

***EUREKA FIRE WEATHER
ANNUAL REPORT 2006***

for

NORTHWEST CALIFORNIA



Smoke associated with multiple large wildfires burning across northwest California. August, 2007

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I. INCIDENT AND WEATHER REVIEW

The summer of 2006 was one of the busiest fire seasons on record for northwest California and the Weather Forecast Office (WFO) in Eureka . The fire weather pattern during the summer months was highlighted by two lightning outbreaks and four “Offshore Wind” events. Three of the four offshore events could be considered mild in that wind speeds were generally light and the durations of the events were less than 36 hours. A late September event was strong and lasted nearly 3 days. This event was characterized by strong and gusty east winds and extremely low relative humidity values warranting the issuance of Red Flag Warnings across all the Eureka “non-coastal” fire weather zones. This event also brought record breaking high temperatures to the coast.

The first lightning outbreak occurred in late June over northern Mendocino and southern Humboldt counties and was considered a mild event in that the number of strikes was small, with only a couple positive strikes recorded and very few new-fire starts. The second event occurred during late July when a surge of monsoonal moisture moving northeast out of the Great Basin generated thunderstorms across the Salmon Mountains and Yolla Bolly Wilderness. Numerous fire starts were detected across the Klamath, Shasta-Trinity, Six Rivers and Mendocino National Forests requiring extensive initial attack response. Despite the efforts of initial attack a number of the wildfires grew to large acre burns requiring Type I and Type II Incident Management Team response. Three large fires: The Bar Complex; Orleans Complex; and Uncles Fire burned throughout the remainder of the summer, finally being declared contained in late October.

On July 29th a fire started approximately one mile east of Junction City on state highway 299. This fire was suspected to have been of human origin. Fanned by southwest winds of 15 to 25 mph along the Trinity River drainage this fire grew to nearly 1000 acres by nightfall. The fire caused the closure of Route 299 and evacuations of all residences along 299 from Junction City to Weaverville. Residences along the west end of Weaverville and the Weaverville Community Hospital were also evacuated. This fire was eventually folded into the Bar Complex.

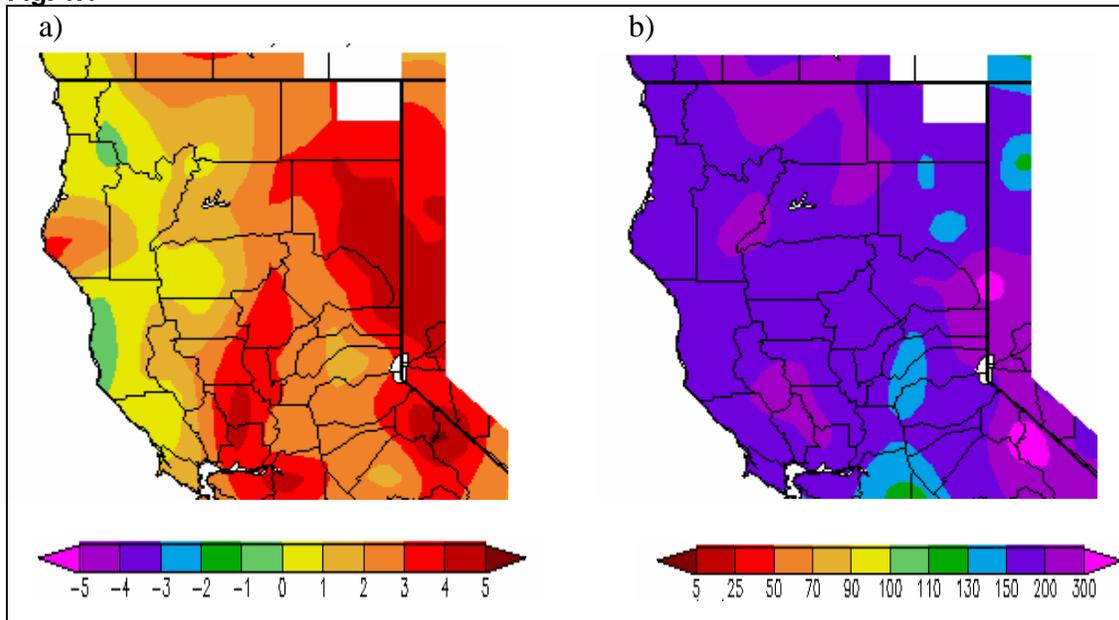
All fires required a great amount of weather support from WFO Eureka as the number of site specific or Spot Forecasts that were issued more than quadrupled in amount from previous years. On-site support in the form of Incident Meteorologist (IMET) dispatches totaled more than 100 days for last season’s fire activity which is the highest amount since IMET records have been kept locally at WFO Eureka.

Last year’s fire season also broke records nationally as large fire activity across the mid-west and western states combined to burn nearly 10 million acres. Due to the increase in national fire activity, WFO Eureka experienced a marked increase in providing IMET support to fires outside of California. Eureka IMET’s were dispatched for a total of 40 days to wildfires in Arizona, Idaho, Washington and Nevada.

Fall and Winter 2005 (Oct – Dec '05)

Leading up to the 2006 season, the fall of 2005 was pleasantly dry with near normal temperatures and only a few mild off-shore events. Although surface high pressure built over the coastal interior during October and November, temperatures remained mild. East and northeast winds were light as upper level troughs over the area prevented the strengthening of the off-shore phenomena. The weather pattern through early December was fairly normal with the occasional pacific storm providing periods of rain...however by mid December the pattern began to shift as the jet stream dropped south into southern Oregon and northern California. The shift, characterized by a weak La Nina episode, brought record breaking rainfall to the north coast and amounts well above average to northwest California. (See Fig. 1). Greatest rainfall amounts occurred between Christmas and New Years as a series of strong and moisture laden pacific storms allowed widespread flooding to main stem rivers from Del Norte County to Mendocino County and across the flood plain of northern California. The strong storms not only brought heavy rainfall to the area but one particular storm brought historically strong winds to the Humboldt Bay region and coastal vicinity on New Years Eve day...causing widespread power outages and significant damage from downed trees.

Fig. 1.1

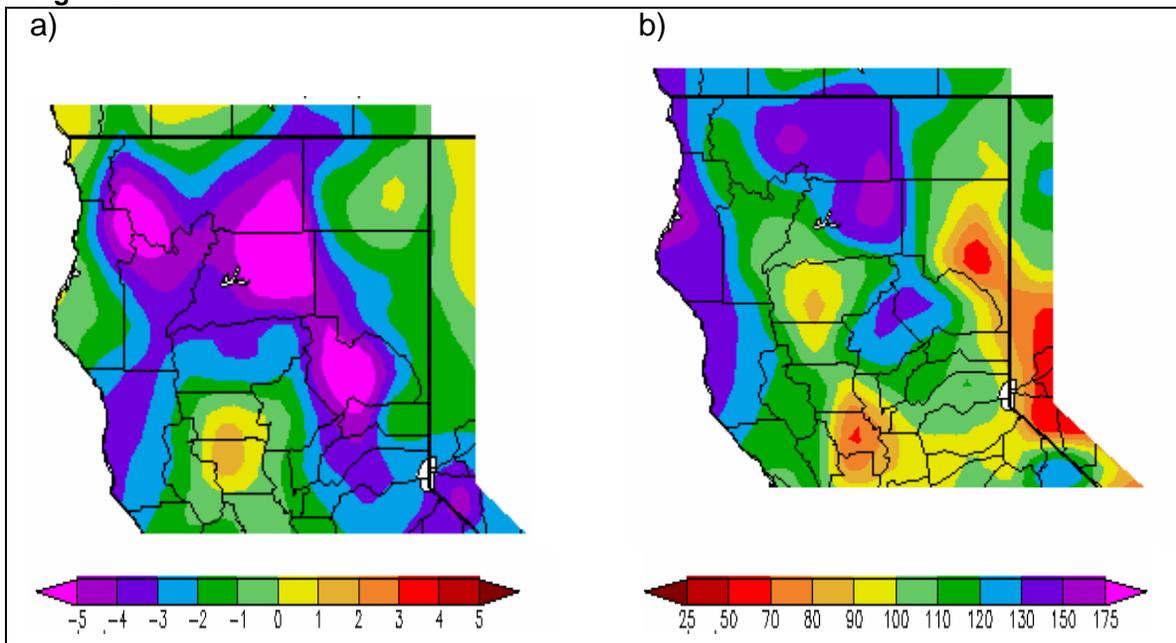


(a) Departure from average temperature October '05 through December '05. (b) Departure from average precipitation in percent October through December '05.

Winter and Spring 2006 (Jan – Mar)

The stormy pattern continued from late December well into January across Northern California. The state was relentlessly struck by additional pacific storms with subtropical influence. The result was yet another wet and warm month with above normal rainfall and slightly higher than normal temperatures. By early February, however, the pattern finally broke and a ridge of high pressure built across the eastern pacific sending the storm track into the Pacific Northwest. The break brought mainly clear skies and colder than normal temperatures to much of the forecast area through the middle of the month. Toward the end of February the storm track returned and brought more heavy rain to the region. By March the very wet pattern remained over northwest California and by the end of the month the coastal areas were nearly 200% above normal in precipitation. A major difference from the January storms was that the source region was not subtropical and many of the systems were cold in nature. The colder storms brought large snow falls to the interior and colder than normal temperatures to the coastal zones. The end result for the 3 month period was colder than normal temperatures along with much greater than normal precipitation. (Fig 1.2)

Fig. 1.2

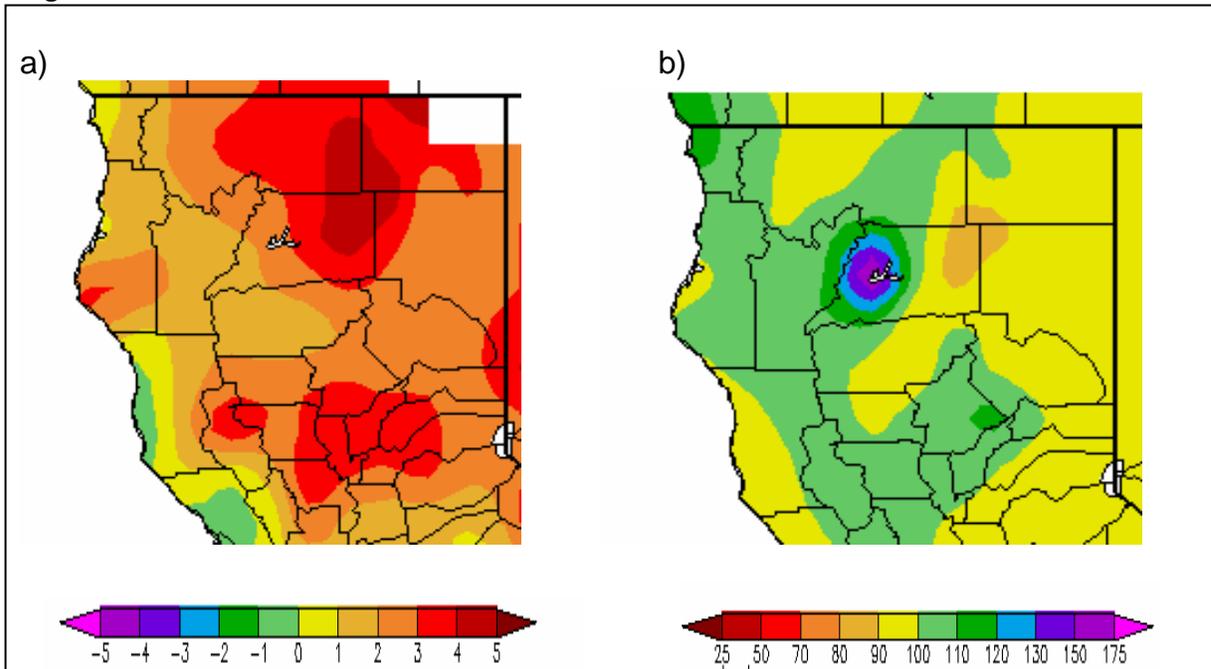


(a) Departure from average temperature January through March '06. (b) Departure from average precipitation in percent January through March '06.

Spring and Early Summer 2006 (Apr – June)

The excessive rainfall resumed into April over northwest California as the succession of pacific storms continued. Finally in early May the rains began to stop and a blocking ridge of high pressure sustained itself across northern California for the latter half of the month. This brought a dry weather pattern to the region including plenty of clear sky days and warmer than normal temperatures (See Fig 1.3). This pattern continued into June as well with pleasant early summer weather. Other than a brief monsoonal surge during the third week of June little rainfall was recorded over northwest California during the month. This is depicted well by Fig as below normal to slightly above normal rainfall is shown over the Eureka fire zones.

Fig. 1.3

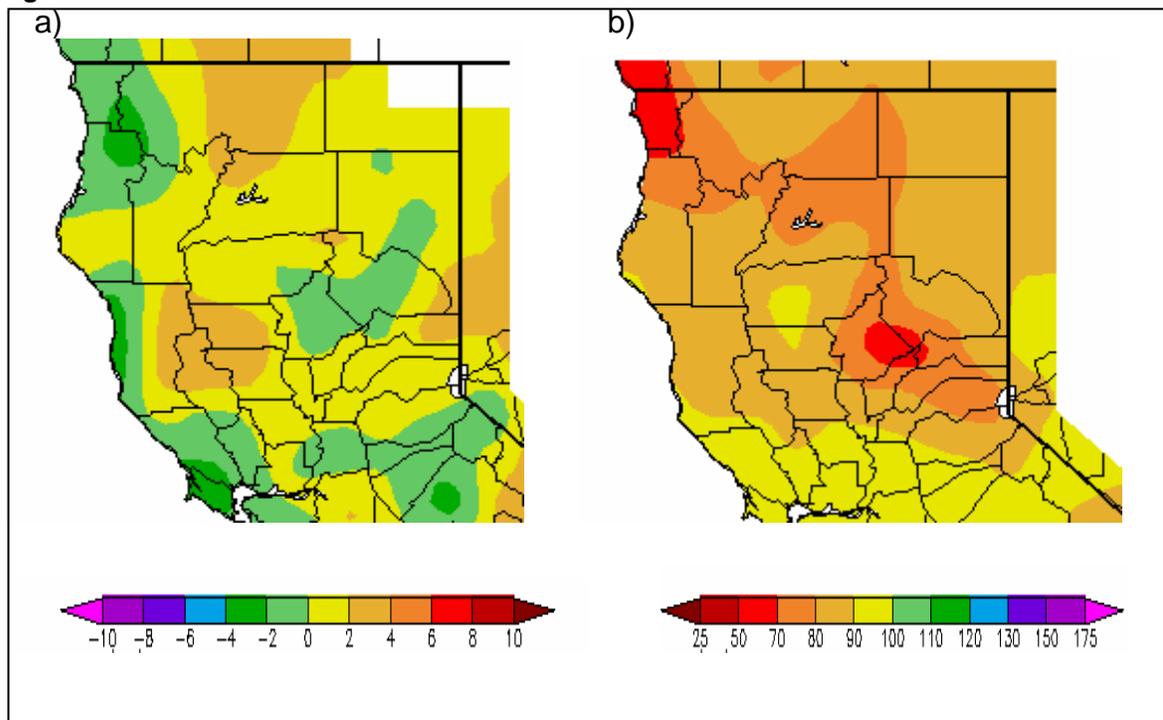


(a) Departure from average temperature April through June '06. (b) Departure from average precipitation in percent April through June '06.

Late Summer / Fall 2006 (July – Oct)

Through June the fire season was fairly un-eventful, however in late July a strong monsoonal flow developed over the desert southwest. A large ridge of high pressure aloft helped deliver much of that moisture north across the central valley of California and into the northwest region of the state. On July 24th the very moist atmosphere helped trigger a vast band of wet thunderstorms to the mountains of northwest California. Although most of the lightning strikes were accompanied by plentiful rainfall, the strikes penetrated areas of steep and complex terrain. The new fire starts were difficult or impossible to reach by IA thus over the course of several days of drying, numerous small fires grew rapidly. The month of August was mainly dry and recorded slightly below seasonal average temperatures as a series of weak upper troughs moved through the region. With large fires burning across northern California it was fortunate that no strong offshore events developed. This changed however in September as two strong easterly flow events shaped up helping to prolong the already busy fire season. The pattern continued well into October as more Red Flag Warnings were issued due to two additional but weaker off-shore flow events.

Fig. 1.4



(a) Departure from average temperature July through September '06. (b) Departure from average precipitation in percent July through September '06.

II. RED FLAG VERIFICATION

Eureka Fire Weather issued a total of 16 individual zone Red Flag Warnings during the 2006 fire season. Three warnings were issued for Dry Lightning and 13 for wind and low humidity. 14 of the 16 warnings verified, of which 10 were preceded by a Fire Weather Watch. The two warnings that did not verify were for Dry Lightning. There were no events that were considered missed.

Of the 14 verified Red Flag Warnings 10 were preceded by a Fire Weather Watch or **71%**.

- Correct Warnings (Verified) = **14**
- Incorrect Warnings (not verified) = **2**
- Missed Events = **0**

POD (Probability of Detection)...**1.0** (Highest Accuracy = 1.0)

CSI (Critical Success Index).....**0.86** (Highest Accuracy = 1.0)

FAR (False Alarm Ratio).....**0.14** (Highest Accuracy = 0)

The average lead time for all Red Flag Warnings issued was **13.6 hours**. The average lead time for the Fire Weather Watches issued was **29.5 hours**.

2006 WARNING VERIFICATION								
ZONE	# RFW	Correct RFW	Incorrect RFW	Missed Event	POD	CSI	FAR	# Watch
201	0.0	0.0	0.0	0.0				0.0
202	0.0	0.0	0.0	0.0				0.0
203	1.0	1.0	0.0	0.0	1.0	1.0	0.0	1.0
204	1.0	1.0	0.0	0.0	1.0	1.0	0.0	1.0
211	2.0	1.0	1.0	0.0	1.0	0.5	0.5	2.0
212	2.0	1.0	1.0	0.0	1.0	0.5	0.5	2.0
276	3.0	3.0	0.0	0.0	1.0	1.0	0.0	1.0
277	3.0	3.0	0.0	0.0	1.0	1.0	0.0	1.0
283	4.0	4.0	0.0	0.0	1.0	1.0	0.0	2.0
TOTALS	16.0	14.0	2.0	0.0	1.0	0.86	0.14	10.0

III. SPOT FORECASTS

The National Weather Service Office in Eureka issued a total of 250 site specific or spot forecasts during the calendar year 2006. This amount is nearly four times the '03 – '05 average of 68 spots. The significant increase is attributed to two factors. First, the large amount of wildfires that were present within the area of responsibility during the summer; and secondly, new Forest Service regulations require spot forecasts for all burning activity. Of this total, 91 spot forecast requests were for wildfires, 158 were for project burns and 1 was issued for a training exercise. The total was up 194 from the previous year. Similar to previous years, the majority of spot forecast requests came from the USFS and CDF with about 10% distributed between the national and state parks and BIA.

The average “turn-around-time” for wildfire spot forecasts was 54 minutes while the average turn around time for project burns was 48 minutes. This was an increase of 20 and 5 minutes respectively from the 2005 average. The increase in turn around time is likely attributed to the significantly higher amount of spot requests. The average spot forecast turn around time was 52 minutes for all spot forecasts

Turn around time is defined as the elapsed time between a spot forecast request receipt (or notification) and forecast transmission. There were 32 instances where spot forecasts were requested a day or more in advance of ignition time. These cases were omitted from the average turn around time calculation.

Table 3.1

Spots For Wildfires.....	91
Spots For Project Burns.....	158
Spots For Hazmat.....	0
Misc. / Training Spots.....	1
Average Turnaround Time	
For Wildfire.....	54 minutes
For Project Burns.....	48 minutes
For All Spots.....	52 minutes
Total Spots	250

Fig. 3.2

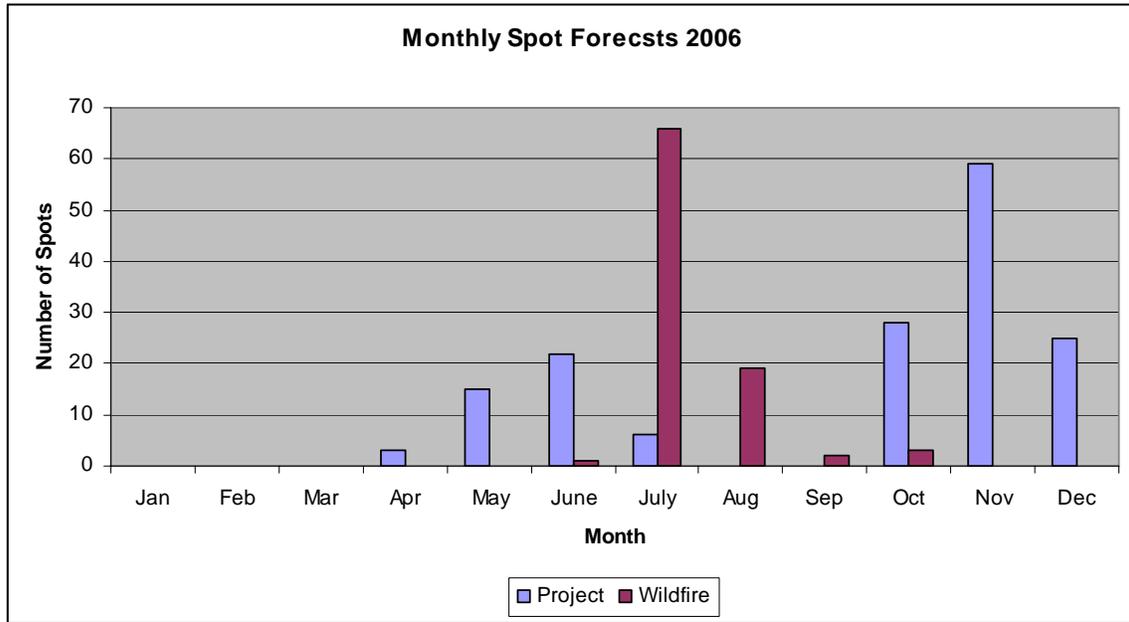
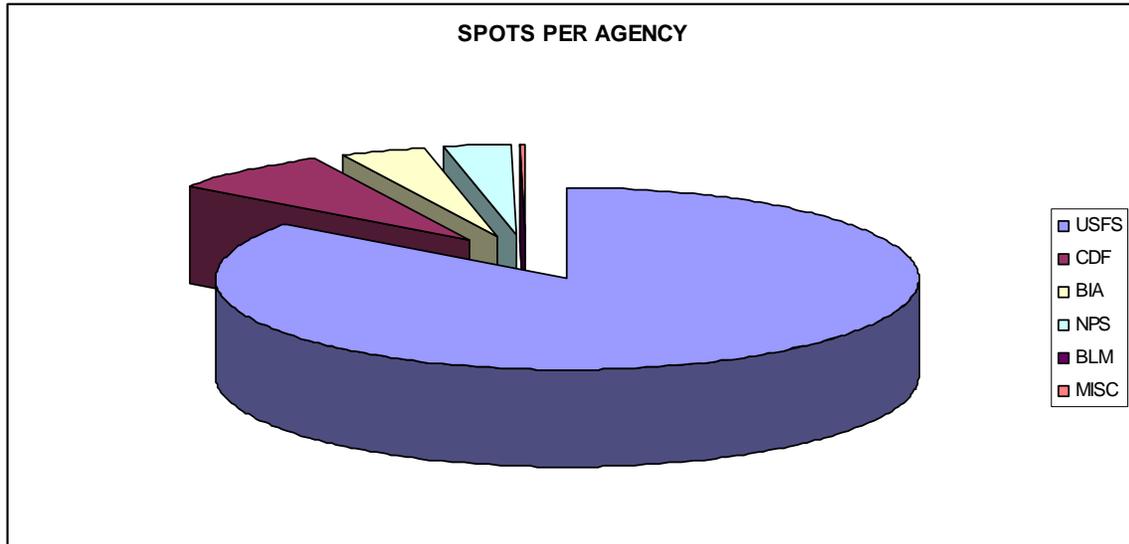
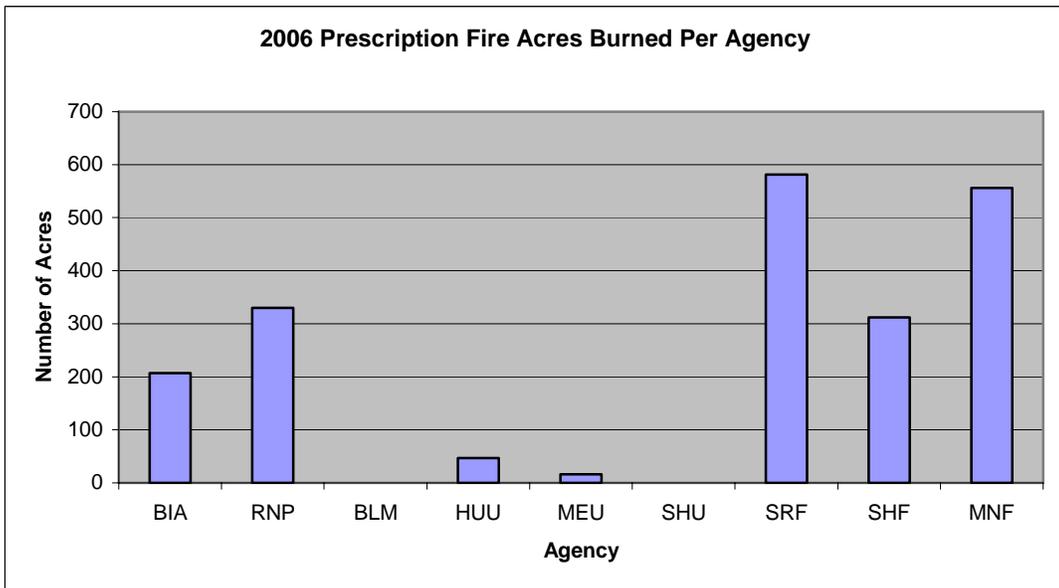
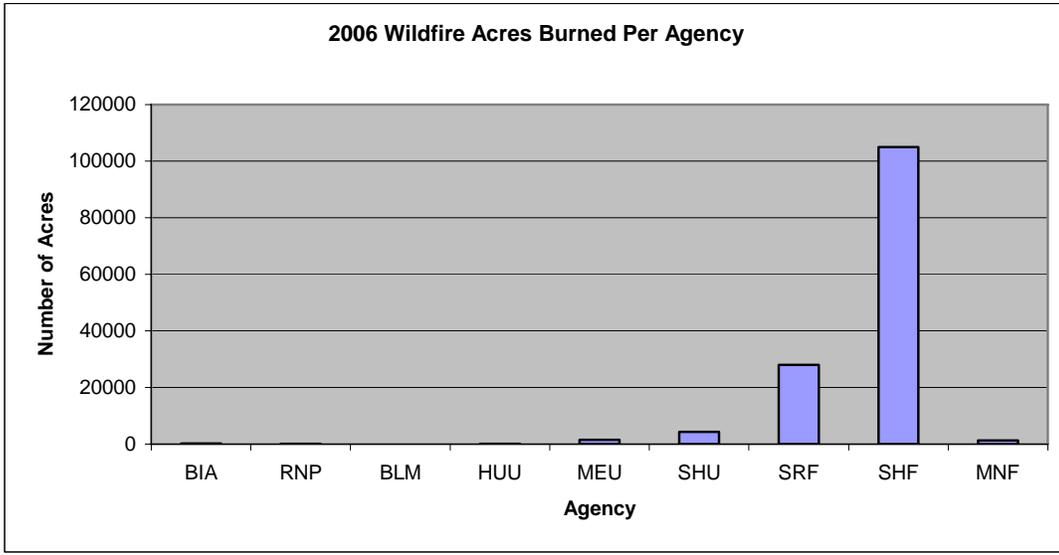


Fig. 3.3



IV. WILDFIRE / PROJECT BURN ACTIVITY

Two major fire complexes impacted primarily the Shasta-Trinity and Six Rivers National Forests. The Orleans Complex and Bar Complex combined to burn nearly 140,000 acres. Given the busy summer, prescription burning was limited until the late summer and fall period when planned burning peaked. The number of project acres burned was very similar to the average over the last few years.



* These totals include acres burned within the Mendocino and Shasta-Trinity National Forests, portions of which overlap into WFO Sacramento's and WFO Medford's areas of responsibility.

V. ON-SITE METEOROLOGICAL SUPPORT

The summer of 2006 was by far the busiest season for onsite meteorological support in the history of the Eureka WFO. Incident Meteorologist (IMET) support from WFO Eureka totaled 106 days, excluding travel, which exceeds the previous record of approximately 52 days by former IMET Nancy Dean during the active fire season of 2001. Eureka currently has two certified IMET's, Jeff Tonkin and Mark Burger. An IMET trainee, Brett Lutz, was certified during the 2006 summer and has since transferred to WFO Medford. IMET Jeff Tonkin was dispatched to 6 separate incidents while Mark Burger was dispatched to 5 incidents. (See Table 5.1)

There were 10 IMET's from both neighboring and distant National Weather Service offices assigned to support to wildfires within Eureka area of responsibility during the 2006 season. Support from these IMET's totaled 101 days and is outlined in table 5.2 below.

Table 5.1

<u>IMET</u>	<u>Incident Name</u>	<u>Location</u>	<u>Dates</u>	<u>Local WFO</u>
Mark Burger	Warm Fire	Jacob Lake, AZ	6/20 to 7/4	Flagstaff
Jeff Tonkin	Jackass	Smith, NV	7/19 to 7/23	Reno
Jeff Tonkin	Sixmile 2	Virginia City, NV	7/23 to 7/26	Reno
Mark Burger	Rico WF	San Ardo, CA	7/25 to 7/28	Monterey
Jeff Tonkin	Happy Camp	Happy Camp, CA	7/28 to 8/9	Medford
Mark Burger	Lakin Fire	McCloud, CA	7/29 to 8/1	Medford
Mark Burger	Uncles Complex	Sawyers Bar, CA	8/17 to 9/1	Medford
Jeff Tonkin	Red Mtn Complex	Lowman, ID	8/18 to 8/26	Boise
Jeff Tonkin	Columbia Complex	Dayton, WA	8/27 to 8/31	Pendleton
Jeff Tonkin	Bar Complex	Junction City, CA	9/8 to 9/21	Eureka
Mark Burger	Bar Complex	Junction City, CA	9/21 to 10/2	Eureka

Table 5.2

<u>IMET</u>	<u>Incident</u>	<u>Dates</u>	<u>WFO</u>
Chuck Redman	Bar Complex	7/28 to 8/12	Boise
Bill Hibbert	Orleans Complex	7/29 to 8/11	Buffalo
Basil Newmerzhucky	Bar Complex	7/30 to 8/2	Sacramento
Dave Lipson	Bar Complex	8/10 to 8/27	Riverton
John Franks	Orleans Complex	8/12 to 8/25	Cincinnati
Tony Edwards (T)	Bar Complex	8/14 to 8/21	Jackson
Cindy Bean	Orleans Complex	8/25 to 9/4	Hanford
Chuck Redman	Bar Complex	9/2 to 9/8	Boise
Dennis Gettman	Noble Fire	9/27 to 10/1	Medford
John Pendergrast	Bar Complex	10/1 to 10/13	Melbourne

VI. EUREKA FIRE WEATHER PROGRAM SUMMARY

The following table illustrates a comparison of activity and performance for the last two years and includes a four year average (2003 through 2006).

ANNUAL COMPARISON TABLE				
	<u>2005</u>	<u>2006</u>	<u>06 - '05 Diff</u>	<u>'03 - '06 Ave.</u>
<u>Warning / Watch</u>				
Red Flag Warnings Issued:	3	16	13	9.5
Dry Lightning:	0	3	3	1
Wind/RH	3	13	10	8.5
Average Lead Time (hr)	9.0	13.6	4.6	12.9
Fire Weather Watches Issued:	4	4	0	5.8
Dry Lightning:	0	0	0	1.0
Wind/RH	4	4	0	4.8
Average Lead Time (hr):	14.5	14.5	N/A	23.4
<u>Verification:</u>				
POD	1.0	1.0	0.0	1.0
CSI	1.0	0.86	-0.14	0.79
FAR	0	0.14	0.14	0.22
<u>SPOT Forecasts</u>				
Total Issued:	56	250	194	114
Wildfire Spots:	14	91	77	52
Average Turn-Around-Time:	34 min	54 min	20 min	53 min
Project Spots:	39	158	119	60
Average Turn-Around-Time:	43 min	48 min	5 min	54 min
<u>IMET Support</u>				
Total Days	23	106	83	38
Mark	N/A	53	N/A	N/A
Jeff	23	53	30	32
Dispatch Days within CWA:	0	127	127	36

VII. TRAINING, EDUCATIONAL AND OUTREACH ACTIVITIES

The following table summarizes various fire weather activities which the Eureka fire weather staff participated in during the 2006 calendar year.

Dates	Activity	Agency/User/Audience	Representative	Location
Mar 13-17	IMET Workshop	NWS	Brett, Mark,Jeff	Boise, ID
Apr 12th	CA-AOP Meeting	NWS/GACC	Nancy	Sacramento
Apr 13th	Taught RX300	Six Rivers NF	Jeff	Eureka
Apr 26-27th	SONCAL	Multiple Agency	Mark	Susanville
May 8-12th	NOAA Hazmet IMET	NWS	Jeff, Brett	Ft. Worth, TX
May 22-26th	All Hazard IMET	NWS	Brett, Mark,Jeff	Boise
June 12th	User Meeting	Six Rivers NF	Nancy	Eureka
June 20-July 4	IMET Dispatch	Warm Fire	Mark	Jacob Lake, AZ
July 19-23	IMET Dispatch	Jackass Fire	Jeff	Smith, NV
July 23-26	IMET Dispatch	Sixmile 2 Fire	Jeff	Virginia City, NV
July 25-28	IMET Dispatch	Rico Fire	Mark	San Ardo, CA
July 28th	User Meeting	Rob Mclelland - Six Rivers NF	Jeff	Willow Ck, CA
July 28 - Aug 9	IMET Dispatch	Happy Camp Fire	Jeff	Happy Camp, CA
Aug 7th	User Meeting	Mike Jameson - Six Rivers NF	Jeff	Virginia City, NV
July 29-Aug 9	IMET Dispatch	Lakin Fire	Mark	McCloud, CA
Aug 17-Sep 1	IMET Dispatch	Uncles Complex	Mark	Sawyers Bar, CA
Aug 18-26	IMET Dispatch	Red Mountain Fire	Jeff	Lowman, ID
Aug 27-31	IMET Dispatch	Columbia Complex	Jeff	Dayton, WA
Sep 8 - 21	IMET Dispatch	Bar Complex	Jeff	Junction City, CA
Sep 12th	User Meeting	George Champman - Shasta T NF	Jeff	Weaverville, CA
Sep 21 - Oct 2	IMET Dispatch	Bar Complex	Mark	Junction City, CA
Oct 19th	Fire Wx Lecture	Humboldt State Univ.	Jeff	Arcata, CA
Oct 23rd	Fire Wx Lecture	Humboldt State Univ.	Jeff	Eureka
Nov 7-8	CA UAT Meeting	Multiple Agency	Nancy	Sacramento