



National Park Service Klamath Fire Ecology Annual Report Calendar Year 2013



A. Summary

The 2013 calendar year marked the second season for the new Klamath Fire Ecologist, and was characterized by collaboration and creativity to accomplish monitoring and research needs in Klamath Network Parks. Efforts at REDW were focused on advancing the understanding of fire effects in 2nd growth redwood forests; the Fire Ecologist assisted the REDW Forester (with help from Humboldt State University interns) in re-sampling an older 2nd growth burn (YR07), and also collaborated with USGS to install pre-burn plots in a new 2nd growth redwood burn unit (treated in fall 2013). Monitoring efforts at WHIS were focused on the regional issue of conifer encroachment in deciduous oak woodlands. With assistance from WHIS Resource Management staff and Fire Effects Leads from the Bay Area and Klamath networks, the Fire Ecologist installed monitoring plots in proposed mechanical thinning units. Lastly, in an effort to monitor treatment effects in ORCA's shaded fuelbreak units, the ORCA Chief of Resource Management assisted the Fire Ecologist in sampling YR01 plots in the Horseshoe Shaded Fuelbreak. In addition to these focused efforts at each park, the Fire Ecologist completed high priority monitoring of long-term FMH plots (six oak forest plots at REDW and 2 mixed-conifer plots at WHIS).

In addition to ground-level fire effects monitoring work at the three KLMN parks, the Fire Ecologist was involved in a number of fire science and training events at REDW and WHIS in 2013, including: California Fire Science Consortium (CFSC) symposium at Humboldt State University (HSU; *presenter*); CFSC webinar and field tour at REDW; class field trips to REDW (HSU range management class) and WHIS (HSU fire ecology class); Northern California Prescribed Fire Council (NCPFC) fall meeting (*presenter*). Lastly, in the fall of 2013, REDW and WHIS hosted a fire training exchange led by The Nature Conservancy and the NCPFC; the event included on the ground burning, fire ecology presentations, and field tours of previous burns.

As of January 1, 2014, REDW signed a Service First agreement with Six Rivers National Forest to create a single, interagency fire management organization. The new organization outlines a number of shared positions, including the Park FMO, Fire Ecologist, Fuels Technician, and Engine Captain, at varying commitment levels. As outlined in the agreement, the Klamath Fire Ecologist will now allocate 10% time to SRNF (with 10% salary covered by SRNF). While the new agreement may add workload, it provides an opportunity for increased resource sharing and budget solvency. The agreement will be re-visited annually to ensure the needs of both organizations are fully addressed.

Table 1. Fire Effects Plot Workload (2013) and Total Plots Installed

Park	Monitoring Unit	Type of Plot	Pre-burn 2013	Immed. Post 2013	Postburn (1-20 yrs) 2013	Annual total (2013)	Total Plots
Redwood National Park	Mixed Prairie (GMIPR1D03)	FMH Grass plot	0	0	0	0	38
Redwood National Park	Oregon Oak Woodland (FQUGA1D09)	FMH Forest plot	0	0	6	6	26
Redwood National Park	Old Growth Redwood (FSESE1D08)	FMH Forest plot	0	0	0	0	4
Redwood National Park	Fir Plots	RA**	0	2	13	15	60**
Redwood National Park	Second Growth Forest	RA	9	9	8	26	19
Redwood National Park	Second Growth Forest	1-Ha Large Plot Sampling	2	2	0	4	2
Redwood National Park	Shaded-Fuelbreak	Photo-Points	8	8	0	16	8
Whiskeytown National Recreation Area	Whiteleaf Manzanita (BARVIG04)	FMH Brush Plot	0	0	0	0	10
Whiskeytown National Recreation Area	Whiteleaf Manzanita (FARVI1D04)	FMH Forest Plot	0	0	0	0	4
Whiskeytown National Recreation Area	Oak Woodland (FQUKE1D09)	FMH Forest Plot	0	0	0	0	11
Whiskeytown National Recreation Area	Oak Woodland (FQUCH1D09)	FMH Forest Plot	0	0	0	0	2
Whiskeytown National Recreation Area	Ponderosa Pine Forest (FPIPO1D09)	FMH Forest Plot	0	0	0	0	6
Whiskeytown National Recreation Area	Mixed Conifer Forest (FMICO1D08)	FMH Forest Plot (post-thin)	0	0	2	2	18
Whiskeytown National Recreation Area	Knobcone Pine Woodland (FPIAT1D10)	FMH Forest Plot	0	0	0	0	5
Whiskeytown National Recreation Area	East Boundary Mixed oak & conifer	Photo-Point	0	0	12	12	20
Whiskeytown National Recreation Area	Encroached Black Oak Woodland	Boulder Mechanical RA	9	0	0	9	9
Oregon Caves National Monument	Douglas-fir Forest (FPSME1D10)	FMH Forest Plot	0	0	0	0	8
Oregon Caves	CC-9 Thinning	RA	0	0	0	0	4

Park	Monitoring Unit	Type of Plot	Pre-burn 2013	Immed. Post 2013	Postburn (1-20 yrs) 2013	Annual total (2013)	Total Plots
National Monument							
Oregon Caves National Monument	Horseshoe Shaded Fuel Break	Rapid Assessment	0	0	4	4	4
Total			28	21	45	94	258

**Denotes short-term monitoring (preburn through two years postburn only)

Table 2. Fire Ecology Staffing 2013

Ecologist and Monitors	Starting Date	Ending Date	# of Pay Periods	READ Qualified (Yes or No)	Training and Development
Fire Ecologist	1/1/13	12/31/13	26	Yes	FFT1 completed; Fire Refresher; READ/WFDSS Refresher (Six Rivers NF); Norcal Rx Fire Council Meetings (Hopland and Redding, CA (presenter)); CA Fire Science Consortium event, Humboldt State University (presenter)
HSU Intern*	1/15/2013	5/15/13	90 hours	n/a	n/a
HSU Intern*	1/15/2013	5/15/13	90 hours	n/a	n/a

*REDW hosted an internship program with Humboldt State University during the spring semester, 2013. The Fire Ecologist utilized two interns for 90 hours each, and both assisted with fire effects plot work at REDW.

Redwood National Park

The Fire Effects Monitoring program at Redwood contains six monitoring types: Oak Woodland, Mixed Prairie, Old-Growth (inactive), Little Bald Hills (inactive), Fir Plots (short-term monitoring), and Second growth (RA). Results are available for Mixed Prairie, Oak Woodland, and Fir Plots. Previously analyzed objectives have been included. All results shown in Table 3 include 80% confidence intervals of the mean. Minimum sample size has been attained for only the Oak Woodland (FQUGA1D09) monitoring type at 01YR02 (in large part due to the relatively small desired *minimum detectable change* of 10% relative native cover).

Table 3. 2013 Management Objectives and Monitoring Results

Monitoring Unit	Management Objective	Monitoring Results (80% confidence interval)	Objective Achieved?	Year Last Analysis Completed
Mixed Prairie	1 st Burn: Do not reduce native plant relative cover by	Change in native plant relative cover = +8.6%	Yes	2010 (1991-

Monitoring Unit	Management Objective	Monitoring Results (80% confidence interval)	Objective Achieved?	Year Last Analysis Completed
(GMIPR1D03)	>10% from preburn levels within two years of the burn.	PRE: 24.2 (21.0—27.3) % cover 01YR02: 26.3 (23.2—29.4) % cover (<i>n</i> = 27 plots, 12 burn units)		1999)
	2 nd Burn: Do not reduce native plant relative cover by >10% from preburn levels within two years of the burn.	Change in native plant relative cover = -1.3% PRE: 26.7 (22.7—30.7) % cover 02YR02: 26.4 (20.9—31.8) % cover (<i>n</i> = 16 plots, 10 burn units)	Yes	2010 (1990-2007)
	3 rd Burn: Do not reduce native plant relative cover by >10% from preburn levels within two years of the burn.	Change in native plant relative cover = +18.3% PRE: 27.5 (22.7—32.3) % cover 03YR02: 32.5 (27.7—37.4) % cover (<i>n</i> = 13 plots, 6 burn units)	Yes	2010 (1990-2000)
	4 th Burn: Do not reduce native plant relative cover by >10% from preburn levels within two years of the burn.	Change in native plant relative cover = -10.1% PRE: 34.4 (27.2—41.7) % cover 04YR02: 31.0 (27.0—34.9) % cover (<i>n</i> = 6 plots, 5 burn units)	No	2010 (1990-2010)
	5 th Burn: Do not reduce native plant relative cover by >10% from preburn levels within two years of the burn.	Change in native plant relative cover = -6.9% PRE: 26.4 (21.0—31.8) % cover 05YR02: 24.6 (19.9—29.2) % cover (<i>n</i> = 7 plots, 4 burn units)	Yes	2010 (1991-2010)
	6 th Burn: Do not reduce native plant relative cover by >10% from preburn levels within two years of the burn.	Change in native plant relative cover = -12.2% PRE: 29.3 (23.9—34.7) % cover 06YR02: 25.8 (23.7—27.8) % cover (<i>n</i> = 7 plots, 4 burn units)	No (but close)	2012 (1991-2012)
Oregon Oak Woodland (FQUGA1D09)	1 st Burn: Do not reduce native plant relative cover by >10% from preburn levels within two years of the burn.	Change in native plant relative cover = -7.8% PRE: 49.8 (45.3—54.2) % cover 01YR02: 45.9 (40.8—51.0) % cover (<i>n</i> = 22 plots, 8 burn units)	Yes	2010 (1991-1999)
	2 nd Burn: Do not reduce native plant relative cover by >10% from preburn levels within two years of the burn.	Change in native plant relative cover = -7.1% PRE: 48.2 (40.0—56.3) % cover 02YR02: 44.8 (38.8—50.7) % cover (<i>n</i> = 9 plots, 5 burn units)	Yes	2010 (1992-2004)
	3 rd Burn: Do not reduce native plant relative cover by >10% from preburn levels within two years of the burn.	Change in native plant relative cover = -13.2% PRE: 52.5 (45.8—59.2) % cover 03YR02: 45.6 (40.5—50.6) % cover (<i>n</i> = 13 plots, 5 burn units)	No	2010 (1991-2010)
	4 th Burn: Do not reduce native plant relative cover by >10% from preburn levels within two years of the burn.	Change in native plant relative cover = -23.4% PRE: 49.6 (40.0—59.1) % cover 04YR02: 38.0 (33.8—42.2) % cover (<i>n</i> = 4 plots, 2 burn units)	No	2010 (1991-2004)

Monitoring Unit	Management Objective	Monitoring Results (80% confidence interval)	Objective Achieved?	Year Last Analysis Completed
	5 th Burn: Do not reduce native plant relative cover by >10% from preburn levels within two years of the burn.	Change in native plant relative cover = -23.7% PRE: 42.7 (33.6—51.8) % cover 05YR02: 32.6 (27.2—38.0) % cover (n = 6 plots, 3 burn units)	No	2012 (1992-2012)
	6 th Burn: Do not reduce native plant relative cover by >10% from preburn levels within two years of the burn.	Change in native plant relative cover = -30.9% PRE: 47.4 (40.2—54.6) 06YR02: 32.7 (26.2—39.3) (n = 6 plots, 1 burn unit) 06YR05: -32.9 (26.8-38.9) (n = 6 plots, 1 burn unit)	No	2010 (1991-2010) 2013 (YR05)

Redwood – Second Growth Forest 2013

Substantial effort was devoted to plot installations and sampling in 2nd growth mixed redwood/Douglas-fir/tanoak forests in 2013. Park staff, Save the Redwoods League, and local land managers are very interested in 2nd growth redwood forest restoration and the utility of Rx fire in achieving restoration objectives. The Fire Ecologist assisted the REDW Forester in re-sampling (YR07) 8 RA plots in the Dolason Rx burn (results yet to be analyzed), and also collaborated with USGS in the installation of 9 RA plots and 2 large, 1-ha plots in the Lower Airstrip Addition (LAE) 2nd growth burn at REDW. The suite of variables sampled included overstory, poles, fuels, and understory vegetation. Additionally, all overstory stems ≥ 20 cm DBH in the 1-ha plots were mapped. LAE will be re-sampled (01YR01) in fall 2014 and results will be presented in the 2015 Annual Report. Funding for the LAE monitoring was provided by a research grant from Save the Redwoods League.



Figure 1. Smoldering combustion at base of second growth redwood clump during the Lower Airstrip 2nd Growth burn, Fall 2013.

Redwood – Fir Plots 2013



Figure 2. Scorched Douglas-fir in the 2013 Eastside Rx burn in the Bald Hills of REDW.

Douglas-fir (≤ 3 ft tall) density was monitored pre- and 2 years post-burn on 36, 0.01 ha plots in the mixed prairie and Oregon white oak woodland monitoring types. Plots were opportunistically installed at random locations in 2008-2010 burn units; data are presented for units that burned and were sampled at the 01YR02 event ($n = 13$ burn units).

Small Douglas-fir mortality ranged from zero to 100% on individual plots, but averaged ca. zero to 30% by burn season (early fall or late fall) and vegetation type (oak forest or grassland) (Figure 3). Generally, early season (i.e., pre-rain) burns had greater levels of small tree mortality (20 to 45% increase for forest and grass plots, respectively) and are more likely to achieve management objectives. Managers should attempt to increase fire intensity in late season units through aggressive ignition patterns (to achieve at least 30% crown scorch), and where possible, transition late-season units to early-season units.

Results displayed in Figure 3. depict negative levels of mortality for late-season, grassland plots, resulting from both low fire-caused mortality and heavy regeneration of small Douglas-fir by 2 seasons post-burn. Regeneration was included in YR02 tree counts, however future small Douglas-fir plots will include tallies by size class to differentiate regeneration from mortality.

Figure 3: Percent Mortality by plot type (**Oak Forest** [Left] or **Grass** [Right]) and season [Red = **Early**, Blue = **Late**]). N = 36 Plots.

Note: Negative percent mortality means PSME density increased 2 years post burn, resulting from low fire-caused mortality and heavy regeneration (high counts of very small PSME).

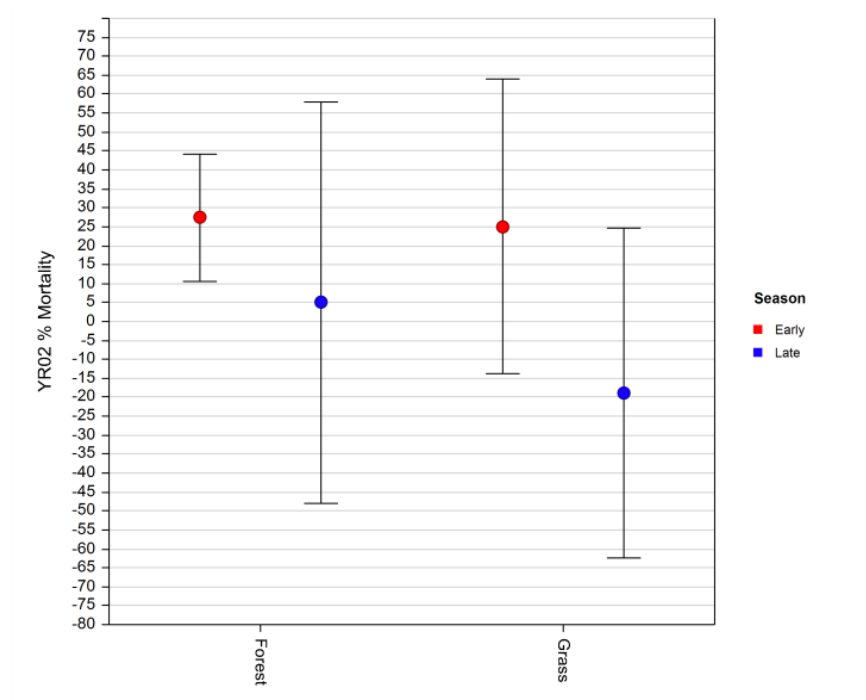
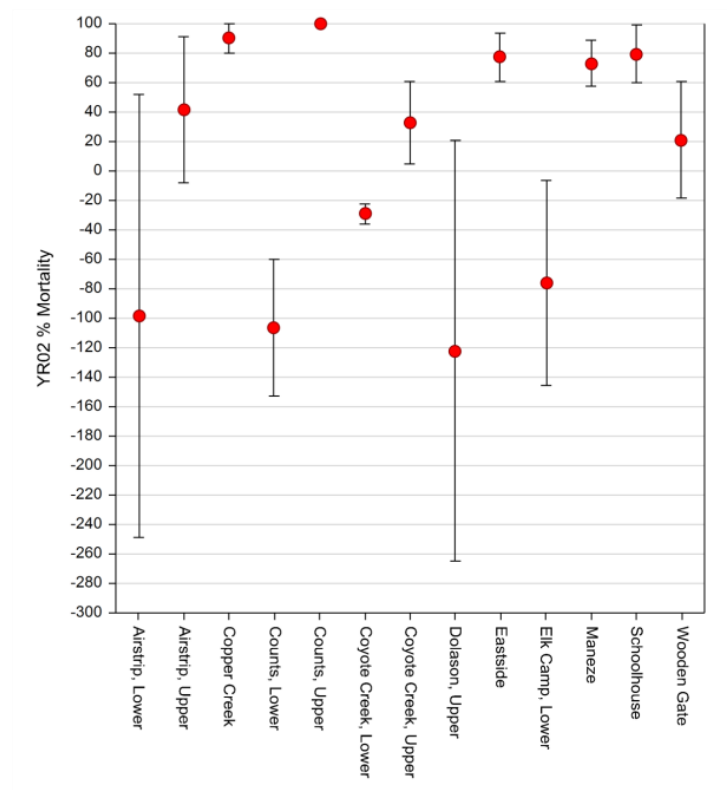


Figure 4: Percent Mortality by Burn Unit. N = 36 Plots



Redwood – Bald Hills Shaded Fuelbreak Photo-Points (N=8)

The Bald Hills Shaded Fuelbreak spans the NPS boundary with private timberland and is adjacent to many of the active burn units at REDW. In 2013, the Fire Ecologist installed 8 permanent photo-points within the 2013 treatment area, as a minimum level of monitoring for this treatment type. Representative photos below depict a substantial decrease in pole-sized trees, ladder fuels, woody surface fuels following treatment.

PP2 (Left: 00PRE, Right: 01POST)



PP4 (Left: 00PRE, Right: 01POST)



PP6 (*Left: 00PRE, Right: 01POST*)



Whiskeytown National Recreation Area

Whiskeytown contains 6 monitoring types: Black Oak Woodland, Live Oak Woodland, Mixed Conifer, Ponderosa Pine, Chaparral, and Knobcone Pine. Previously analyzed objectives have been included below. All results shown in Table 9 include 80% confidence intervals of the mean. Minimum sample size has not been attained for any monitoring type at Whiskeytown.

Fire effects sampling at WHIS in 2013 focused on RA plot installations in the proposed Boulder Cr. mechanical thin and conifer removal (N=9), and photo-point monitoring in East Boundary Rx units. Boulder Cr. Mechanical Thin was not treated in 2013, but will be treated in 2014 and results will be presented following the 01YR01 sample event.



Figure 5. Typical conifer-encroached black oak woodland in the Boulder Cr. mechanical units.

Table 5. 2013 Management Objectives and Monitoring Results

Monitoring Unit	Management Objective	Monitoring Results (80% confidence interval)	Objective Achieved?	Year Last Analysis Completed
Chaparral	Maintain dead surface fuel loading 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 (<i>n</i> = 4 plots, 2 fires)	Yes	2009
Oak Woodland	Maintain average overstory* tree densities of 5-50 trees/acre <i>*live trees >10" DBH</i>	00PRE: 55 (47—63) trees/acre 01YR01: 42 (33—51) trees/acre 01YR02: 33 (23—42) trees/acre (<i>n</i> = 9 plots, 4 fires)	Yes	2010
	Maintain average overstory* tree densities of 5-50 trees/acre <i>*live trees >10" DBH</i>	00PRE: 59 (46—72) trees/acre 01YR01: 45 (29—62) trees/acre 01YR02: 38 (23—53) trees/acre 01YR05: 41 (31—52) trees/acre 01YR15: 49 (33—65) trees/acre (<i>n</i> = 5 plots, 1 fire)	Yes	2010
	Maintain average pole-sized* tree densities between 20-100 trees/acre <i>*live trees <10" DBH</i>	00PRE: 318 (240—396) trees/acre 01YR01: 168 (87—249) trees/acre 01YR02: 148 (73—223) trees/acre (<i>n</i> = 9 plots, 4 fires)	No	2010
	Maintain average pole-sized* tree densities between 20-100 trees/acre <i>*live trees <10" DBH</i>	00PRE: 350 (199—501) trees/acre 01YR01: 272 (107—437) trees/acre 01YR02: 239 (85—392) trees/acre 01YR05: 216 (78—353) trees/acre 01YR15: 183 (97—269) trees/acre (<i>n</i> = 4 plots, 1 fire)	No	2010
	Maintain average total dead surface fuel loads between 5-15 tons/acre	00PRE: 20.6 (19.3—21.9) tons/acre 01POST: 3.8 (2.9—4.7) tons/acre 01YR01: 7.6 (4.0—11.2) tons/acre 01YR02: 8.7 (5.6—11.8) tons/acre (<i>n</i> = 9 plots, 4 fires)	Yes	2010
	Maintain average total dead surface fuel loads between 5-15 tons/acre	00PRE: 20.2 (18.0—22.4) tons/acre 01POST: 3.4 (2.3—4.5) tons/acre 01YR01: 10.1 (3.1—16.9) tons/acre 01YR02: 10.3 (5.0—15.6) tons/acre 01YR05: 23.7 (13.9—33.5) tons/acre 01YR15: 19.2 (15.8—22.6) tons/acre (<i>n</i> = 5 plots, 1 fire)	Yes, then no	2010
Knobcone Pine Woodland	Maintain total dead surface fuel loads between 8-35 tons/acre	00PRE: 13.7 (10.8—16.6) 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 (<i>n</i> = 5 plots, 2 fires)	Not really	2009
Mixed Conifer Forest	Maintain 10-65 overstory* 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 (<i>n</i> = 9 plots, 2 fires)	Yes	2009

Monitoring Unit	Management Objective	Monitoring Results (80% confidence interval)	Objective Achieved?	Year Last Analysis Completed
	Maintain 10-65 overstory* 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 (<i>n</i> = 5 plots, 1 fire)	Yes, then no	2009
	Maintain average pole-sized* tree density between 10-80 trees/acre <i>*live trees <10" DBH</i>	00PRE: 234 (125—342) trees/acre 01YR01: 124 (48—200) trees/acre 01YR02: 104 (45—163) trees/acre 01YR05: 100 (47—152) trees/acre (<i>n</i> = 9 plots, 2 fires)	No	2009
	Maintain average pole-sized* tree density between 10-80 trees/acre <i>*live trees <10" DBH</i>	00PRE: 312 (131—493) trees/acre 01YR01: 170 (39—301) trees/acre 01YR02: 130 (39—222) trees/acre 01YR05: 131 (49—214) trees/acre 01YR15: 142 (41—242) trees/acre (<i>n</i> = 5 plots, 1 fire)	No	2009
	Maintain basal area of 75-200 ft ² /acre	00PRE: 160.4 (105.9—214.9) ft ² /acre 01YR01: 160.0 (107.2—212.8) ft ² /acre 01YR02: 143.2 (95.0—191.4) ft ² /acre 01YR05: 133.2 (83.7—182.7) ft ² /acre (<i>n</i> = 9 plots, 2 fires)	Yes	2009
	Maintain basal area of 75-200 ft ² /acre	00PRE: 75.1 (43.1—107.1) ft ² /acre 01YR01: 81.2 (49.6—112.8) ft ² /acre 01YR02: 83.2 (51.8—114.6) ft ² /acre 01YR05: 80.5 (56.7—104.3) ft ² /acre 01YR15: 109.9 (79.4—140.4) ft ² /acre (<i>n</i> = 5 plots, 1 fire)	Yes	2009
	Maintain dead surface fuel load 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 (<i>n</i> = 9 plots, 2 fires)	Yes, then no	2009
	Maintain dead surface fuel load between 10-35 tons/acre	00PRE: 19.7 (15.5—23.9) 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 (<i>n</i> = 5 plots, 1 fire)	Yes	2009
Ponderosa Pine Forest	Maintain average overstory* tree densities between 15-45 trees/acre <i>*live trees >10" DBH</i>	00PRE: 92 (69—115) trees/acre 01YR01: 87 (67—106) trees/acre (<i>n</i> = 5 plots, 3 fires)	No	2009
	Maintain average overstory* tree densities between 15-45 trees/acre <i>*live trees >10" DBH</i>	00PRE: 105 (71—140) trees/acre 01YR01: 94 (64—124) trees/acre 01YR02: 85 (67—103) trees/acre 02YR02: 81 (69—93) trees/acre	No	2010

Monitoring Unit	Management Objective	Monitoring Results (80% confidence interval)	Objective Achieved?	Year Last Analysis Completed
		02YR05: 74 (61—88) trees/acre 02YR10: 77 (59—95) trees/acre 03YR01: 76 (53—98) trees/acre 03YR02: 63 (34—93) trees/acre (<i>n</i> = 3 plots, 4 fires)		
	Maintain 10-75 pole-sized* trees/acre *live trees <10" DBH	00PRE: 424 (299—549) trees/acre 01YR01: 262 (88—436) trees/acre (<i>n</i> = 5 plots, 3 fires)	No	2009
	Maintain 10-75 pole-sized* trees/acre *live trees <10" DBH	00PRE: 301 (197—404) trees/acre 01YR01: 80 (11—148) trees/acre 01YR02: 63 (0—146) trees/acre 02YR02: 45 (0—94) trees/acre 02YR05: 32 (0—73) trees/acre 02YR10: 36 (5—68) trees/acre 03YR01: 14 (1—26) trees/acre 03YR02: 12 (1—24) trees/acre (<i>n</i> = 3 plots, 4 fires)	Yes	2010
	Maintain average dead surface fuel load of 5-28 tons/acre	00PRE: 32.3 (26.3—38.3) tons/acre 01YR01: 23.7 (0.0—47.4) tons/acre (<i>n</i> = 5 plots, 3 fires)	Yes	2009
	Maintain average dead surface fuel load of 5-28 tons/acre	00PRE: 29.7 (24.7—34.6) tons/acre 01POST: 5.3 (2.1—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 (10.3—14.0) tons/acre 03YR01: 12.9 (11.4—14.5) tons/acre 03YR02: 15.8 (9.0—22.6) tons/acre (<i>n</i> = 3 plots, 4 fires)	Generally yes	2010

East boundary photo-points

Twenty Photo-points have been installed in the East Boundary burn units (primarily mixed oak, pine, & shrub vegetation) as a minimum level of fire effects monitoring. Subunits are treated with prescribed fire in both the growing and dormant seasons; photos depict 1-2 seasons post-burn and highlight rapid re-sprouting of shrubs and hardwoods, recruitment of surface fuels from the topkilled shrub layer, and moderate mortality in the pole tree size class (<10 in DBH).

Photo point 15, Subunit 1 (Left: 01POST, Right: 01YR02)



Photo point 20, Subunit 2 (Left: 01POST, Right: 01YR01)



Photo point 20, Subunit 2 (Left: 01POST, Right: 01YR01)



Photo Point 19, Subunit 2 (Left: 01POST, Right: 01YR01)



Photo Point 18, Subunit 2 (Left: 01POST, Right: 01YR01)



Photo point 3, Subunit 8 (Left: 00PRE, Right: 01YR02)



Photo point 7, Subunit 8 (Left: 00PRE, Right: 01YR02)



Whiskeytown Black Oak Woodland

Seven oak woodland plots in two burn units were treated with a single prescribed fire, and six of these were sampled at YR02, YR05, and YR15. Photos from a single plot (Figure 6) depict heavy recruitment of small trees and shrubs between 5 and 15 years post-burn. Black oak mortality at 2 years post-burn was concentrated in the pole size class (<10 in DBH; Figure 7), with a 43% reduction in pole density (245 to 140 TPA). Results suggest re-entry should occur on a ca. 10 yr interval to maintain an open understory and reduced ladder fuels.



Figure 6. Vegetation change following a single burn in the black oak woodland type at WHIS. Notice heavy regeneration between 5 and 15 years post-burn.

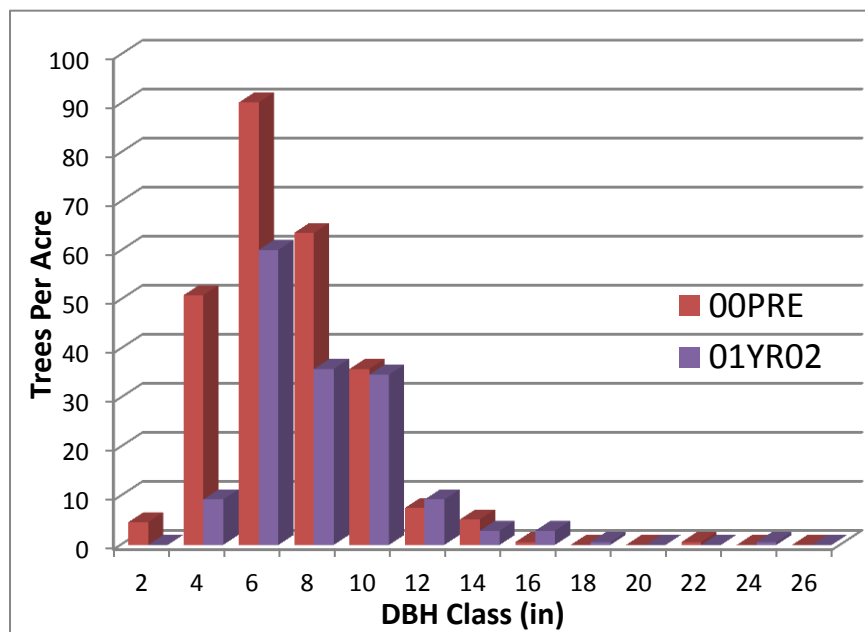


Figure 7. Changes in black oak density following a single prescribed burn at WHIS (N=7 plots). Pole tree (≤ 10 in DBH) density was reduced by 43 % at 2 years post-burn.

Oregon Caves National Monument

Oregon Caves contains three monitoring types: Douglas-Fir (FMH) – 8 plots, CC9 (Rapid Assessment) – 4 plots, and Horseshoe Shaded Fuelbreak (HSFB-Rapid Assessment) – 4 plots. HSFB2 has been thinned and pile burned, and in 2014 further thinning is proposed for HSFB3. Specific monitoring objectives for thinning and pile burning at ORCA are in review. Minimum sample size has not been achieved for any monitoring type at Oregon Caves.

Table 6. Management Objectives and Monitoring Results for Oregon Caves.

Monitoring Unit	Management Objective	Monitoring Results (80% confidence interval)	Objective Achieved?	Year Last Analysis Completed
Douglas-fir (FPSME1D10)	At immediate postburn: Reduce total fuel load by 20-50% from preburn levels	Reduction in total dead surface fuel load: -71.5% PRE: 115.5 (0 – 235) tons/acre YR01: 32.9 (11.3—54.5) tons/acre (<i>n</i> = 3 plots, 2 fires)	No	2008
	At three years postburn: Limit mortality of large overstory trees, >60 cm DBH, to <10% of preburn levels	0% change from preburn (<i>n</i> = 3 plots, 2 fires)	Yes	2008

Oregon Caves – Horseshoe Shaded Fuelbreak (N = 4 plots)

Four plots in the Horseshoe Shaded Fuelbreak were monitored pre-thin & pile burn (00PRE) and one year post-treatment (01YR01); key findings from this monitoring effort are outlined below:

- *Overstory trees (>15 cm DBH)*: negligible change given non-target for treatment (Figure 8). Mean pre-treatment density of 138 trees per acre (SD=45), post treatment density of 135 trees per acre (SD=53).
- *Pole trees (<15 cm DBH)*: substantial change, with 93% reduction in pole tree density, from 216 trees per acre pre-treatment to 15 trees per acre post-treatment (Figure 9).
- *Fuels*: Fine fuels (1-100 hr) increased 69% following treatment, from 3.2 to 5.4 tons/ac, likely resulting from thinning-generated slash (Figure 10).
- *Fuels*: 1000-hr fuels (sound and rotten) showed little change, with a slight reduction from 21.4 to 20.5 tons/ac following treatment (Figure 10).
- *Understory vegetation*: native cover was minimally influenced by treatments (pre-treatment native cover =117%, 01YR01 native cover =118%). Non-native cover was slightly reduced, from 2.25% pre-treatment to 0.75% at YR01 (Figure 12).

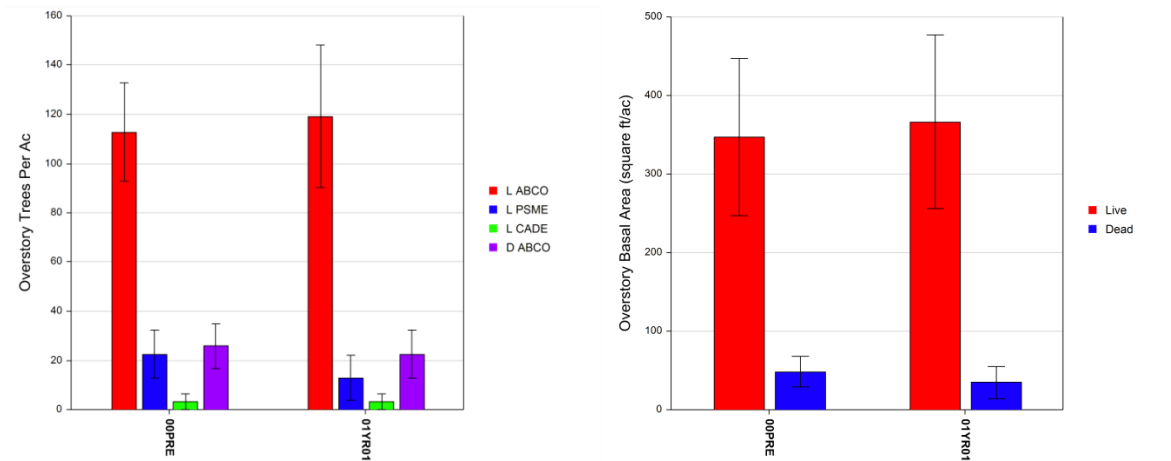


Figure 8. Overstory tree density by species (Left) and basal area (Right) following thin and pile burn. ABCO = white fir, PSME = Douglas-fir, CADE = incense cedar, L = live, D = dead.

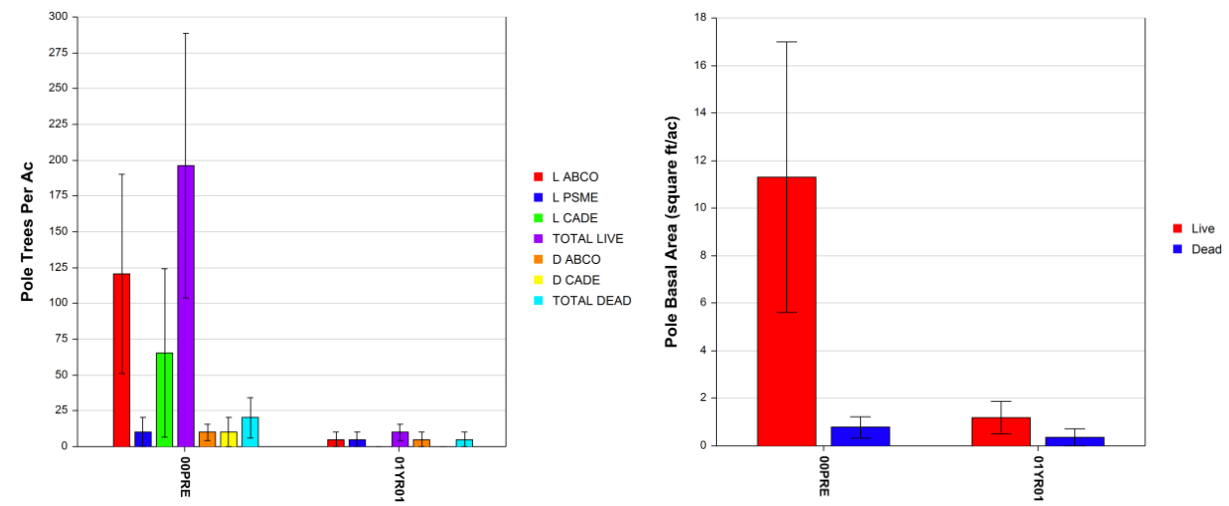


Figure 9. Pole density by species (Left) and basal area (Right) pre-treatment (00PRE) and one year post treatment (01YR01).

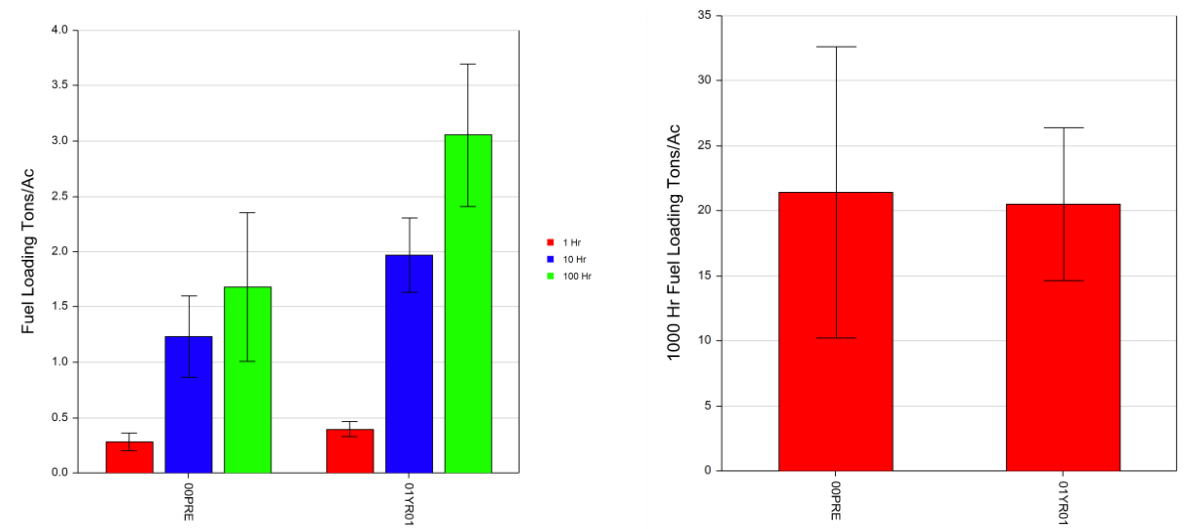


Figure 10. Fine fuel loading (Left) and 1000-hr fuel loading (Right) pre-treatment (00PRE) and one year post treatment (01YR01).

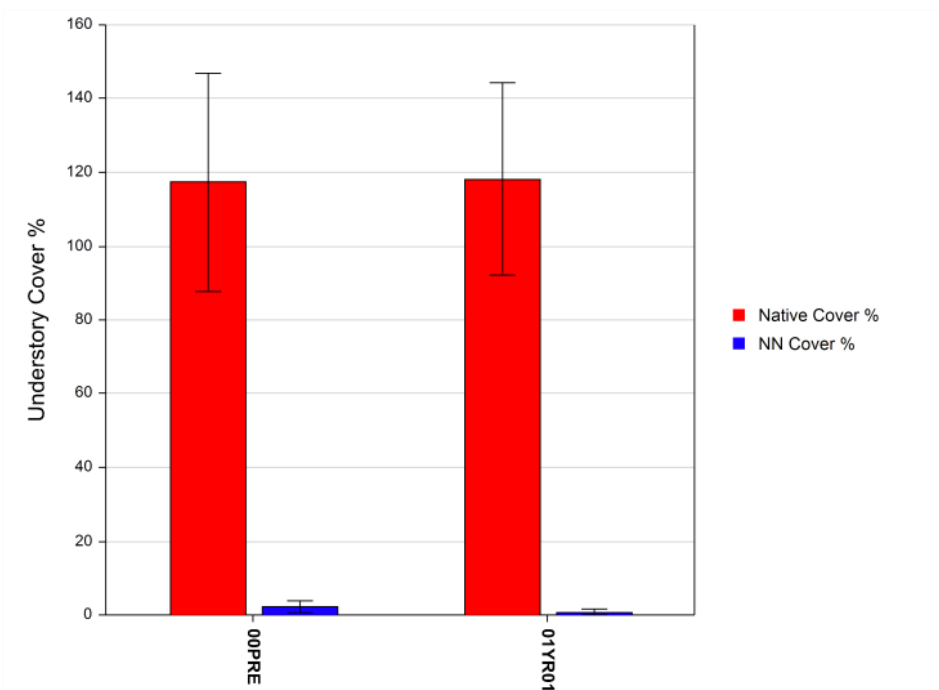


Figure 11. Native (red) and non-native (blue) understory cover pre-treatment (00PRE) and one year post treatment (01YR01).

B. Fire ecologist accomplishments and areas of focus

Table 4. Fire Ecologist 2013 Accomplishments/Focus Areas

Category	Percent Time	Accomplishments and/or areas of activities
Planning	25 %	Burn plan revisions & fire modeling for current year units at REDW; FMP annual updates at REDW and WHIS; PSME mortality monitoring protocol revisions at REDW; WHIS Mechanical thin monitoring protocol revisions; WHIS Boulder Mechanical prescription review.
Presentations	5%	NPS fire ecology & management presentation at Humboldt State University; Klamath fire ecology presentation to TNC Prescribed Fire Training Exchange (TREN) group at REDW; Fire effects monitoring presentation at the fall Northern Ca Rx Fire Council Meeting
NPS Meetings/ task groups	10%	READ, Scientific Integrity, Little Bald Hills mechanical, and 2 nd Growth fire management meetings at REDW; Annual 5 yr Rx/Mechanical update at WHIS
Interagency work	5%	Fire history of low elevation oak woodlands pilot study (WHIS) collaboration with UC Cooperative Extension (Redding); Assisted in planning of TNC/FLN northern CA fire training exchange (REDW & WHIS); Northern CA Rx Fire Council committee calls
Wildfire assignments	5%	FEMO, FFT1 on two wildfire assignments
Prescribed fire projects	3%	FEMO for 3 Rx fires at REDW and 2 Rx fires at WHIS
Non-fire fuels projects	2%	Conifer removal projects at REDW
Research	10%	Fire Effects in 2 nd Growth Redwood (Save the Redwoods League funds), collaboration with USGS.
Data collection	10%	Assisted with all fieldwork at REDW, WHIS, ORCA, in collaboration with vegetation management staff and USGS staff; Fuel moisture sampling at REDW
Data entry	10%	Data entry for REDW, WHIS, and ORCA
Data analysis	5%	Estimated amount of time spent performing analyses, including data summaries and statistical tests.
Supervision/Admin	2%	Volunteers and Interns at REDW
Training	2%	Fire refresher, PT
Travel out-of-park for plot or project work	3%	WHIS and ORCA site visits
Miscellaneous	3%	FEMO reports, email response,

C. Fire effects crew accomplishments and areas of focus

N/A

D. Additional Program Information

Please complete the tables below which contain additional information that we feel is valuable to compile on an annual basis to help assess the fire ecology program workload. Everglades National Park is used as a fictitious example in the tables.

Table 6. Planning - 2013

Park	Does Park have written DFCs? (yes or no)	Date Park-level Monitoring Plan completed (or revised)	Total # of Project- or Community-level Monitoring Plans (not just 2013)	Assisted with how many BAER plans in 2013?
Redwood National Park	YES	2010	3 (FMH program; Fir plots; second growth RA)	0
Whiskeytown National Recreation Area	YES	2012 (in progress)	4 (FMH program; Mechanical RA; shaded fuelbreak; photo-point)	0
Oregon Caves National Monument	NO	2013	2 (FMH; Fuelbreak RA)	0

Table 7. Monitoring - 2013

Park	% 2013 Data Entered	% 2013 Data Quality Checked	# Prescribed Fires Monitored*	# Non-fire Fuels Treatments Monitored*	# Wildfires Monitored*	# BAER Treatments Monitored*
Redwood National Park	75%	75%	14	1	0	0
Whiskeytown National Recreation Area	75%	75%	5	1	0	0
Oregon Caves National Monument	100%	100%	0	1	0	0

* Number of treatment units with treatment effects monitoring conducted. Include pre-burn and post-burn monitoring but not burn-day monitoring.

Table 8. Communicating Results - 2013

Park	# of Project Monitoring Reports completed in 2013	# of Annual meeting(s) with Park staff	# of Formal presentations of results	Do you use Minitab?*
Redwood National Park	2	3	1	n
Whiskeytown National Recreation Area	1	2	1	n

Oregon Caves National Monument	1	1	0	n
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* This information will help to assess Minitab multi-user license needs.

Table 9. Research - 2013

Park	Are research needs identified in FMP or Monitoring Plan? (yes or no)	# of Proposals Submitted in 2013	# of Proposals Funded in 2013	# of Research Projects Supported in 2013*	Additional Comments
Redwood National Park	Not really	0	1	2	
Whiskeytown National Recreation Area	Yes (but needs to be updated)	0	0	1	
Oregon Caves National Monument	No	0	0	0	

*Number of funded research projects, new or ongoing, supported by the fire ecology program including logistical info or support, staffing, etc.

Reserve Fund Research: If your park(s) received Reserve Fund Research funding or completed a previously-funded project in the last year, please provide the following:

- Current project status (short description)
- Expected project completion date
- List of deliverables

Also, if a Reserve Fund research project is completed, please remember to submit an article to the Rx Effects newsletter by the last Friday in February (see <http://www.nps.gov/fire/wildland-fire/what-we-do/science-ecology-and-research/rx-effects-newsletter.cfm> for submission guidelines).

E. 2014 Direction

The major change in the Klamath Fire Ecology Program for 2014 is the recently signed Service First agreement between REDW and Six Rivers National Forest for Fire Management. The Fire Ecologist is presently assessing fire ecology needs on the Forest and considering alternatives for completely monitoring needs at all units.

Also, to help in the ongoing effort to improve FFI, please include any feedback or suggestions here based on your experiences using FFI.

G. Metadata and FFI Database Update on NPS Data Store

As you know, long-term monitoring data are highly valuable! We are glad to have almost all of the NPS FFI databases centrally located on the NPS Data Store. This central data storage option

allows us to have an additional secure data location other than those in the parks' or regional offices. It also allows NPS users and others to view the metadata and contact data stewards for access to monitoring data for research or educational purposes. In addition, Landfire staff will be able to download the needed FFI databases directly from the Data Store for Landfire model validation purposes, eliminating the need for NPS staff to respond to another, separate data call.

Once this season's FFI data entry and quality checking are complete, please follow these instructions to update your park(s) metadata ("references") and upload the updated FFI databases to the NPS Data Store.

- 1) Backup the FFI database(s) in FFI (note backup file date for metadata).
- 2) Zip backup file(s) - this step is critical to reduce file size, upload time and server storage space utilized. PLEASE use the following naming convention for your zip files: "**FFI_2013_XXXX**", where XXXX is the 4 letter code for the park, or for the lead park in a network if more than one parks' data are included in the database.
- 3) Access the Data Store at: <https://irma.nps.gov/App/Reference/Welcome>
- 4) Select **Manage**, then **Manage My References** and click on the **Search** button (don't need to enter any search criteria to display all references for which you are an owner).
- 5) Select the reference (metadata record) you wish to update from the list displayed to open the Reference Profile where you can make edits to update the reference.
- 6) Expand "Version History", to view and select the **Manage Versions** option. You will then select **Clone this Reference to Create a New Version** to create a new Reference for this year's update while preserving past metadata and databases as archives.
- 7) Once you **Save** the new, cloned reference, you can make any changes necessary to update the reference with this year's information. Most likely, the edits will be to the "Date of Issue/Release", which is the date of the new FFI backup file, and the "Content End Date", if you have collected new data this year that was added to the FFI database. Select **Edit Details** from the menu at the top of the profile to make these changes. If anything else has changed (e.g. new protocols established, old protocols abandoned, etc.), you can make these edits to the text fields (e.g. Abstract) as well. Once changes are complete, you must select the "Save and set to" **Active** button at the bottom of the window.
- 8) Finally, upload the new zipped FFI database backup file by selecting **Add Digital File** from the menu at the top of the reference profile (or Add Holding from the Holdings section). Click on **Select Files** and then browse to your zipped FFI database backup file to select it, and then select **Upload**. You must also add additional owners here who have permission to edit the holdings if necessary (we recommend at least one person besides yourself; I (MB) am happy to serve as an additional owner to assist with Data Store if you'd like, but not required!). Remember to Save as **Active** once you have completed any changes.

- 9) Repeat the above steps for each of your FFI databases.

Please feel free to contact MB if you have any questions at all about the process of updating the metadata and FFI databases on the Data Store. This is the first year of adding this aspect to our annual reporting process, therefore, we expect questions may arise about the Data Store, so don't be shy!

INSTRUCTIONS FOR UPLOADING 2013 ANNUAL REPORT TO SHAREPOINT

1. Save your report as a PDF file using the following file naming convention "2013 *Park/Network Name* Annual Report.pdf".
2. Go to the NPS Fire Ecology Sharepoint site (<http://famshare.inside.nps.gov/wildlandfire/firescience/fireecology/default.aspx>). In Fire Ecology Documents, upload your report to the 2013 Park and Network Fire Ecology Program Annual Reports folder.
3. Please e-mail your regional ecologist, Nate Benson, and MaryBeth Keifer to let us know when you get your report uploaded.

Call MaryBeth Keifer (603-795-2333) or Nate Benson (208-387-5219) if you have any questions or problems.