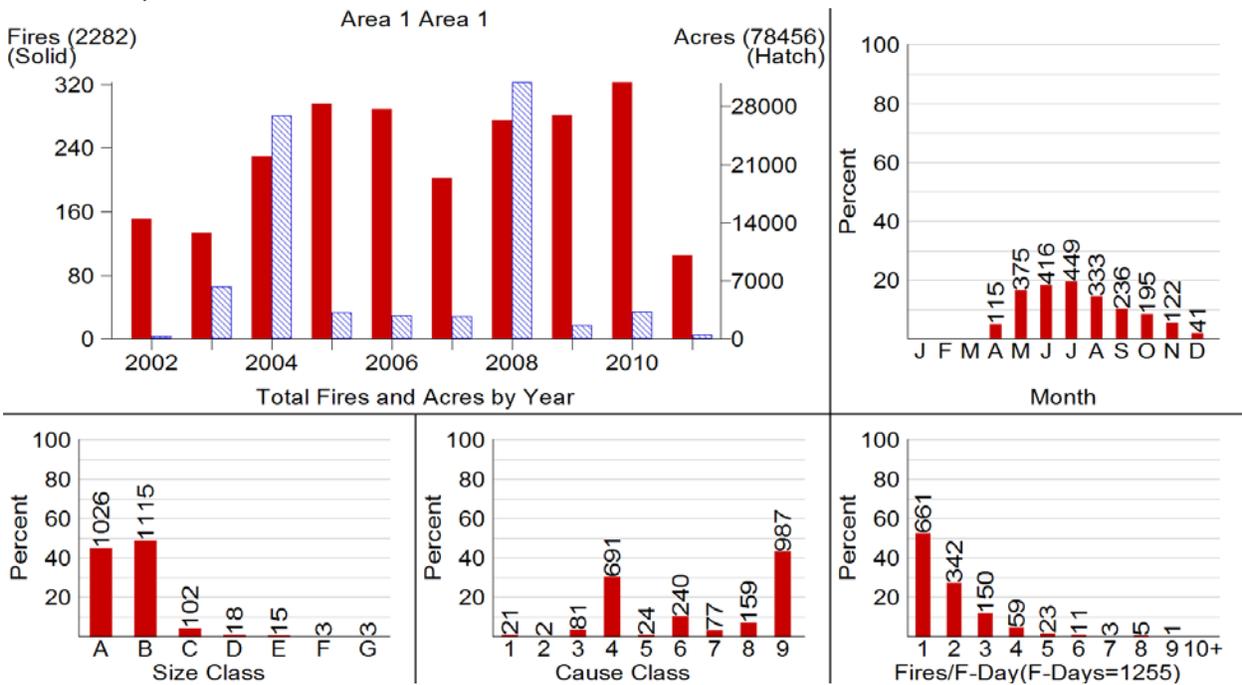
Size Class Codes	Size Class Code	Fire Size
A		<= 0.25 acres
B		0.26 to 9.9 acres
C		10 to 99.9 acres
D		100 to 299 acres
E		300 to 999 acres
F		1000 to 4999 acres
G		>= 5000 acres

*\*\*Please note that Size Class 'A' is null in both FDRAs because a Class 'A' fire is '0' acres. If '0' values are included in a data set that you are running statistics on, it will skew your results. For this reason, all actual fires that were '0' acres were adjusted to .01 acres.*



The graph above and those that follow show fire occurrence in Riverside County's High and Low FDRAs for the years 2002-2011. The bars in red represent fires in quantity while the blue hatched bars represent amount of acres burned. Further, the above unit wide perspective of fire occurrence has been separated geospatially (as follows) to be analyzed temporally and spatially.

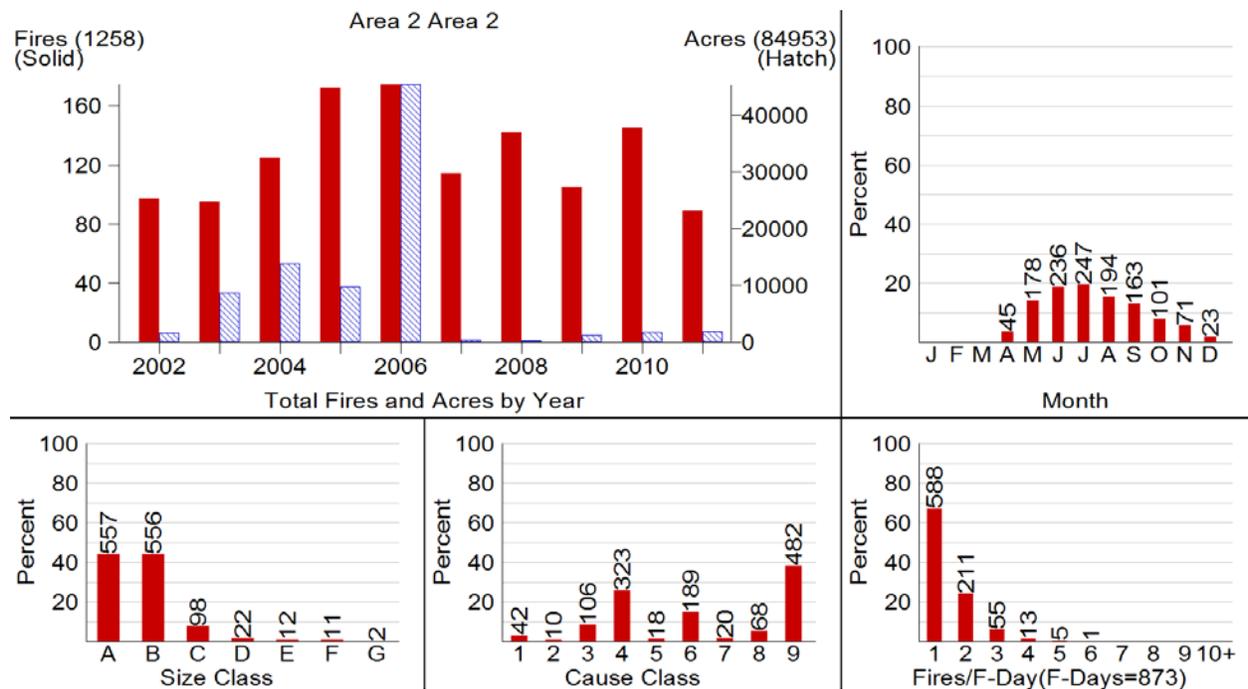
**Low Country FDRA**



The following points can be drawn from the graph above.

1. Most acres in this area were burned in 2004 and 2008.
2. 93% of fires in the Riverside Unit have been between .26 to 9.9 acres (Class A and B).
3. 52% of fire days have been single fire days, 27% of all fire days have had 2 fires per day.

### High Country FDRA



The following points can be drawn from the graph above.

1. The High Country FDRA had large acreage fires in 2004, 2005 and 2006.
2. 88% of all fires are 9.9 acres or less in size.
3. 46% of fire days have been single fire days, and 16% of all fire days have had 2 fires per day.

#### E. Weather Stations

a. Description: Riverside County has 4 CAL FIRE owned RAWs: Santa Rosa Plateau, Clark, Beaumont, and Anza. The data from these four stations are utilized for rating daily fire danger levels. The Riverside ECC has the responsibility of management and editing of the daily weather observations that are required within the Weather Information Management System (WIMS). The action of data entry into WIMS is required on a daily basis for the NFDRS decision support tool to function properly. The 1400-hour observation in WIMS may be the observation closest to the required observation time of 1300 hours LST. All observations must be converted in WIMS prior to 1430 hours LST. Through the process of the FDOP analyses, it is clear that there have been station maintenance issues in the past. These issues are apparent in the data and multiple anomalies have occurred.

The purpose of NFDRS is to rate relative fire danger as an average worst-case scenario for a given Fire Danger Rating Area. Riverside County is a complex area with respect to fuels, weather and topography. A concerted effort was made to account for these complexities with the goal of providing a baseline for

decision-making. It is important to note that each FDRA has areas that will be well represented by its RAWS indices.

Each FDRA has a pair of weather stations that best represents the areas. The RAWS stations regrouped in a Special Interest Group (SIG) that averages the data each day across the FDRA. All RAWS stations, regardless of ownership, are maintained the same way and their data is made available for all inter-agency applications through the Fire Data Warehouse.

b. RAWS Summary (Table)

WIMS ID Number	045616	045617	045623	045624
NESDIS ID	CA44C7A2	CA264670	CA4A6332	CA44E14E
Station name	Anza	Beaumont	Santa Rosa Plateau	Clark
Status	active	active	active	active
Owner	CAL FIRE	CAL FIRE	CAL FIRE	CAL FIRE
Data years	1995-2014	2003-2014	1993-2014	2000-2014
Elevation	3939	2604	1987	1637
Transmit time	XX:54	XX:14	XX:54	XX:54
Reporting time	1254	1314	1254	1254
Trend Forecast Zone	513	510	513	509

\*Data Years Source: Western Region Climate Center- RAWS data archive. Some data may be missing. Check the archive for missing dates. In this analysis missing observations were derived from other sources nearby.

c. Weather Station Catalogs:

A station catalog is a component of WIMS which tells NFDRS processors the characteristics of a station and NFDRS.

Catalog Information

WIMS ID	045616	145617	145623	045624
Mean Precipitation in.	14	14	14	12
Latitude N	33.5558610	33.963610	33.5181665	33.8771665
Longitude W	116.6745276	117.006774	117.2291110	117.3041110
Aspect	south	south	south	south
Site Location	Valley bottom	Valley bottom	midslope	Valley bottom
Time zone	PST	PST	PST	PST
FDRA	High	High	Low	Low

WIMS station catalogs need to be updated annually to reflect the staffing level breakpoints and to properly calculate adjective class. The screen capture below displays the information that the personnel in the Emergency Command Center adjust.

----- Display/Edit Default NFDRS Parameters -----

Station ID: 45624 Effective Date: 12-Dec-14  [Station Info](#) | [NFDRS Param](#) | [Extra Data Channels](#)

---

78 & 88 NFDRS	100-hr	15	SOW Thresholds (No Precip last 24 Hrs)	Pct Psbl	SOW & Wet Flag Thresholds (Precip last 24 Hrs)		CC2*
88 NFDRS	1000-hr	16			PCNT_Clear	85	
	1hr=10hr	N	PCNT_Scattered	75	1HR_Rain (inches)	0.15	
	KBD	631	PCNT_Broken	50	1HR_Showers (inches)	0.5	
Snow Flag			N			3HR_DUR_WetFlag (hours)	2
						3HR_AMT_WetFlag (inches)	0.75
						24HR_DUR_WetFlag (hours)	10
						24HR_AMT_WetFlag (inches)	1.5

\* Climate Class of the first priority Fuel Model (7F)

P r i	ID	** 78 NFDRS Only **				88 s b	S l p	G r s	C l i	Herb FM	Woody FM	X-1000	Staffing ldx Breakpoints					
		H S	Herb Date	Greenup Date	SI								DC	Low		High		
													SI%	Val	SI%	Val		
1	7F	F	04-Nov-14	08-Mar-14		1	A	2	10	60	16		BI	5	90	46	97	68
2	7A	F	04-Nov-14	08-Mar-14		1	A	2	10	60	16		BI	5	90	52	97	64
3	7G	F	04-Nov-14	08-Mar-14		1	A	2	10	60	16		BI	5	90	73	97	83

#### d. RAWS Site Description and Photos

##### Anza



The Anza RAWS is located on the site of the Anza Forest Fire Station. It is slightly elevated from the station grade but does have several large trees to the south. There is also a metal building to the south approximately 30'. The main east and west flow directions are not obstructed.

##### Beaumont

(insert current photo)

The Beaumont RAWS is located on the grounds of the Riverside County Transportation and Land Management Agency Beaumont Yard. It is separated from any buildings or roads by hundreds of feet. We ran a portable RAWS station on the site for over two years to compare data before moving and found the data to be statistically similar. We will continue to use the historical record and name for Beaumont based on this finding.

## Santa Rosa Plateau



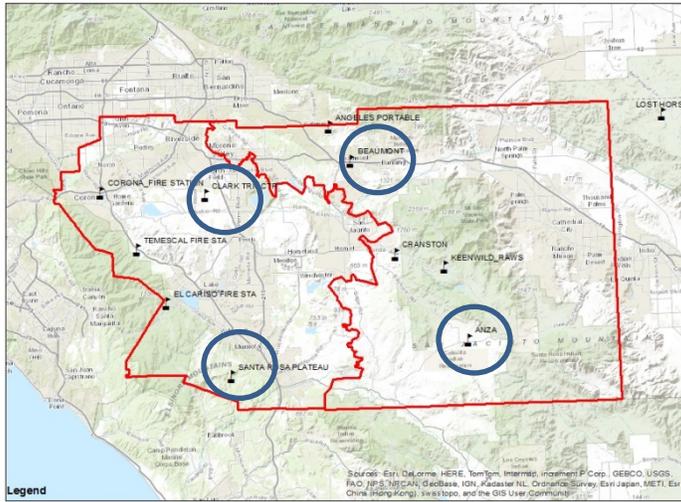
The Santa Rosa Plateau RAWS is located on the Santa Rosa Plateau Ecological Reserve. It is on a gentle slope of a small hill. It is in the southwest corner of the county in an area significantly impacted by the marine influence.

## Clark



The Clark RAWS is located on the grounds of the Clark Training Center in central Riverside County. This RAWS was moved to this location when Riverside County took possession of this facility on the former March Air Force Base from the military. It is located 50' from a 2 story building but otherwise has an unobstructed area.

e. Map of the location of Remotely Automated Weather Stations (RAWS)



F. Fire Weather Station Analysis Summary

The FireFamilyPlus FIRES regression analysis was performed to determine statistically which mix of weather station observations, NFDRS fuel model, and NFDRS index best correlates to historic fire occurrence (both individual occurrence and large fire) for High and Low FDRAs. Four weather stations were considered, along with every possible combination of those weather stations grouped into Special Interest Groups (SIGS). The four stations and SIG combinations of Anza/Beaumont and Clark/Santa Rosa Plateau were then ran in the FIRES analysis with all 20 NFDRS fuel models for Burning Index (BI).

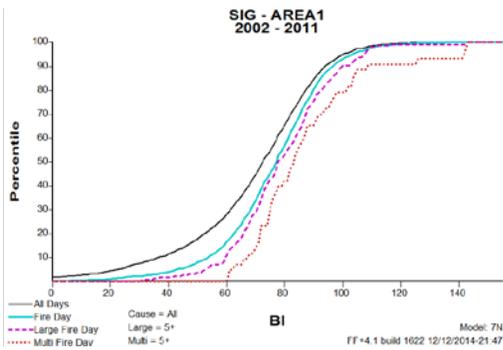
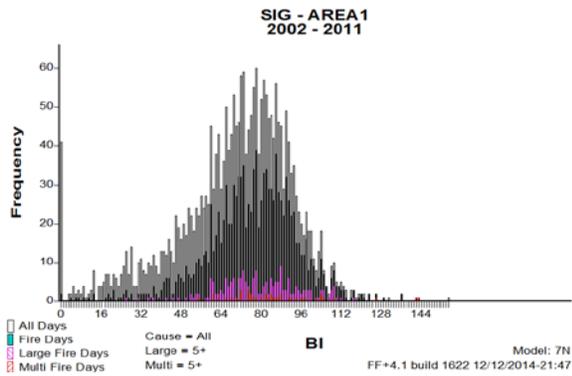
The FIRES analysis uses logistic regression to rate models (indexes) by reviewing:

Chi-squared: The chi-square value provides a way to quantify the visual graphs and models created in Fire Family Plus. It serves as the goodness of fit of the data points. A chi-square value less than 13 is considered to be best, less than 20 is good, and anything over 26 is not acceptable.

R-squared: The R-squared value is used to describe how well a regression line fits a set of data. The closer the R-squared value is to one, the better. It is a way to measure how well the applied model can predict future outcomes.

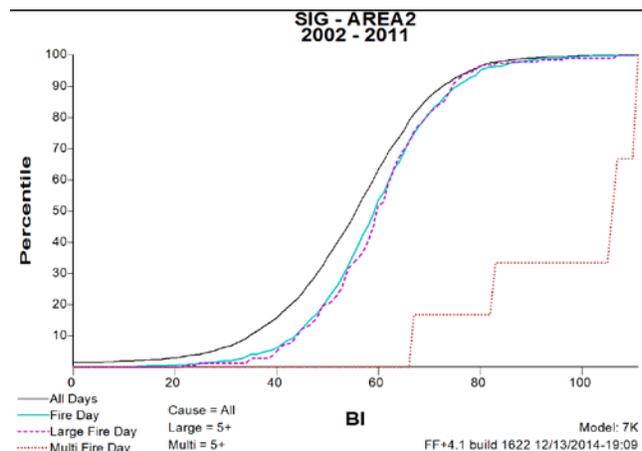
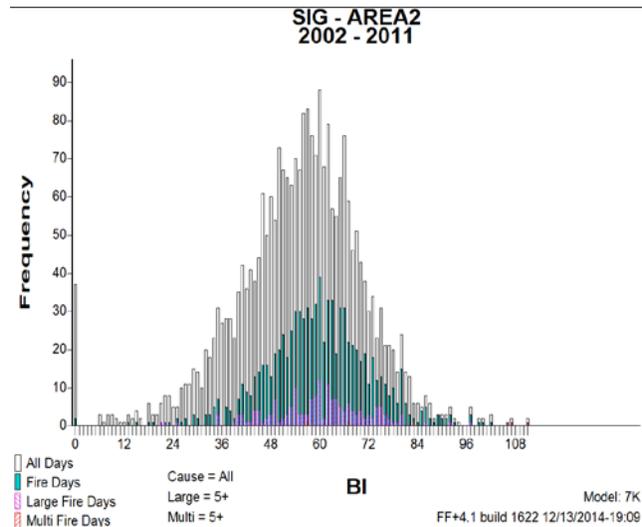
### Distribution of the Low Country FDRA:

A fairly good fit with BI to the large fires on the Low Country FDRA from 2002-2011 was found considering Anza/Beaumont SIG and with fuel model K, Large Fires (Acres) set to 5, and Multi Fire Days (Fires) set to 5.



## Distribution of the High Country FDRA:

A fairly good fit with BI to the large fires on the High Country FDRA from 2002-2011 was found considering Anza/Beaumont SIG and with fuel model K, Large Fires (Acres) set to 5, and Multi Fire Days (Fires) set to 5.



Limitations: The process of obtaining the necessary weather data required quality control.

## G. Special Interest Groups (SIGS)

Remote Automated Weather Stations located in different geographical locations with common sensitivity to NFDRS model inputs can be grouped together to form a SIG. A technique developed by

Michael Fosberg and William Furman utilizes the 1-hour time lag fuel moisture as the integrator of temperature and relative humidity to help define fire climate zones.

The Anza and Beaumont RAWS were combined into a SIG called Area 2 for the High Country FDRA and the Clark and Santa Rosa Plateau RAWS stations were combined into a sig called Area 1 for the Low Country FDRA. Weighting in the SIGS was set equally at 1.0. Analysis allows the user to view the trend information for each station within the SIG group. The trending weather and spatial locations support and justify why these stations were combined into SIGs.

## **SECTION V: FIRE DANGER BASED DECISIONS**

A. Fire business thresholds and climatic breakpoints: A breakpoint is a threshold which corresponds to a change in historical fire activity. Preparedness levels differ from adjacent fire danger ratings because they take fire history into account, in addition to weather data.

The FireFamilyPlus software package was used to establish the fire business breakpoints. A statistical analysis based on historical weather adjusted for fire activity determines the appropriate staffing index and associated break points for each FDRA.

### **B. NFDRA Definitions, Indices, and Outputs**

The following list represents the array of NFDRA indices that are used by the NFDRA system to quantify Fire Danger.

**Spread Component (SC)** is an estimate of a fire at its head. It is projecting the potential rate of a fire's spread at its head, in feet per minute, under the assumed weather, fuels, and topographic conditions associated with the fire danger rating area. Spread component is a highly sensitive index that accounts for live and dead fuels, and is highly dependent on wind.

**Energy Release Component (ERC)** is a number related to the available energy BTU per unit area (sq. ft.) within the flaming front at the head of the fire. It evaluates the contribution of various fuel loadings represented mathematically in the NFDRA Fuel Models. ERC is utilized for modeling preparedness levels because it is a trending index which depicts seasonal conditions well. In older versions of the Fire Danger Rating System, it was referred to as the Buildup Index because it "builds" through the fire season as fuels dry.

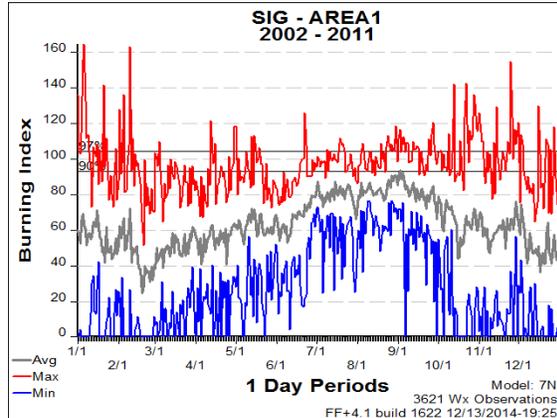
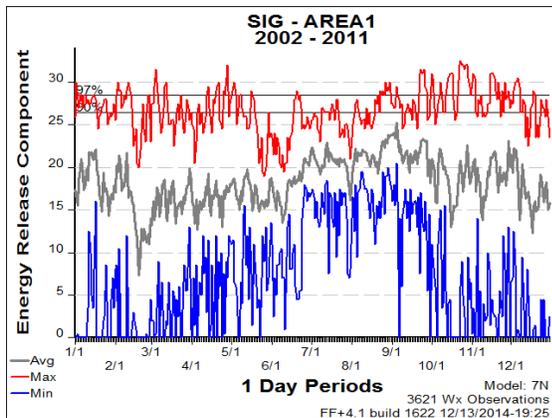
**Burning Index (BI)** is a number that relates the contribution of a fire's behavior in containing the fire. Containment difficulty directly relates to fire line intensity (Btu/ft./sec). This is the heat release along the fire perimeter at its head. BI is an index that rates fire danger related to potential flame length over a fire danger rating area. This index is ideal to use when determining dispatch and staffing levels due to its moderate sensitivity. Since BI is a combination index that takes into account ERC and SC it is very good for determining variation during the day. The nature of BI makes it suitable for many different geographic locations and is a universal index.

**Ignition Component (IC)** is an expressed probability that a firebrand will cause an actionable fire, one that requires suppression action. Ignition component is analogous to probability of ignitions, but additionally takes into consideration wind speed.

**Thousand Hour Time Lag (1000-hr FM)** is an addition to the above NFDRS output indices, the intermediate output which models the 1000-hr time lag fuel moisture content can also be utilized as a fire danger index. This long term trending output can be a valuable tool in evaluating the larger fuels within an area where larger fuels make up the primary fuel bed indicator. This is a trending index which illustrates seasonal conditions well. It is a major component of the ERC.

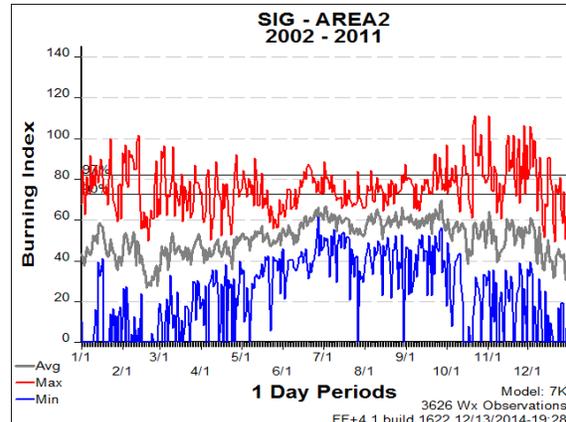
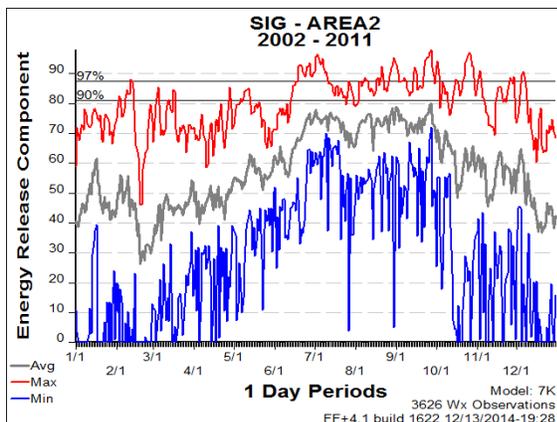
### C. ERC/BI Graphs

Low Country FDRA, based on the Clark and Santa Rosa Plateau RAWs:



The ERC graph above depicts the threshold which coincides with the opening of fire season in the Low Country FDRA. For this FRDA an **ERC of 20**, the 50th percentile, is the critical point in which to gauge the occurrence or onset of fire season. The start of fire season can be described at the time in which large fires (5 acres or more) begin to occur. Reaching an ERC of 19 has been known to occur before May 15th, in some cases as early as the beginning of April. In the event that an ERC reaches 19 before May 15th, there is reason to consider cessation of burn days, the early onset of fire season, and adequate resources for these large fires. Drought has a large influence on the occurrence of this threshold occurring in early spring.

High Country FDRA, based on Anza and Beaumont RAWs:



The ERC graph above depicts the threshold, which coincides with the opening of fire season in the HighCountry FDRA. For this FRDA an **ERC of 61**, the 50th percentile, is the critical point in which to gauge the occurrence or onset of fire season. The start of fire season can be described at the time in

which large fires (5 acres or more) begin to occur. Reaching an ERC of 61 has been known to occur before May 15<sup>th</sup>, (traditionally the start of fire season), in some cases as early as the beginning of April. In the event that an ERC reaches 61 before May 15th, there is reason to consider cessation of burn days, an early onset of fire season, and gauging adequate resources for large fires.

#### D. Fuel Model Choices and Justifications

Fuel models were chosen based on the distribution of fire and weather data. After having adjusted for data that was inadequate for statistical analysis, every fuel model had been run against the dataset in order to determine which had the best statistical fit for our purposes. For the Low country FDRA, the statistical analysis yielded the best outcome with Fuel Model N. For the high Country FDRA, fuel model K yielded the best statistical numbers. All analysis ran the fire season from 4/1 to 12/15.

FDRA	Fire Day r <sup>2</sup>	Fire Day chi <sup>2</sup>	Large Fire Day r <sup>2</sup>	Large Fire Day chi <sup>2</sup>
Low Country FM-N	0.93	19.37	0.64	4.58
High Country FM-K	0.87	17.38	0.67	9.79

#### E. Fire Danger Decision Levels

NFDRS outputs from WIMS can be used to determine various levels of fire danger rating to address the fire problems identified previously in the Fire Problem Analysis Section. The Fire Danger Rating system is designed to calculate “average worst-case scenario” fire danger. Outputs from NFDRS will be utilized in two ways for the purpose of this plan. The Preparedness Level will assist fire managers with more long-term (or seasonal) decisions with respect to fire danger. The Staffing Level will be used for appropriate day-to-day suppression resource staffing. Staffing level is also a major component of the adjective class calculation.

#### F. Preparedness Level Awareness: Fire Season

Preparedness Levels are established to assist fire managers with weekly and /or monthly planning decisions based upon seasonal fire danger elements. The FireFamilyPlus software has been used to establish the fire business thresholds. A statistical analysis of fire occurrence and historical weather has been completed for each Fire Danger Rating Area.

Preparedness Level: Fire Family Plus Analysis Factors and Determinations

FDRA	RAWS	Data Years	Weight	Fuel Model	NFDRS Index	Threshold
Low Country	Clark/Santa Rosa Plateau	2002-2011	1.0	N	ERC	15
High Country	Anza/Beaumont	2002-2011	1.0	K	ERC	42

G. Staffing Level Analysis

Staffing levels are established to assist fire managers with daily staffing decisions. The Fire Family Plus software has been used to establish the staffing level thresholds. A statistical analysis of fire occurrence and historical weather has been collected and analyzed for all Fire Danger Rating Areas in Riverside County. This was done by correlating various combinations of NFDRS outputs with weather records. The final staffing level determination will also incorporate the Riverside County’s FDRAs preparedness level.

The staffing level forms the basis for decisions regarding the “degree of readiness” of initial attack (IA) resources and support resources. The staffing level is based on an analysis of the value of Burning Index (BI) as they relate to a Local Preparedness Levels. Staffing levels are expressed as numerical values where 1 represents the low end of the fire danger continuum and 5 the high end. It is intended to provide fire managers with day-to-day decision support regarding staffing of suppression resources. Staffing level can assist with decisions about employee overtime, and associates with working people beyond their normal schedules (i.e., STAFFING PATTERNS). In addition, the extended staffing or shared resources such as air tankers, helicopters, and other large fire support resources will be linked to the staffing level. Staffing level is an important component of the Adjective Fire Danger Rating system. It is a way for us to break up the BI continuum based on percent weather to make it an operational reality.

Staffing Level: Fire Family Plus Analysis Factors and Determinations

STAFFING LEVELS

FDRA	RAWS	Fuel Model	Index	1	2 90th/4	3 90th/2	4 90th	5 97th
Low	Clark/Santa Rosa Plateau	N	BI	0-22	23-46	47-93	94-103	104+
High	Anza/Beaumont	K	BI	0-17	18-35	36-72	73-96	97+

## H. Adjective Fire Danger Rating

The Adjective Fire Danger Rating will be used by agency personnel to inform the public of the current level of fire danger associated with a specific Fire Danger Rating Area. The amount of interaction will depend on the magnitude of the adjective fire danger. However, NFDRS processors (such as WIMS) will automatically calculate the adjective class rating.

Staffing level for each FDRA is calculated using the 90th and 97th percentile thresholds. The Adjective class is determined in WIMS using these calculated staffing levels in conjunction with ignition component (predefined interval values). The combination of staffing level with ignition component describes relative risk.

Staffing Level	<90 <sup>th</sup> /4	90 <sup>th</sup> /4	90 <sup>th</sup> /2	90 <sup>th</sup>	97 <sup>th</sup>
1	L	L	L	M	M
2	L	M	M	M	H
3	M	M	H	H	VH
4	M	H	VH	VH	E
5	H	VH	VH	E	E
Ignition Component	0-20	21-45	46-65	66-80	81-100

## I. Climatological Percentiles

Climatological breakpoints are points on the cumulative distribution of one fire weather/danger index computed from climatology without regard for associated fire occurrence/business. For example, the value of the 90th percentile BI is the climatological breakpoint at which only 10 percent of the BI values are greater in value.

CAL FIRE will use the 90<sup>th</sup> and 97<sup>th</sup> percentiles. (7800 Handbook 7842.6)

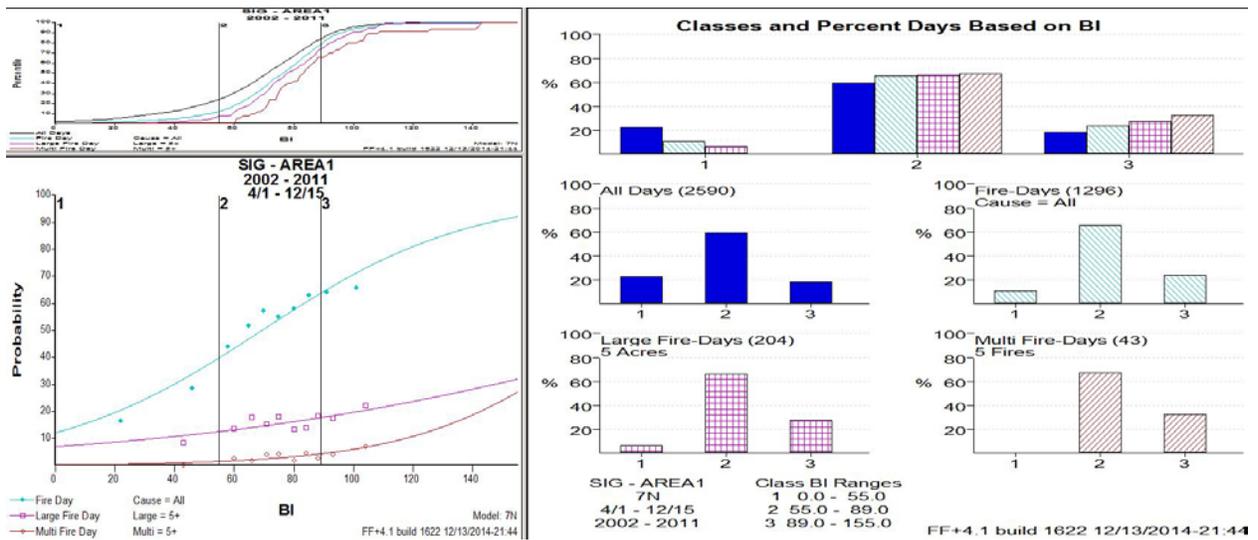
It is equally important to identify the period or range of data analysis used to determine the agency percentiles. The percentile values for 12 months of data will be different from the percentile values for the fire season. Year round data should be evaluated for percentiles involving severity-type decisions. Recognizing climatological breakpoints is useful to provide situational awareness for fire managers.

## J. Decision Points for Dispatch Level

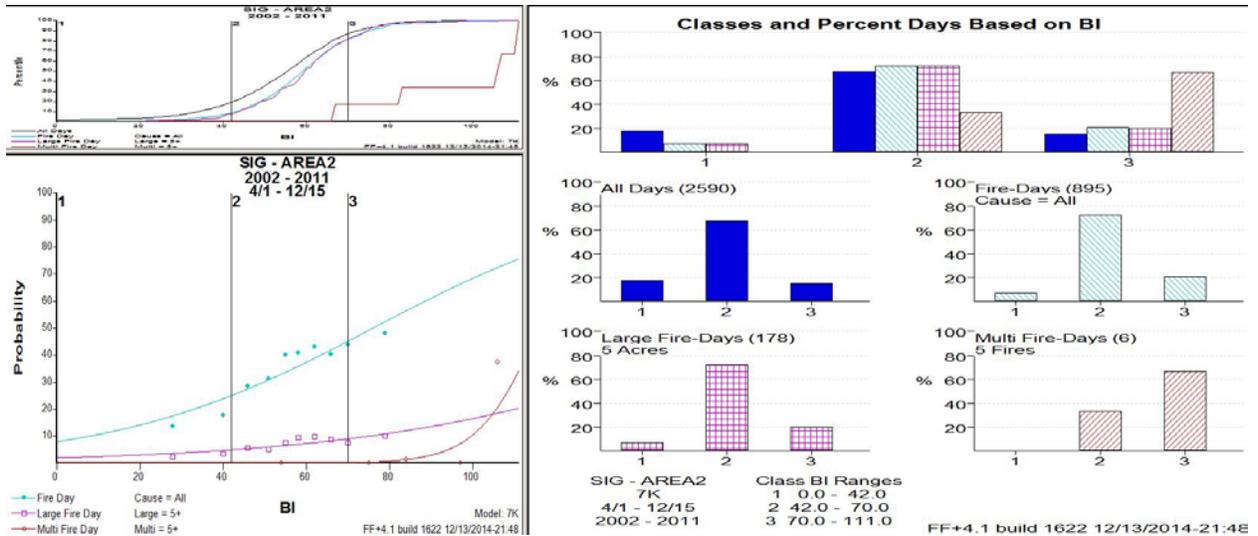
Decision Criteria for CAL FIRE/Riverside County Fire was developed using different breakpoint criteria for each NFDRA within the Unit. All FDRAs in CAL FIRE/Riverside County Fire will use Burning Index (BI) for setting dispatch levels throughout the day.

Dispatch Level: Fire Family Plus Analysis Factors and Determinations

### Low Country Dispatch Level



### High Country Dispatch Level



Index Break Points

FDRA	RAWS	Data years	Weighting	Fuel Model	NFDRS Index	LOW	MEDIUM	HIGH
Low	Clark/Santa Rosa Plateau	2002-2011	1.0	N	BI	0-55	56-89	90-155
High	Anza/Beaumont	2002-2011	1.0	K	BI	0-42	43-70	71-111

L. How levels will be communicated

During fire season CAL FIRE/Riverside County Fire / ECC will announce over the radio the current SIGs readings to better prepare the firefighter’s situational awareness. These announcements are made at 10:00 am, 12:00 pm, 2:00 pm, 4:00 pm and 6:00 pm. The ECC also uses these times to determine dispatch levels.

Additionally, CAL FIRE/Riverside County Fire owns and updates a daily Smokey the Bear Adjective Fire Danger Rating signs. The intent is to raise awareness of the potential fire danger in simple easy to communicate terms. Primarily this is used as a fire prevention tool to alert the public to be fire safe. The main contact for this notification will be the media.

Complementing the physical Smokey the Bear Adjective Fire Danger Rating sign it would be beneficial to the Riverside community at large, to have access to an online broadcast of daily fire danger electronically. This can be located on the CAL FIRE, Riverside website, <http://calfireslo.org/> and can be in the form of a digital Smokey the Bear sign.

### Fire Danger Based Decisions

This section describes some of the standard fire weather based management decisions made in the Riverside Unit.

#### Initial Attack Dispatch

The initial incident response pre-set dispatch level, applies when the Emergency Command Center Officers (ECCO's) have a report of a wildland fire and a location, but possibly little additional information. The intent is to send sufficient resources given the potential fire behavior at that time. The intent is also to save time, money, and resources by sending resources appropriate for the fuel and weather conditions. Specific resource amounts by dispatch level are identified in Computer Aided Dispatch (CAD) for each preplanned response area.

Control: <b><i>Who does decision affect</i></b>		<b><i>Level of Control and Communication</i></b>	
<input checked="" type="checkbox"/> Agency Personnel	Initial attack forces	<input checked="" type="checkbox"/> High	Radio communication at all times.
<input type="checkbox"/> Industry		<input type="checkbox"/> Medium	
<input type="checkbox"/> Public		<input type="checkbox"/> Low	

---

Setting initial incident response / dispatch levels using customized criteria based on predicted fire behavior indexes. Breakpoints for dispatch levels were determined using the "Fire Family Plus" fire weather analysis program.  
See section J.

Southern California Edison, Union Pacific Railroad and CalTrans can modify their daily operational activities based on the fire danger. This is primarily a fire prevention measure to reduce risk sources during very high and extreme fire danger conditions.

Control: <b><i>Who does decision affect</i></b>		<b><i>Level of Control and Communication</i></b>	
<input type="checkbox"/> Agency Personnel		<input type="checkbox"/> High	
<input checked="" type="checkbox"/> Industry		<input type="checkbox"/> Medium	
<input type="checkbox"/> Public		<input checked="" type="checkbox"/> Low	CAL TRANS Utilities and railroad –no formal communications method

---

Use Adjective levels

See section H

## Public

This is the general, once per day description of the “fire danger”. The intent is to raise the awareness of potential fire danger in simple easy to communicate terms. This is primarily a fire prevention tool to alert the public to be fire safe through media press releases.

Control: ***Who does decision affect***

Agency Personnel Initial attack forces  
 Industry

***Level of Control and Communication***

High  
 Medium PIO Outreach  
Usually one time per day at best via local radio,  
TV, newspaper, “Smokey” sign at all Unit FFS.  
(1700 hrs.)

Public  
General public, local citizens and tourists.  
Includes agency personnel and industry  
but not specifically aimed at their  
activities.

Low

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Use Adjective Level. See Section H.

## Staffing Patterns

Occasionally, it is necessary to hold employees on duty or to call employees back from days off to staff equipment. When fire potential is severe enough, it may be prudent to take action before an incident occurs.

Control: ***Who does decision affect***

Agency Personnel Initial attack forces  
 Industry

***Level of Control and Communication***

High Radio and Email  
 Medium

Public

Low

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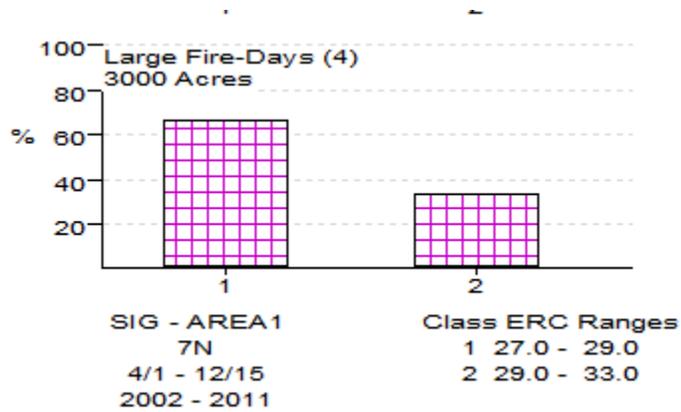
Staffing Patterns may take the form of :

- Cover all crews

- Cover all dozer modules
- Additional staffing on engines or for overhead
- Hold personnel on duty
- Cover county Type 3 engines
- Or all the above

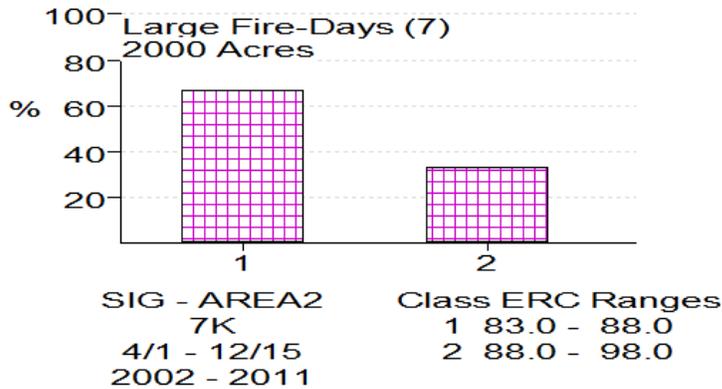
Area 1

Use ERC of 27



Area 2

Use ERC of 83



#### M. Needs Assessment

Weather Station Sites: The Beaumont and Anza RAWs are not located in ideal situations. Specifically they both were sited on Fire Station grounds for security reasons but some wind speed and other measurements may be compromised by the proximity of buildings and trees. A plan is underway to re-locate the Beaumont RAWs to a climatologically similar site so the data can be continuous. A similar plan should be undertaken with the Anza RAWs.

The Santa Rosa Plateau RAWs was sited to capture data for prescribed fire activities at the Ecological Reserve. While important, it is perhaps not in the ideal location for the southwest county. It may have too many days of marine influence. An analysis will have to be done to determine if this is true and if so to re-locate the RAWs.

WIMS & NFDRS Training: WIMS and NFDRS training needs to be a priority for ECC staff, especially personnel that are charged with implementing or maintaining this plan. The ECC is the anchor point for the implementation of this Fire Weather Operating Plan. Communications Operators, ECC Captains, ECC Chief, and Management will need to make training a priority. Further effort should be made to identify candidates for the Advanced National Fire Danger Rating course offered at National Advanced Fire & Research Institute (NAFRI) in Tucson, AZ. This course is the final course in the NFDRS series which provides the student with the tools needed to create and manage a NFDRS Fire Danger Rating Operating Plan.

Quality Assurance and Analysis: As is the case with any new tool, this Fire Danger Rating Operating Plan must undergo continuous quality assurance and analysis to ensure the plan is functioning as needed to fulfill operational objectives. As this product is rolled out to the field it will require input from

responding field staff to validate the appropriateness of the decisions that are made throughout the season. The evaluation must be as objective as possible and address the problems with a given incident or administrative decision in an honest manner. The field staff will be asked to provide written feedback throughout the first year to refine the decision making process.

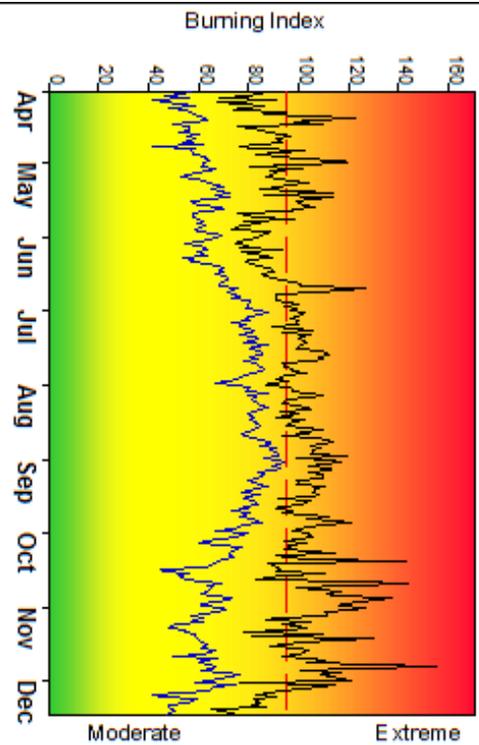
## **SECTION VI: APPENDIX**

### **APPENDIX A: Low Country FDRA Pocket Card**

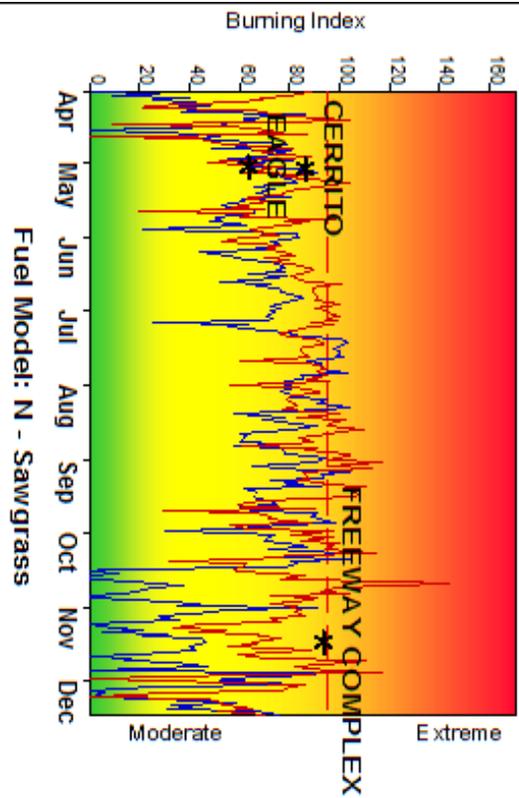
The Low Country FDRA Pocket card displays the three largest fires in the past 10 years within this FDRA. These fires have occurred within the average or maximum Burning Index thresholds for this FDRA. Although there is a great deal of climate variation in this FDRA, the largest fires have still occurred within the expected range of Burning Index for large fire occurrence. This FDRA and pocket card is a great depiction of expected fire activity in the geographic region of Riverside County.

### FIRE DANGER -- Western Riverside Co Lo Elev.

Maximum, Average, and 90th Percentile, based on 10 years data

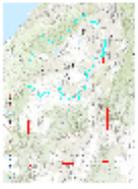


Years to Remember: 2004 2007



### Fire Danger Area:

- ◆ Western Riverside Low
- ◆ NWS Fire WX Zone 248
- ◆ Clark, Santa Rosa Plateau
- Meets NWCG Wx Station Standards



### Fire Danger Interpretation:

- EXTREME** -- Use extreme caution
- (Caution)** -- Watch for change
- Moderate** -- Lower Potential, but always be aware

Maximum -- Highest Burning Index by day for 2002 - 2011

Average -- shows peak fire season over 10 years (2577 observations)

90th Percentile -- Only 10% of the 2577 days from 2002 - 2011 had an Burning Index above 94

### Local Thresholds - Watch out:

of any of these factors can greatly increase fire behavior:  
 20' Wind Speed over 15 mph, RH less than 25%,  
 Temperature over 90, Burning Index over 90

### Remember what Fire Danger tells you:

- ✓ Burning Index gives day-to-day fluctuations calculated from 2 pm temperature, humidity, wind, daily temperature & rh ranges, and precip duration.
- ✓ Wind is part of BI calculation.
- ✓ Watch local conditions and variations across the landscape -- Fuel, Weather, Topography.
- ✓ Listen to weather forecasts -- especially WIND.

### Past Experience:

Mid summer fires tend to slow down at night when coastal influence arrives. Fall fires speed up at night. Elsinore Front Country can experience down slope winds in late afternoon. Perris-Hemet-Winchester areas experience battling winds in mid afternoon when the sea breeze comes up the Santa Margarita Drainage through the southwest county and through the Santa Ana Canyon in the northwest county.

Responsible Agency: CAL FIRE Riverside  
 FF+4:1 build 1622 12/13/2014-22:28 (C:\Users\lchavez\Docu... \FDOP\_database\_05092014)

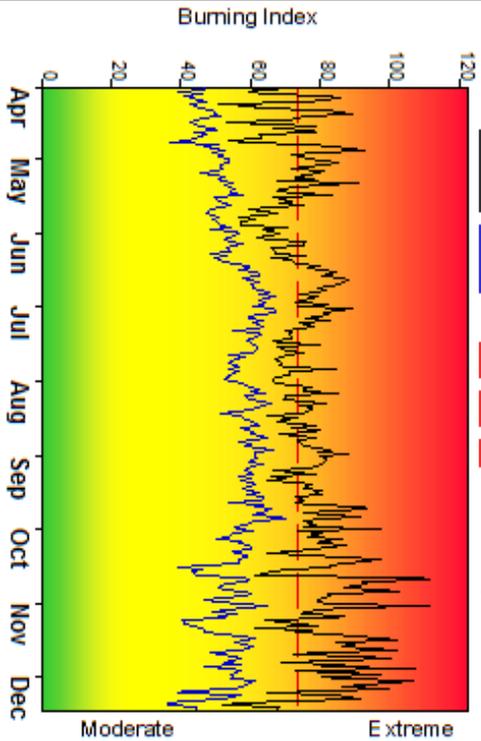
Design by NWCG Fire Danger Working Team

## APPENDIX B: High Country FDRA Pocket Card

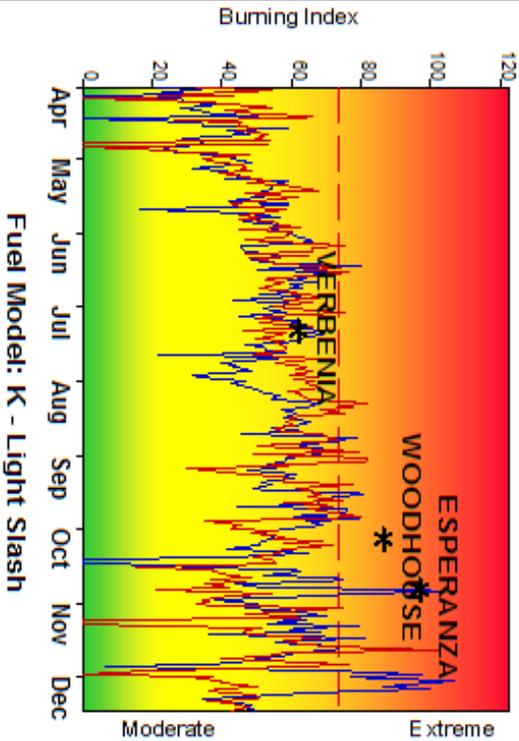
The High Country FDRA Pocket card displays the three largest fires in Riverside County fire history. Wind is the largest predictor of large fire occurrence in Riverside County. In addition to wind activity, topography has a large effect on not only to spread of a fire, but also the access and response to extinguish the fire. In some parts, these large fires were inaccessible and difficult to combat due to their topographic location. El Nino or wet years may result in multiple large fires in what would normally be considered “desert” with no vegetation. The Verbena in 2005 is an example of this type of year. This area is also prone to monsoon flow almost every year and can result in multiple large fires from one storm, or over successive days.

### FIRE DANGER -- (Fire Danger Area)

Maximum, Average, and 90th Percentile, based on 10 years data



Years to Remember: 2006 2002

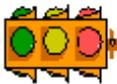


### Fire Danger Area:

- ◆ Central: Riverside Co. HI
- ◆ NWS Zone 256
- ◆ Anza-Besant
- \* Meets NWCG Wx Station Standards



### Fire Danger Interpretation:



- EXTREME** -- Use extreme caution
- (Caution)** -- Watch for change
- Moderate** -- Lower Potential, but always be aware

Maximum -- Highest Burning Index by day

for 2002 - 2011

Average -- show's peak fire season over 10 years (2579 observations)

90th Percentile -- Only 10% of the 2579 days from 2002 - 2011 had an Burning Index above 73

### Local Thresholds - Watch out:

Combinations of any of these factors can greatly increase fire behavior:  
 20' Wind Speed over 15 mph, RH less than 25%,  
 Temperature over 90, Burning Index over 80

### Remember what Fire Danger tells you:

- ✓ Burning Index gives day-to-day fluctuations calculated from 2 pm temperature, humidity, wind, daily temperature & rh ranges, and precip duration.
- ✓ Wind is part of BI calculation.
- ✓ Watch local conditions and variations across the landscape -- Fuel, Weather, Topography.
- ✓ Listen to weather forecasts -- especially WIND.

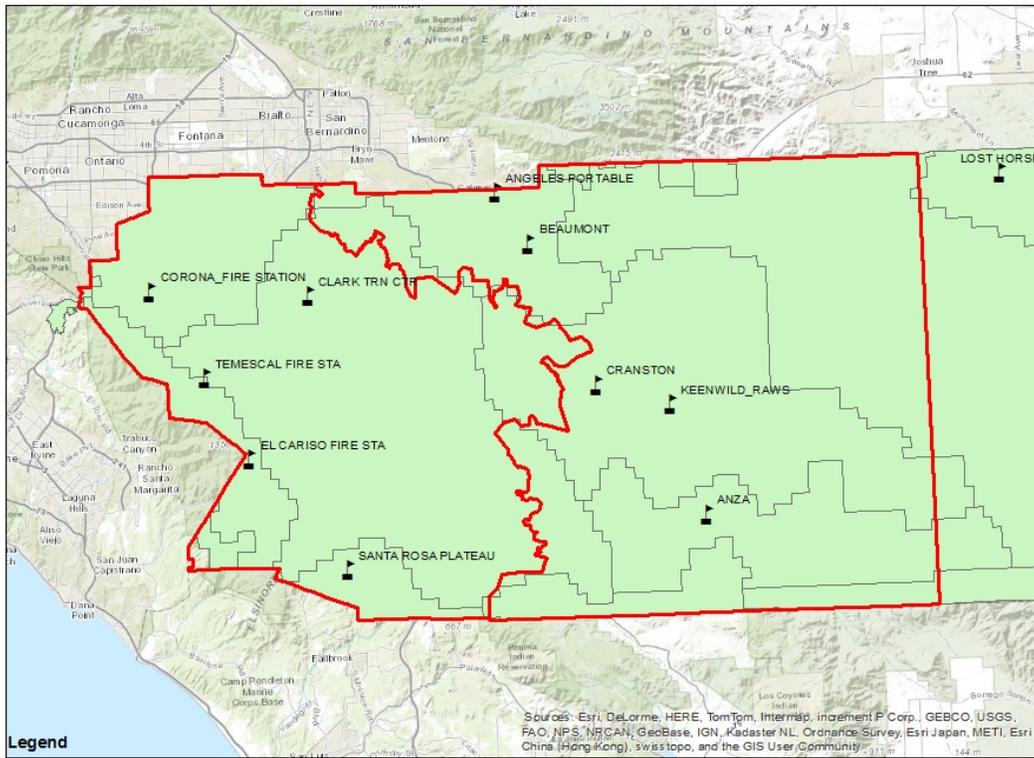
### Past Experience:

Years with abundant rainfall result in fires far out in the east side of the FDRA.  
 Wind driven fires may move rapidly for three days or more.  
 Monsoon season July-September results in multiple lightning fires

Responsible Agency: CAL FIRE Riverside  
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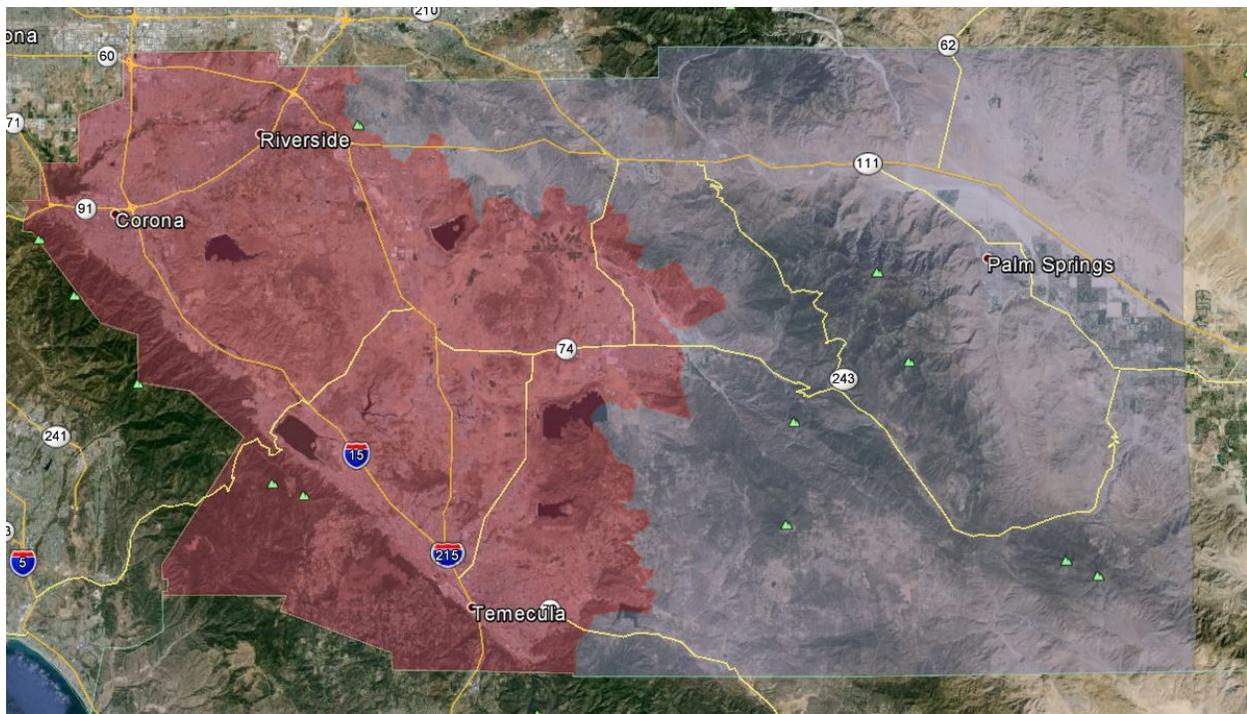
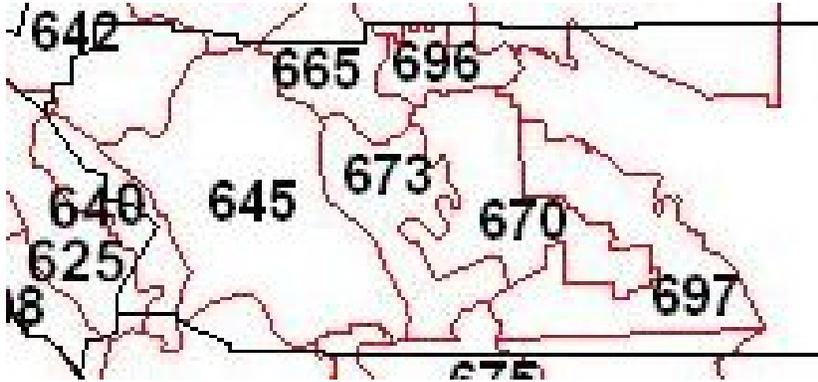
Design by NWCG Fire Danger Working Team

APPENDIX D: Remote Automated Weather Station Locations for Riverside County



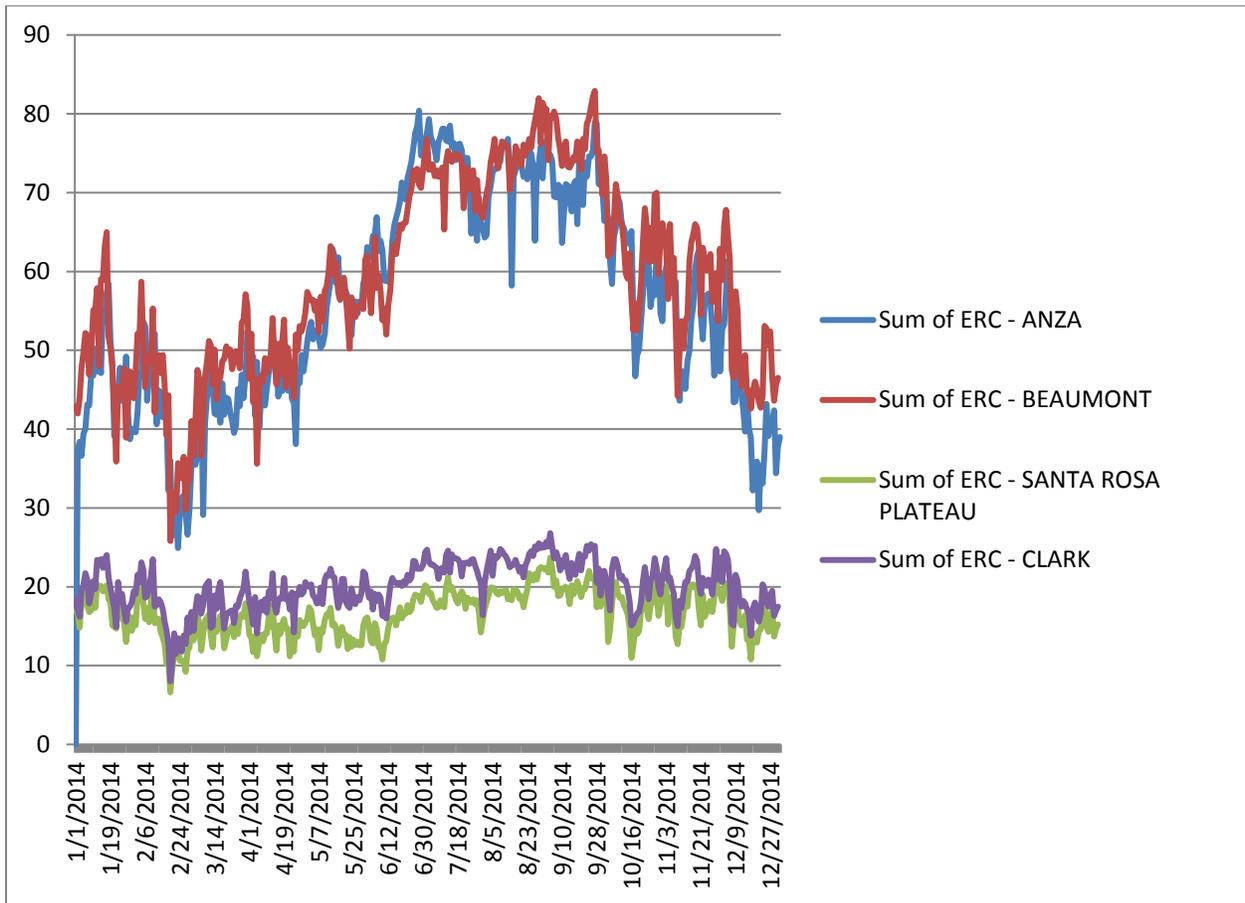
APPENDIX E: CAL FIRE/Riverside County Fire, Fire Danger Rating Areas

Legacy FDRA's



## Pivot Table

The pivot table exercise is a way to evaluate the compatibility of RAWs stations that are being used in a SIG (special interest group) like the use of Anza and Beaumont in the High FDRA and the use of Clark and Santa Rosa Plateau in the Low FDRA. The graphic below indicates that the stations are reasonably compatible. This is indicated by the grouping of the curves and the similarity of the shape and amplitude.



**SIGNATURES**

Riverside Unit Fire Danger Operating Plan

**RECOMMENDED BY:**

TIM CHAVEZ BC  
PRINT NAME TITLE

[Signature] 11/28/16  
SIGNATURE DATE

**APPROVED BY:**

JOHN R. HAWKINS FIRE CHIEF  
PRINT NAME TITLE

[Signature] 11/17/16  
SIGNATURE DATE