



NATIONAL PARK SERVICE

KLAMATH FIRE ECOLOGY PROGRAM

FIRE ECOLOGY ANNUAL REPORT

CALENDAR YEAR 2009

SUMMARY

2009 was a smooth season for the Klamath Fire Ecology program. The crew consisted of Chris Merideth who returned for his second year as a seasonal, and Aimee Collins, a new hire. Although the crew had a large amount of scheduled plot work in Whiskeytown National Recreation Area (WHIS), relatively small amounts of plot work and installs in Redwood National Park (REDW) and Oregon Caves National Monument (ORCA) enabled the crew to successfully complete all scheduled field work, along with catching up on almost all data entry from the previous two years.

The crew spent seven weeks in Whiskeytown during May, June and July completing a variety of plot reads including one year post reads after the extensive wildfires of 2008 and other regularly scheduled plot reads. During these seven weeks, WHIS ecologist Jennifer Gibson was kind enough to lend the fire effects crew one exotic plant crewmember for three weeks. The crew became so efficient that they also had time to locate and GPS six plots scheduled to be read in 2010, kayak to Brandy Island to locate and pull rebar of two mothballed plots, and install two FMH forest plots within the Carr burn unit.

After all regular plot work was finished in Whiskeytown, the crew returned to Redwood and completed the few FMH plots scheduled to be read this year. They traveled to Oregon Caves during the last week of July for three days to read two FMH forest plots and four rapid assessment plots, and were treated to a tour of the cave by omniscient John Roth.

The month of August brought the crew back to Whiskeytown for two more weeks to read Composite Burn Index (CBI) plots in the 2008 Motion and Whiskeytown Complex wildfire areas with the help of the Point Reyes crew. Working together the crews were able to read 130 CBI plots within the two wildfires while bonding with new fire effects co-workers.

The crew had such an efficient field season that they were able to spend a significant amount of time during the fall entering and quality checking a considerable amount of data. This meant that almost all data were input and quality checked before the crew was laid off in November. This would be a first for the crew within the last five years.

During the data management-filled fall, the crew was able to help prepare for prescribed burns. This included helping the fuels crew prepare units, collecting on-site weather and submitting spot weather forecasts. The crew was also able to help complete prescribed burns in REDW and WHIS by filling a variety of roles.

While the crew spent their days in the field collecting data, Fire Ecologist Jen Beck was held hostage within the confines of her office. Some of her many accomplishments during captivity include: creating much needed resource advisor (READ) programs within Redwood and Whiskeytown, completing an extensive and thorough monitoring plan for Redwood, beginning the process of creating a dynamic fuels map for Whiskeytown, and continued production of pretty graphs to present to fire managers. She was able to escape the holding cell of her office to make multiple trips to Whiskeytown along with a few trips to Oregon Caves to meet with various other park resources.

TABLE 1. FIRE EFFECTS MONITORING WORKLOAD

Park	Monitoring Unit	Type of Plot	Preburn	Immediate Post	Postburn (1 – 20 years)	Total Plots
Oregon Caves	Douglas-fir	FMH Forest	-	-	2	8
	Douglas-fir	Rapid Assessment	-	4*	-	4*
Whiskeytown	California Black Oak	FMH Forest	1	-	8	11
	Canyon Live Oak	FMH Forest	1	-	-	2
	Ponderosa Pine	FMH Forest	-	-	3	6
	Mixed Conifer	FMH Forest	-	-	13	19
	Whiteleaf Manzanita	FMH Forest	-	-	4	4
	Whiteleaf Manzanita	FMH Brush	-	-	10	10
	2009 Burned Areas	CBI	-	130^	-	130^
Redwood	Redwood	FMH Forest	-	-	1	1
	Oregon White Oak	FMH Forest	1	1	2	26
	Mixed Prairie	FMH Grass	2	10	4	38
	Encroaching Fir	Rapid Assessment	17*	14*	-	34*
Totals			22	159	47	293

* denotes pilot sampling

^ installed with help of Point Reyes crew

FIRE ECOLOGY STAFFING

TABLE 2. FIRE ECOLOGY STAFFING 2009

Ecologist & Monitors	Starting Date	Ending Date	# of Pay Periods	READ Qualified (Yes or No)	Training & Development
Jen Beck	1/1/09	12/31/09	26	Yes	GIS training, BARC training
Becky Smith	1/1/09	12/31/09	26	No	S-330, RX-341, ICT4 taskbook completed, worked on RXB2 taskbook, started attending TFM program
Chris Merideth	5/19/09	11/20/09	13.5**	No	S-211, S-260, S-261
Aimee Collins	5/26/09	11/20/09	13**	No	S-130, S-190, I-100, S-211, worked on FEMO taskbook

** Four of these pay periods (10/1/09-11/20/09) were paid for with fuels dollars to help accomplish Redwood's prescribed fire goals



FIGURE 1. FIRE EFFECTS CREWMEMBERS CHRIS MERIDETH, BECKY SMITH AND AIMEE COLLINS NEAR BRANDY ISLAND IN WHIS; FIRE ECOLOGIST JEN BECK BEING HELD HOSTAGE IN HER OFFICE

MANAGEMENT OBJECTIVES AND MONITORING RESULTS

Fire Effects Monitoring has been occurring at Redwood and Whiskeytown since 1990, while work at Oregon Caves has been ongoing since 1996. The monitoring programs at all parks are still evolving, and no monitoring types have sufficient sample sizes to assess objectives with the desired level of statistical power. The results of long-term monitoring provide managers with insights into changes occurring in vegetation communities after prescribed fire and mechanical thinning treatments, and assessing trends from monitoring data helps determine treatment efficacy.

WHISKEYTOWN NATIONAL RECREATION AREA

Whiskeytown NRA has seven defined FMH monitoring types: black oak woodland - FQUKE1Do9*, live oak woodland - FQUCH1Do9* (**note: these two types are lumped for analysis into “oak woodland”*), ponderosa pine forest - FPIPO1Do9, mixed conifer forest – FMICO1Do8, knobcone pine forest – FPIAT1D10, and chaparral – FARV11Do4, BARV11Do4.



FIGURE 2. IMAGES OF 2008 WHISKEYTOWN COMPLEX WILDFIRES

WHISKEYTOWN – OAK WOODLAND

Twelve oak woodland plots are currently installed within Whiskeytown NRA; three of the twelve plots are currently within prescribed burn units that have not been treated as of this time. These twelve plots are located within the Brandy Creek, Sunshine, Dog Gulch, Buck and Carr prescribed burn units. Monitoring results are available from preburn (ooPRE) through one year after the first burn (o1YRo1) for nine plots in the Brandy Creek, Dog Gulch, Monarch Mountain, and Sunshine burn units. Results are available from ooPRE through five years after the first burn (o1YRo5) for five plots in the Brandy Creek burn unit. A photo sequence of an FQUKE1Dog plot located within the Dog burn unit is provided below.

TABLE 3. MANAGEMENT OBJECTIVES AND MONITORING RESULTS FOR OAK WOODLAND MONITORING TYPE

Park Monitoring Unit	Management Objective	Monitoring Results (80% confidence intervals)	Objective Achieved?	Minimum Plots Achieved?
WHIS Oak Woodland (FQUKE1Dog & FQUCH1Dog) n = 9	Maintain average total dead & down fuel loads between 5-15 tons/acre	ooPRE: 20.6 (19.3—21.9) tons/acre o1POST: 3.8 tons/acre (2.9—4.7) tons/acre o1YRo1: 7.6 tons/acre (4.0—11.2) tons/acre	Yes, but additional plots needed	No
WHIS Oak Woodland (FQUKE1Dog) n = 5	Maintain average total dead & down fuel loads between 5-15 tons/acre	ooPRE: 20.2 (18.0—22.4) tons/acre o1POST: 3.4 (2.3—4.5) tons/acre o1YRo1: 10.0 (3.1—16.9) tons/acre o1YRo5: 23.7 (13.9—33.5) tons/acre	Yes, until o1YRo5, but additional plots needed	No
WHIS Oak Woodland (FQUKE1Dog & FQUCH1Dog) n = 9	Maintain average overstory* tree density between 5-50 trees/acre <i>*live trees > 10" DBH</i>	ooPRE: 54 (46—62) trees/acre o1YRo1: 52 (29—74) trees/acre	Not yet, but additional plots needed	No
WHIS Oak Woodland (FQUKE1Dog) n = 5	Maintain average overstory* tree density between 5-50 trees/acre <i>*live trees > 10" DBH</i>	ooPRE: 59 (46—72) trees/acre o1YRo1: 45 (29—62) trees/acre o1YRo2: 38 (23—53) trees/acre o1YRo5: 41 (30—52) trees/acre	Yes, but additional plots needed	No

Park Monitoring Unit	Management Objective	Monitoring Results (80% confidence intervals)	Objective Achieved?	Minimum Plots Achieved?
WHIS Oak Woodland (FQUKE1D09 & FQUCH1D09) n = 9	Maintain average pole* sized tree density between 20-100 trees/acre <i>*live trees ≤ 10" DBH</i>	00PRE: 318 (240—396) trees/acre 01YR01: 168 (87—249) trees/acre	No, but additional plots needed	No
WHIS Oak Woodland (FQUKE1D09) n = 5	Maintain average pole* sized tree density between 20-100 trees/acre <i>*live trees ≤ 10" DBH</i>	00PRE: 340 (230—450) trees/acre 01YR01: 232 (97—366) trees/acre 01YR02: 201 (77—324) trees/acre 01YR05: 142 (49—236) trees/acre	No, but additional plots needed	No

EXAMPLE OF WHIS OAK
WOODLAND MONITORING
TYPE THROUGH TIME:



PHOTO 1. FQUKE1D09-15, PRE, 2007



PHOTO 2. FQUKE1D09-15, 01POST, 2008



PHOTO 3. FQUKE1D09-15, 01YR01, 2009

WHISKEYTOWN – MIXED CONIFER

Nineteen mixed conifer FMH plots are installed at Whiskeytown; they are located within the Coggins Park, County Line and Queen Mary prescribed burn units. One of these plots, located within the Queen Mary prescribed burn unit was burned for the first time during the Whiskeytown Complex fire of 2008. Six of the mixed conifer FMH plots are control plots located near the Coggins Park burn unit; these control plots are scheduled to be read 00YR20 during the 2010 and 2011 field seasons. Monitoring results are available for nine plots from 00PRE to 01YR05 located in the Coggins Park and Queen Mary burn units, and for five plots from 00PRE to fifteen years after the first burn (01YR15) in the Coggins Park unit. A photo sequence of an FMICO1Do8 plot located within the Coggins Park burn unit is provided below.

TABLE 4. MANAGEMENT OBJECTIVES AND MONITORING RESULTS FOR MIXED CONIFER MONITORING TYPE

Park Monitoring Unit	Management Objective	Monitoring Results (80% confidence intervals)	Objective Achieved?	Minimum Plots Achieved?
WHIS Mixed Conifer Forest (FMICO1Do8) n = 9	Maintain average total dead & down fuel loads between 10 – 35 tons/acre	00PRE: 35.9 (24.1—47.4) tons/acre 01YR01: 16.7 (10.7—22.7) tons/acre 01YR02: 18.3 (12.4—24.2) tons/acre 01YR05: 35.3 (21.2—49.4) tons/acre	Yes, until 01YR05, but additional plots needed	No
WHIS Mixed Conifer Forest (FMICO1Do8) n = 5	Maintain average total dead & down fuel loads between 10 – 35 tons/acre	00PRE: 19.7 (15.5—23.9) tons/acre 01POST: 11.8 (7.1—16.5) tons/acre 01YR01: 8.5 (4.9—12.2) tons/acre 01YR02: 13.1 (4.9—21.2) tons/acre 01YR05: 17.9 (15.1—20.7) tons/acre 01YR15: 15.4 (13.8—17.0) tons/acre	Yes, but additional plots needed	No
WHIS Mixed Conifer Forest (FMICO1Do8) n = 9	Maintain average overstory* tree density between 10 – 65 trees/acre <i>*live trees > 10" DBH</i>	00PRE: 49 (39—59) trees/acre 01YR01: 49 (41—58) trees/acre 01YR02: 49 (40—57) trees/acre 01YR05: 49 (39—59) trees/acre	Yes, but additional plots needed	No
WHIS Mixed Conifer Forest (FMICO1Do8) n = 5	Maintain average overstory* tree density between 10 – 65 trees/acre <i>*live trees > 10" DBH</i>	00PRE: 44 (34—54) trees/acre 01YR01: 47 (38—56) trees/acre 01YR02: 49 (41—57) trees/acre 01YR05: 52 (43—60) trees/acre 01YR15: 66 (50—83) trees/acre	Yes, until 01YR15, but additional plots needed	No

Park Monitoring Unit	Management Objective	Monitoring Results (80% confidence intervals)	Objective Achieved?	Minimum Plots Achieved?
WHIS Mixed Conifer Forest (FMICO1Do8) n = 9	Maintain average overstory* tree basal area between 75 – 200 ft ² /acre <i>*live trees > 10" DBH</i>	ooPRE: 160.4 (105.9—214.9) ft ² /acre o1YR01: 160.0 (107.2—212.8) ft ² /acre o1YR02: 143.2 (95.0—191.4) ft ² /acre o1YR05: 133.2 (83.7—182.7) ft ² /acre	Yes, but additional plots needed	No
WHIS Mixed Conifer Forest (FMICO1Do8) n = 5	Maintain average overstory* tree basal area between 75 – 200 ft ² /acre <i>*live trees > 10" DBH</i>	ooPRE: 75.1 (43.1—107.1) ft ² /acre o1YR01: 81.2 (49.6—112.8) ft ² /acre o1YR02: 83.2 (51.8—114.6) ft ² /acre o1YR05: 80.5 (56.7—104.3) ft ² /acre o1YR15: 109.9 (79.4—140.4) ft ² /acre	Yes, but additional plots needed	No
WHIS Mixed Conifer Forest (FMICO1Do8) n = 9	Maintain average pole* sized tree density between 10 – 80 trees/acre <i>*live trees ≤ 10" DBH</i>	ooPRE: 234 (125—342) trees/acre o1YR01: 124 (48—200) trees/acre o1YR02: 104 (45—163) trees/acre o1YR05: 100 (47—152) trees/acre	No, but additional plots needed	No
WHIS Mixed Conifer Forest (FMICO1Do8) n = 5	Maintain average pole* sized tree density between 10 – 80 trees/acre <i>*live trees ≤ 10" DBH</i>	ooPRE: 312 (131—493) trees/acre o1YR01: 170 (39—301) trees/acre o1YR02: 130 (39—222) trees/acre o1YR05: 131 (49—214) trees/acre o1YR15: 142 (41—242) trees/acre	No, but additional plots needed	No

EXAMPLE OF WHIS MIXED
CONIFER MONITORING TYPE
THROUGH TIME:



PHOTO 1. FMICO1D08-12, PRE, 1993



PHOTO 2. FMICO1D08-12, 01POST, 1995



PHOTO 3. FMICO1D08-12, 01YR01, 1995



PHOTO 4. FMICO1D08-12, 01YR02, 1996



PHOTO 5. FMICO1D08-12, 01YR05, 1999



PHOTO 6. FMICO1D08-12, 01YR15, 2009

WHISKEYTOWN – PONDEROSA PINE

There are currently six ponderosa pine FMH plots installed at Whiskeytown. They are located within the Monarch Mountain, Panther Gap and Carr prescribed burn units. The Carr burn unit, which contains one plot, has not been treated as of this time. Monitoring results are available from 00PRE to 01YR01 from five plots in the Monarch Mountain and Panther burn units. Results are also available from 00PRE to one year after the third burn (03YR01) for three plots in the Monarch Mountain unit, which is the only burn unit at Whiskeytown that has been treated three times with prescribed fire.

TABLE 5. MANAGEMENT OBJECTIVES AND MONITORING RESULTS FOR PONDEROSA PINE MONITORING TYPE

Park Monitoring Unit	Management Objective	Monitoring Results (80% confidence intervals)	Objective Achieved?	Minimum Plots Achieved?
WHIS Ponderosa Pine Forest (FPIPO1D09) n = 5	Maintain average total dead & down fuel loads between 5 – 28 tons/acre	00PRE: 32.3 (26.3—38.3) tons/acre 01YR01: 23.7 (0.0—47.4) tons/acre	Yes, but additional plots needed	No
WHIS Ponderosa Pine Forest (FPIPO1D09) n = 3	Maintain average total dead & down fuel loads between 5 – 28 tons/acre	00PRE: 29.7 (24.7—34.6) tons/acre 01POST: 5.3 (2.0—8.5) tons/acre 01YR01: 10.1 (6.2—14.0) tons/acre 02POST: 5.6 (4.9—6.2) tons/acre 02YR02: 16.4 (5.2—27.5) tons/acre 02YR05: 29.3 (14.0—44.5) tons/acre 02YR10: 30.8 (23.5—38.1) tons/acre 03POST: 12.2 (10.5—14.0) tons/acre 03YR01: 12.9 (11.4—14.5) tons/acre	Yes; 3 rd treatment keeps total fuel loads within targets, but additional plots needed	No
WHIS Ponderosa Pine Forest (FPIPO1D09) n = 5	Maintain average overstory* tree density between 15 – 45 trees/acre <i>*live trees > 10" DBH</i>	00PRE: 92 (69—115) trees/acre 01YR01: 87 (67—106) trees/acre	No, but additional plots needed	No

Park Monitoring Unit	Management Objective	Monitoring Results (80% confidence intervals)	Objective Achieved?	Minimum Plots Achieved?
WHIS Ponderosa Pine Forest (FPIPOoDo9) n = 3	Maintain average overstory* tree density between 15 – 45 trees/acre <i>*live trees > 10" DBH</i>	00PRE: 105 (71—140) trees/acre 01YRo1: 94 (64—124) trees/acre 01YRo2: 85 (67—103) trees/acre 02YRo2: 81 (69—93) trees/acre 02YRo5: 74 (61—88) trees/acre 02YRo10: 77 (59—95) trees/acre 03YRo1: 76 (53—98) trees/acre	No, but additional plots needed	No
WHIS Ponderosa Pine Forest (FPIPO1Do9) n = 5	Maintain average pole* sized tree density between 10 – 75 trees/acre <i>*live trees ≤ 10" DBH</i>	00PRE: 424 (299—549) trees/acre 01YRo1: 262 (88—436) trees/acre	No, but additional plots needed	No
WHIS Ponderosa Pine Forest (FPIPO1Do9) n = 3	Maintain average pole* sized tree density between 10 – 75 trees/acre <i>*live trees ≤ 10" DBH</i>	00PRE: 301 (197—404) trees/acre 01YRo1: 80 (11—148) trees/acre 01YRo2: 63 (0—146) trees/acre 02YRo2: 45 (0—94) trees/acre 02YRo5: 32 (0—73) trees/acre 02YRo10: 36 (5—68) trees/acre 03YRo1: 14 (1—26) trees/acre	Yes, after 01YRo1, but additional plots needed	No

WHISKEYTOWN – WHITELEAF MANZANITA

Whiskeytown currently has four whiteleaf manzanita forest FMH plots in Whiskeytown. Two of these plots are located within the Sunshine prescribed burn unit while two are located within the White Rock prescribed burn unit. All of these plots burned in the 2008 Motion fire; the Sunshine unit plots were burned in a prescribed fire in 2001, the White Rock unit plots had not been treated until the wildfire of 2008. A photo sequence of an FARV11Do4 plot located within the Sunshine burn unit is provided below.

TABLE 6. MANAGEMENT OBJECTIVES AND MONITORING RESULTS FOR WHITELEAF MANZANITA MONITORING TYPE

Park Monitoring Type	Management Objective	Monitoring Results (80% confidence intervals)	Objective Achieved?	Minimum Plots Achieved?
WHIS Whiteleaf Manzanita (FARV11Do4) n = 4	Maintain average total dead & down fuel loads between 2 – 10 tons/acre	00PRE: 16.2 (11.2—21.3) tons/acre 01POST: 6.2 (0.2—12.1) tons/acre 01YR01: 7.5 (1.1—13.8) tons/acre	Yes, but additional plots needed	No
WHIS Whiteleaf Manzanita (FARV11Do4) n = 4	Maintain presence of isolated overstory trees (> 15 cm DBH)	00PRE: 57 (24—81) trees/acre 01YR01: 53 (18—71) trees/acre	Yes, but additional plots needed	No

EXAMPLE OF WHIS WHITELEAF
MANZANITA MONITORING TYPE
THROUGH TIME:



PHOTO 1: FARV1Do4-01, PRE, 1998



PHOTO 2: FARV1Do4-01, 01POST, 2001



PHOTO 3: FARV1Do4-01, 01YR01, 2002



PHOTO 4: FAVRV1Do4-01, 01YR06, 2007



PHOTO 5: FARV1Do4-01, 02POST, 2008



PHOTO 6: FARV1Do4-01, 02YR01, 2009

WHISKEYTOWN – KNOBCONE PINE

Whiskeytown has five knobcone pine FMH plots all of which are located within the Shasta Divide prescribed burn unit. This unit has been treated twice with fire, once in 1996 and once in 2003. Both prescribed burns were completed during spring months.

TABLE 7. MANAGEMENT OBJECTIVES AND MONITORING RESULTS FOR KNOBCONE PINE MONITORING TYPE

Park Monitoring Type	Management Objective	Monitoring Results (80% confidence intervals)	Objective Achieved?	Minimum Plots Achieved?
WHIS Knobcone Pine (FPIATiG10) n = 5	Maintain average dead & down fuel loads between 8 – 35 tons/acre	00PRE: 13.7 (10.8—16.6) tons/acre 01YR01*: 16.4 (10.0—22.8) tons/acre 01YR05*: 30.0 (18.3—41.7) tons/acre 02POST: 27.3 (15.5—39.0) tons/acre 02YR02: 42.4 (33.2—51.6) tons/acre 02YR05: 44.4 (31.9—56.9) tons/acre *n = 4	Yes, until 02YR02, but additional plots needed	No



FIGURE 3. TOYON RESPROUT AFTER 2008 MOUNTAIN WILDFIRE; FIRE EFFECTS MONITOR CONTEMPLATING LIFE AND CBI PLOTS

REDWOOD NATIONAL PARK

Redwood NP utilizes the Fire Monitoring Handbook (FMH) protocols for fire effects monitoring work, complemented by rapid assessment monitoring. Three FMH monitoring types have been defined: Oregon oak woodland – FQUGA₁Do₉, mixed prairie – GMIPR₁Do₃, and old growth redwood – FSESE₁Do₈. Rapid assessment monitoring includes “Fir Plots,” which monitor the effects of prescribed fire on encroaching fir in prairies and oak woodlands. Additional fire effects work at REDW involves pilot sampling in Jeffery Pine/Idaho Fescue grasslands in the Little Bald Hills, second growth forests of the Bald Hills, and coastal vegetation at Requa; and assisting California State Park and Redwood Vegetation Management staff in monitoring fire effects in Prairie Creek State Park’s Boyes Prairie.



FIGURE 4. 2008 COPPER CREEK PRESCRIBED BURN; 2009 LUPINE BLOOM IN THE BALD HILLS

REDWOOD – ENCROACHED FIR

Monitoring of fire effects on encroaching fir seedlings began in 2008. Thirty three plots are currently installed within prescribed burn units. Fifteen open grassland plots have been installed; twelve have been treated as of this time. Eighteen plots have been installed in oak woodlands. Fire management objectives for oak woodlands are stratified by burn prescription into “early” units (treated before receiving fall precipitation – typically completely surrounded by fireline) and “late” units (treated after receiving fall precipitation – typically utilizing “wet” forest edges for control). Thirteen oak woodland plots have been installed in “early” season burn units; seven plots have been treated. Five oak woodland plots have been installed in “late” season burn units, and all five have been burned. The “Fir Plot” methodology is simple and short-term in nature, with monitoring lasting only two years postburn. The first fir plots installed in 2008 will be read for the final time during the 2010 field season. A photo sequence for two open grassland fir (FIRG) plots are provided below; the first one is located in the Eastside burn unit, an early unit, while the second one is located in the Lower Elk burn unit, a late unit.

TABLE 8. MANAGEMENT OBJECTIVES AND MONITORING RESULTS FOR ENCROACHED FIR PLOTS

Park Monitoring Type	Management Objective	Preliminary Monitoring Results (80% confidence intervals)	Objective Achieved?	Minimum Plots Achieved?
REDW Fir Encroached Grassland (FIRG) n = 12	In open grassland, reduce density of live Douglas-fir, < 3' tall, by ≥ 80% within two years of the burn	00PRE: 766 trees/acre (538—994 trees/acre) 01POST: 226 trees/acre (83—369 trees/acre) -70.5% change	Will be determined beginning in 2010	Will be determined beginning in 2010
REDW Fir Encroached Oak Woodland – Early Season Rx (FIROE) n = 7	In oak woodlands with conifer encroachment, reduce density of live Douglas-fir, < 3' tall, by ≥ 70% within two years of the burn	00PRE: 908 trees/acre (675—1141 trees/acre) 01POST: 254 trees/acre (0—555 trees/acre) -72% change	Will be determined beginning in 2010	Will be determined beginning in 2010
REDW Fir Encroached Oak Woodland – Late Season Rx (FIROL) n = 5	In oak woodlands with conifer encroachment, reduce density of live Douglas-fir, < 3' tall, by ≥ 50% within two years of the burn	00PRE: 1562 trees/acre (727—2397 trees/acre) 01POST: 469 trees/acre (95—843 trees/acre) -70% change	Will be determined beginning in 2010	Will be determined beginning in 2010

EXAMPLE OF REDW FIR
ENCROACHED GRASSLAND
(FIRG) PLOTS THROUGH
TIME:



PHOTO 1. EASTSIDE FIRG, PRE, 2009



PHOTO 2. EASTSIDE FIRG, 01POST, 2009



PHOTO 3. LOWER ELK FIRG, PRE, 2009



PHOTO 4. LOWER ELK FIRG, 01POST, 2009

REDWOOD – MIXED PRAIRIE

Maintaining the mixed prairies of Redwood requires frequent treatments with prescribed fire and mechanical thinning. Thirty eight mixed prairie monitoring plots have been installed since the early 1990s, and have now experienced as many as six burn treatments. Sixteen of these plots were moved from inactive to active status in 2009; because of this, and inconsistent plot reads throughout the years the amount of monitoring data fluctuates. This situation will improve as time passes and plots continue to be sampled.

Sixteen plots have burned twice; located in the Childs Hill (n = 1), Lower Counts (n = 1), Upper Coyote Creek (n = 2), Lower Coyote Creek (n = 3), Lower Dolason (n = 1), Lower Elk Camp (n = 1), Lyon's Ranch (n = 1), Schoolhouse (n = 2), Williams Ridge (n = 1), and Wooden Gate (n = 3) units. Thirteen plots have burned three times, located in the Upper Coyote Creek (n = 2), Lower Coyote Creek (n = 3), Upper Dolason (n = 1), Lower Elk Camp (n = 1), Schoolhouse (n = 2), Williams Ridge (n = 1), and Wooden Gate (n = 3) units. Five plots have burned four times, located in the Lower Coyote Creek (n = 1), Dolason (n = 1), Schoolhouse (n = 2), and Williams Ridge (n = 1) units. Four plots have burned five times, located within the Upper Dolason (n=2), Lower Elk Camp (n=1), and Upper Lyons (n=1) units.

TABLE 9. MANAGEMENT OBJECTIVES AND MONITORING RESULTS FOR MIXED PRAIRIE MONITORING TYPE

Park Monitoring Type	Management Objective	Monitoring Results (80% confidence intervals)	Objective Achieved?	Minimum Plots Achieved?
REDW Mixed Prairie (GMIPR ₁ Do ₃) n = 27	Do not reduce the relative cover of native plant species by $\geq 10\%$ two years postburn as measured from original preburn conditions	ooPRE: 24.8(21.6—28.0)% o1YRo2: 26.7(23.7—29.8)% Difference: +7.7%	Yes, but additional plots needed	No
REDW Mixed Prairie (GMIPR ₁ Do ₃) n = 16	Do not reduce the relative cover of native plant species by $\geq 10\%$ two years postburn as measured from original preburn conditions	ooPRE: 27.2 (23.3—31.2)% o2YRo2: 26.7 (21.2—32.2)% Difference: -1.8%	Yes, but additional plots needed	No
REDW Mixed Prairie (GMIPR ₁ Do ₃) n = 15	Do not reduce the relative cover of native plant species by $\geq 10\%$ two years postburn as measured from original preburn conditions	ooPRE: 25.9 (22.1—29.7)% o1YRo2: 28.2 (23.3—33.1)% Difference from ooPRE: +8.9% o2YRo2: 26.0 (20.3—31.8)% Difference from ooPRE: +0.4%	Yes, but additional plots needed	No

Park Monitoring Type	Management Objective	Monitoring Results (80% confidence intervals)	Objective Achieved?	Minimum Plots Achieved?
REDW Mixed Prairie (GMIPR ₁ Do ₃) n = 13	Do not reduce the relative cover of native plant species by $\geq 10\%$ two years postburn as measured from original preburn conditions	ooPRE: 27.6 (22.9—32.4)% o3YRo2: 33.2 (28.5—37.8)% Difference: +20.0%	Yes, but additional plots needed	No
REDW Mixed Prairie (GMIPR ₁ Do ₃) n = 10	Do not reduce the relative cover of native plant species by $\geq 10\%$ two years postburn as measured from original preburn conditions	ooPRE: 26.9 (21.3—32.5)% o1YRo2: 34.5 (29.1—39.9)% Difference from ooPRE: +28.3% o2YRo2: 28.4 (20.9—35.9)% Difference from ooPRE: +5.6% o3YRo2: 32.3 (27.2—37.3)% Difference from ooPRE: +20.1%	Yes, but additional plots needed	No
REDW Mixed Prairie (GMIPR ₁ Do ₃) n = 5	Do not reduce the relative cover of native plant species by $\geq 10\%$ two years postburn as measured from original preburn conditions	ooPRE: 32.8 (24.1—41.5)% o4YRo2: 31.5 (26.6—36.3)% Difference: -4.0%	Yes, but additional plots needed	No
REDW Mixed Prairie (GMIPR ₁ Do ₃) n = 4	Do not reduce the relative cover of native plant species by $\geq 10\%$ two years postburn as measured from original preburn conditions	ooPRE: 26.3 (19.6—33.1)% o5YRo2: 24.8 (18.6—31.1)% Difference: -5.7%	Yes, but additional plots needed	No

REDWOOD - OREGON WHITE OAK WOODLAND

Frequent treatments with prescribed fire and mechanical thinning are required to keep the oak woodlands in Redwood free of encroaching fir. There are 26 oak woodland monitoring plots that have been installed since the early 1990s, and have now experienced as many as six treatments with fire. Six of these plots were moved from inactive to active status in 2009; because of this and inconsistent plot reads throughout the years the amount of monitoring data fluctuates. This situation will improve as time passes and plots continue to be sampled.

Twenty two plots have burned once, located in the Childs Hill (n = 2), Copper Creek (n = 6), Lower Coyote Creek (n = 3), Lower Elk Camp (n=1), Upper Lyon's Ranch (n = 2), Maneze (n = 1), Schoolhouse (n = 6), and Wooden Gate (n = 1) burn units. Nine plots have burned twice; located in the Copper Creek (n = 2), Lower Coyote Creek (n = 3), Upper Lyon's Ranch (n = 2), Maneze (n = 1), and Wooden Gate (n = 1) units. Seven plots have burned three times, located in the Upper Lyon's Ranch (n = 2), Maneze (n = 1), Schoolhouse (n = 3), and Wooden Gate (n = 1) units. Four plots have burned four times, located in the Upper Lyon's Ranch (n = 2) and Schoolhouse (n = 2) units. A photo sequence is provided below of an FQUGA1Do9 plot located in the Maneze burn unit.

TABLE 10. MANAGEMENT OBJECTIVES AND MONITORING RESULTS FOR OREGON WHITE OAK WOODLAND TYPE

Park Monitoring Type	Management Objective	Monitoring Results (80% confidence intervals)	Objective Achieved?	Minimum Plots Achieved?
REDW Oregon Oak Woodland (FQUGA1Do9) n = 22	Do not reduce the relative cover of native plant species by $\geq 10\%$ two years postburn as measured from original preburn conditions	00PRE: 52.2 (47.4—57.1)% 01YR02: 49.0 (43.8—54.3)% Difference: -6.2%	Yes	Almost
REDW Oregon Oak Woodland (FQUGA1Do9) n = 9	Do not reduce the relative cover of native plant species by $\geq 10\%$ two years postburn as measured from original preburn conditions	00PRE: 51.4 (42.4—60.4)% 01YR02: 57.3 (47.2—67.4)% Difference from 00PRE: +11.5% 02YR02: 49.5 (42.1—56.8)% Difference from 00PRE: -3.8%	Yes	Almost

Park Monitoring Type	Management Objective	Monitoring Results (80% confidence intervals)	Objective Achieved?	Minimum Plots Achieved?
REDW Oregon Oak Woodland (FQUGA1Do9) n = 7	Do not reduce the relative cover of native plant species by $\geq 10\%$ two years postburn as measured from original preburn conditions	00PRE: 43.4 (35.3—51.5)% 01YRo2: 44.0 (34.1—53.9)% Difference from 00PRE: +1.6% 03YRo2: 46.8 (37.8—55.8)% Difference from 00PRE: +8.0%	Yes	Almost
REDW Oregon Oak Woodland (FQUGA1Do9) n = 4	Do not reduce the relative cover of native plant species by $\geq 10\%$ two years postburn as measured from original preburn conditions	00PRE: 50.1 (39.7—60.5)% 01YRo2: 43.2 (27.4—59.0)% Difference from 00PRE: -13.9% 03YRo2: 56.2 (46.1—66.3)% Difference from 00PRE: +12.1% 04YRo2: 42.2 (36.7—47.8)% Difference from 00PRE: -15.8%	Additional plots needed	Almost

AN EXAMPLE OF REDWOOD OREGON
WHITE OAK MONITORING TYPE WITH
FUEL AND BURN TREATMENTS THROUGH
TIME:

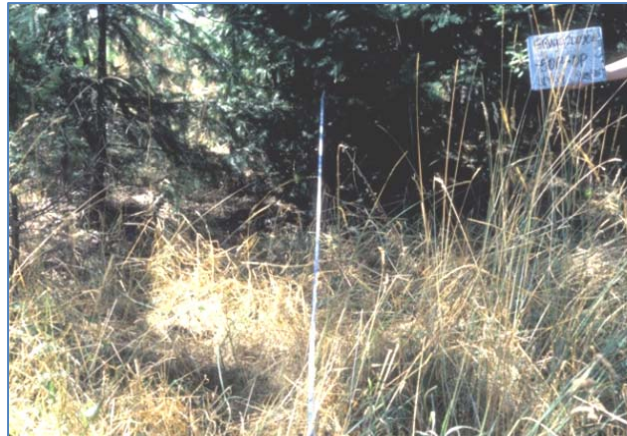


PHOTO 3. FQUGA1D09-08, 01YR01, 1998



PHOTO 6. FQUGA1D09-08, 03POST, 2006



PHOTO 1. FQUGA1D09-08, PRO, 1990



PHOTO 4. FQUGA1D09-08, 01YR02, 1999



PHOTO 2. FQUGA1D09-08, 01POST, 1997



PHOTO 5. FQUGA1D09-08, 02POST, 2001



PHOTO 7. FQUGA1D09-08, 03YR02, 2008

OREGON CAVES NATIONAL MONUMENT

Oregon Caves utilizes standard FMH fire monitoring protocols along with rapid assessment monitoring. Because Oregon Caves has a small land base, there is only one FMH monitoring type, Douglas-fir. There are currently eight Douglas-fir FMH plots installed within Oregon Caves; all have been thinned while only three have ever been treated with fire. Four rapid assessment plots were first installed during the 2008 field season to measure thinning treatments; results are not yet available for these plots.

OREGON CAVES – DOUGLAS-FIR

Only two Douglas-fir FMH plots were read this year at Oregon Caves. They were read ten years post thin and have never been burned. The results shown below are for the three Douglas-fir plots that have been burned in Oregon Caves. A photo sequence of an FPSME1D10 plot located in the CC5 thinning unit, which has never been burned, is provided below.

TABLE 11. MANAGEMENT OBJECTIVES AND MONITORING RESULTS FOR DOUGLAS-FIR MONITORING TYPE

Park Monitoring Type	Management Objective	Monitoring Results (80% confidence intervals)	Objective Achieved?	Minimum Plots Achieved?
ORCA Douglas-fir Forest (FPSME1D10) n = 3	<u>At immediate postburn:</u> Reduce total fuel load by 20 – 50% from preburn levels	00PRE: 115.5 (0—235) tons/acre 01YR01: 32.9 (11.3—54.5) tons/acre -71.5% change from preburn 01YR03: 59.0 (3.4—114.5) tons/acre 01YR05: 68.6 (0—139.1) tons/acre 01YR11: 58.0 (0—120.8) tons/acre	Additional plots needed	No
ORCA Douglas-fir Forest (FPSME1D10) n = 3	<u>At three years postburn:</u> Limit mortality of large overstory trees, > 60 cm DBH, to < 10% of preburn levels	00PRE: 11 (8—13) trees/acre 01YR01: 11 (8—13) trees/acre 01YR03: 11 (8—13) trees/acre 0% change from preburn 01YR05: 11 (8—13) trees/acre 01YR11: 11 (6—16) trees/acre	Additional plots needed	No

EXAMPLE OF ORCA DOUGLAS-FIR
MONITORING TYPE WITH ONE THINNING
TREATMENT THROUGH TIME:



PHOTO 1. FPSME1D10-05, PRE THIN, 1999



PHOTO 2. FPSME1D10-05, 01POST THIN, 1999



PHOTO 3. FPSME1D10-05, 01YR10 THIN, 2009

FIRE ECOLOGIST ACCOMPLISHMENTS AND AREAS OF FOCUS

TABLE 13. FIRE ECOLOGIST ACCOMPLISHMENTS/FOCUS AREAS

Category	Percent Time	Accomplishments and/or areas of activities
Planning	45%	FMP review, REDW monitoring plan, REDW burn plan review, READ program
Presentations	5%	Fire effects data, READ program
NPS Meetings	10%	Staff meetings, FMP reviews, WHIS fuels map, REDW FMP goals & objectives meeting, READ meetings
Prescribed Fire	2.5%	REDW prescribed burns
Research	5%	Proposals
GIS	5%	Burn severity maps, plot installation maps, plot maps
Data Collection	2.5%	Field work
Data analysis	20%	Data summaries and analysis
Training	5%	GIS training, BARC training, annual required training, fire refresher + pack test
Supervision/Admin	5%	Supervision, travel, payroll, budget, etc.



FIGURE 5. OAK IN BALD HILLS PRESCRIBED BURN

FIRE EFFECTS CREW ACCOMPLISHMENTS AND AREAS OF FOCUS

TABLE 14. FIRE EFFECTS CREW ACCOMPLISHMENTS/FOCUS AREAS

Category	Percent Time	Accomplishments and/or areas of activity
FMH Plot Work	20%	Seven weeks in WHIS, two in REDW, one in ORCA
CBI	5%	One pay period in WHIS with PORE crew
Other Plot Work	7%	PSME Plots in REDW and rapid assessment plots in ORCA
Fire Assignments	9%	- Two crewmembers worked on a suppression fire within REDW for three days - Crew assisted with five prescribed burns in REDW - One crewmember assisted with a prescribed burn in WHIS
Fuels Project Work	4%	Helping REDW fuels crew prep RX units
Data Entry	21%	This includes data entry, quality checking, and pre visit work preparing species and tree lists
Supervision/Admin	14%	Supervision of two quail, hiring, travel, payroll
Training	13%	- One crewmember attended S-130/190 and I-100 - One crewmember attended S-260, S-261 - Two crewmembers attended S-211 - Lead attended S-330 and RX-341 - Lead is attending TFM program - All crewmembers completed required NPS training
Miscellaneous	7%	Physical training, meetings with other fire and park staff



FIGURE 6. CREWMEMBER CHRIS MERIDETH WORKING IN A REDW OREGON WHITE OAK PLOT; CREWMEMBER AIMEE COLLINS DEMONSTRATING HOW NOT TO HOLD THE PHOTO BOARD