



National Park Service Ozark Highlands Fire Ecology Annual Report Calendar Year 2013

A. Summary

Continued budget cuts resulted in the Ozark Highlands Fire Effects Crew being cut to half of what it had been in 2011 (6 to 3 fire-funded positions). Fortunately, I was able to work with Lincoln University to obtain a superb volunteer botany intern, Simone Johnson. Simone was a great asset to us.

We also received a grant that funded our fire-dependent rare plant researcher, Christine Steinwand. Christine was primarily dedicated to monitoring and researching tall larkspur. Nevertheless, her substantial talents benefitted our regular fire-effects monitoring program in many ways.

Thankfully, 2013 was not another locally record-breaking hot and dry summer. Nevertheless, we were worn thin by a large number of remote and rugged plots to monitor. This was compounded by the need for our Lead Monitor to be gone for 40 days of wildfire duty in order to stay financially solvent through a 10-week end-of-season furlough.

Another crewmember was gone for 20 days due to a wildfire deployment, which further depleted our crew. We had to work at a sprinter's pace throughout the season, but we eventually finished all of our highest-priority plot work.

In order to do more with less, we have also turned to grants in order to pay for the costs associated with the new interagency 1,836-acre Jerktail Mt. prescribed burn unit. I contributed substantially in helping to obtain 3 grants totaling over \$107,000 by working with the OZAR terrestrial ecologist and staff from Pioneer Forest.

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

Park	Monitoring Unit	Plot Type (FMH plot, fuels, rare plant, photo point, CBI, etc.)	Pre-burn 2013	Immed. Post 2013	Postburn (1-20 yrs) 2013	Annual Total (2013)	Total Plots
Ozark NSR	Glade/Woodland Transition (SCSC)	FMH forest plot	0	9	13	22	23
Ozark NSR	Dry Mesic Woodland Oak/Hickory (QUAL)	FMH forest plot	0	6	6	12	14
Ozark NSR	Dry Woodland Oak/Hickory/Pine (QUVE)	FMH forest plot	0	2	5	7	19
Ozark NSR	Various (Brown's lines)	Fuels	0	0	0	0	58
Ozark NSR	Various	CBI	0	0	0	0	67
Ozark NSR	Tall larkspur*	Rare species count/photo points	0	0	8 + 1 control	9	10
Ozark NSR	Riddell's goldenrod*	Rare species count/photo points	0	0	2	2	2
Ozark NSR	Cedar removal	Photo point	0	0	0	0	3
Ozark NSR	Deer exclosure & open deer control	Species richness	0	0	0	0	6
Buffalo NR	Glade/Woodland Transition (SCSC)	FMH Forest plot	0	1	3	4	10
Buffalo NR	Dry Woodland Oak/Hickory/Pine (QUVE)	FMH Forest plot	0	4	5	9	17
Buffalo NR	Dry Woodland Oak/Hickory/Pine	Modified Forest plot (no herbaceous)	0	0	0	0	16
Buffalo NR	Various (Brown's lines)	Fuels	0	0	0	0	7
Buffalo NR	Bush's poppy mallow*	Rare species count/photo points	0	0	0	0	1
Hot Springs NP	Dry Woodland Pine-oak (HOSP)	FMH Forest plot	0	0	0	0	7
Hot Springs NP	Dry Woodland Pine-oak (HOSP)	Modified Forest plot	0	0	0	0	8
Hot Springs NP	Ouachita blazing star*	Rare species count/photo points	0	0	0	0	3
Pea Ridge NMP	Oak Hickory forest/Woodland (OAH)	FMH Forest plot	0	0	5	5	6
Pea Ridge NMP	Post Oak – Black Jack Oak Woodland (QUMA)	FMH Forest plot	0	0	0	0	6
Total	* Pilot sampling plots		0	22	48	70	283

Table 2. Fire Ecology Staffing 2013

Ecologist and Monitors	Starting Date	Ending Date	# of Pay Periods	READ Qualified (Yes or No)	Training and Development completed in 2013
Dan Drees Fire Ecologist	1/1/13	12/31/13	26	No	Ozark Botany, Red-carded, Fire Safety refresher, USERRA, FISSA, Discrimination & Whistleblowing in the Workplace (No FEAR Act), VET-FHM, Approving Official and Cardholder mandatory charge card trainings, mandatory 10 hours of annual training for Supervisors, EEO course, DOI Safety & Occupational Health Overview, Federal Safety & Health Programs, Safety Authorities, Roles, & Responsibilities for Executives.
Angela Sokolowski, promoted from Asst. Lead to Lead Monitor	1/14/13	11/2/13	21	Yes	2-day Rare Mo. plant ID workshop, ENOP task book development, Ozark Botany, Red-carded, Fire Safety refresher, USERRA, FISSA, Motor boat operator training.
Asst. Lead Monitor	Held vacant				
Ryan Manuel, monitor	5/6/13	9/20/13	10	No	S- 130/190, Ozark Botany, Red-carded, Fire Safety refresher, USERRA, FISSA
Charity Lake, monitor	5/6/13	8/9/13	7	No	Ozark Botany, Red-carded, Fire Safety refresher, USERRA, FISSA
GS-5 FEMO	Held vacant				
GS-5 FEMO	Held vacant				
Christine Steinwand, YPP grant - larkspur intern	5/6/13	9/20/13	10	No	Ozark Botany, Red-carded, Fire Safety refresher, USERRA, FISSA,
Simone Johnson, volunteer botany intern	5/20/13	8/9/13	6	No	Ozark Botany, USERRA, FISSA,

Table 3. 2013 Management Objectives and Monitoring Results

Monitoring Unit	Management Objective (Restoration)	Monitoring Results (XX% confidence interval)	Objective Achieved?	Year Last Analysis Completed (Range of data years included in analysis)
OZAR, Glade/Transition	Reduce the density of pole trees (2.5-15 cm dbh) by at least 40% within two growing seasons after 2 nd burn ; (80% C.I.)	Total pole tree reduction = 26% Decrease (n=18 plots, 2 fires)	No	2013 (1999-2013)
	Increase the average number of species (per quadrat) in the herbaceous layer by at least 40% within two growing seasons after the second burn (90% C.I.)	Total increase in average number of species (per quadrat) in the herbaceous layer = 24.2% (n=18 plots, 2 fires)	No	2013 (1999-2013)
OZAR, Dry-Mesic Woodland (Oak/Hickory/Pine)	Reduce the density of pole trees (2.5-15 cm dbh) by at least 30% within two growing seasons after 2 nd burn; (80% C.I.)	Total pole tree reduction = 54% Decrease (n=13 plots, 2 fires)	Yes	2013 (1999-2013)
	Increase the average number of species (per quadrat) in the herbaceous layer by at least 20% within two growing seasons after the second burn (90% C.I.)	Total increase in average number of species (per quadrat) in the herbaceous layer = 45% Increase (n=13plots, 2 fires)	Yes	2013 (1999-2013)
OZAR, Dry Woodland (Oak/Hickory/Pine)	Reduce the density of pole trees (2.5-15 cm dbh) by at least 30% within two growing seasons after 2 nd burn; (80% C.I.)	Total pole tree reduction = 53% (n=19 plots, 2 fires)	Yes	2013 (1999-2013)
	Increase the average number of species (per quadrat) in the herbaceous layer by at least 40% within two growing seasons after the second burn (90% C.I.)	Total increase in average number of species (per quadrat) in the herbaceous layer = 54% Increase (n=19 plots, 2 fires)	Yes	2013 (1999-2013)

OZAR data analysis interpretation

OZAR is meeting goals to reduce pole trees in dry woodlands and moist woodlands. OZAR is also meeting goals to increase herbaceous richness in dry woodlands and moist woodlands. OZAR is not meeting goals to reduce pole trees on glades due to eastern red cedars that are now too big to kill with fire alone. Consequently, mechanical removal of cedars has been initiated. This mechanical cedar removal is also expected to result in attaining the goal to increase the glade herbaceous diversity.

The following spreadsheet tracks fire effects goals on a plot-by-plot basis at OZAR, (see below). In the next year, I hope to analyze data from plots that have burned four times in order to see what is happening to herbaceous species richness.

I would also like to conduct further analysis of the OZAR herbaceous data to determine if there are significant differences between the plots inside of the 3,000-acre deer refuge portion of the park versus the portion open to deer hunting.

I compared 7 glade plots and 8 woodland plots in the Thorny Creek Rx unit based on whether the plots were on rhyolite derived soils versus dolomite derived soils. I found no significant difference in fire effects results based on soil type at this point.

OZAR Monitoring Type	Plot #	Burn Unit	1st Burn	2nd Burn	% reduction of pole-size trees per hectare, 2nd yr after 2nd burn	% increase in avg # of native herbaceous species per 1 meter quadrat	3rd Burn	4th Burn
Moist woodland	1	Little Booming Shoal	3/?/2000	3/?/2004	goal is at least -30% from 1160 to 200 = -83%	goal is at least +20% from 2.5 to 3.8 = up 52%	3/24/2007	3/5/2010
Moist woodland	2	Brandewiede	3/?/2000	3/?/2003	from 1560 to 1120 = -28%	from 8.4 to 8 = -7%	3/27/2009	4/3/2013
Moist woodland	3	Lower Thorny	3/?/2002	4/3/2013	Data due in 2014	Data due in 2014		
Moist woodland	4	West Thorny	3/?/2001	3/?/2003	from 1680 to 840 = -50%	from 2.8 to 4.1 = up 46%	3/27/2009	4/3/2013
Moist woodland	5	West Thorny	3/?/2001	3/?/2003	from 2720 to 920 = -66%	from 4.4 to 10.7 = up 143%	3/27/2009	4/3/2013
Moist woodland	6	Booming Shoal II	?/?/2001	3/?/2004	from 1560 to 1120 = -28%	from 1.3 to 1.6 = up 23%	3/24/2007	3/5/2010
Moist woodland	7	Chilton Creek	3/?/2003	4/4/2006	from 1000 to 680 = -32%	from 2.2 to 2.6 = up 18%	3/18/2010	
Moist woodland	8	Chilton Creek	3/?/2003	4/4/2006	from 920 to 400 = -57%	from 3.8 to 4.1 = up 8%	3/18/2010	
Moist woodland	9	Russell Mt.	?/?/2003	3/29/2006	from 1080 to 120 = -89%	from 1.5 to 1.5 = no change	3/23/2010	4/3/2013
Moist woodland	10	Russell Mt.	?/?/2003	3/29/2006	from 1400 to 480 = -66%	from 4.3 to 5.7 = up 33%	3/23/2010	4/3/2013
Moist woodland	11	South Chilton	4/4/2006	3/18/2010	from 1160 to 490 = -58%	from 1.9 to 6.2 = up 226%		
Moist woodland	12	South Chilton	4/4/2006	3/18/2010	from 960 to 360 = -63%	from 4.9 to 6.1 = up 24%		
Moist woodland	13	Angel Ridge	3/22/2007	3/12/2011	from 1240 to 40 = -97%	from 2.8 to 8.2 = up 193%		
Moist woodland	14	Angel Ridge	3/22/2007	3/12/2011	from 560 to 280 = -50%	from 3.5 to 5.6 = up 60%		
Moist woodland recovery goals and avg. results		Reduce the density of pole trees (2.5-15 cm dbh) by at least 30% within two growing seasons after 2nd burn; (80% C.I.)		Total pole tree reduction = 54% Decrease (N=13 plots with 2 fires)		Total increase in average number of species (per quadrat) in the herbaceous layer = 23% (N=11 plots with 2 fires)	Increase the average number of species (per quadrat) in the herbaceous layer by at least 20% within two growing seasons after the second burn (90% C.I.)	

OZAR Monitoring Type	Plot #	Burn Unit	1st Burn	2nd Burn	% reduction of pole-size trees per hectare, 2nd yr after 2nd burn	% increase in avg # of native herbaceous species per 1 meter quadrat	3rd Burn	4th Burn
Dry woodland	1	Campbell Pt.	3/?/2000	3/?/2004	goal is at least -30% from 1320 to 600 = -55%	goal is at least +40% from 3.1 to 2.7 = -13%	3/26/2007	3/19/2010
Dry woodland	2	Campbell Pt.	3/?/2000	3/?/2004	from 1520 to 400 = -74%	from 2.3 to 4 = up 74%	3/26/2007	3/19/2010
Dry woodland	3	Little Booming Shoal	3/?/2000	3/?/2004	from 1080 to 160 = -85%	from 0.2 to 2.9 = up 1350%	3/24/2007	3/5/2010
Dry woodland	4	Campbell Pt.	3/?/2000	3/?/2004	from 1840 to 1320 = -28%	from 5.1 to 5.6 = up 10%	3/26/2007	3/19/2010
Dry woodland	5	West Thorny	3/?/2000	3/?/2003	from 1080 to 680 = -37%	from 2.9 to 4.3 = up 48%	3/27/2009	4/3/2013
Dry woodland	6	Booming Shoal II	?/?/2001	3/?/2004	from 800 to 120 = -85%	from 1.2 to 2.8 = up 133%	3/24/2007	3/5/2010
Dry woodland	7	Booming Shoal II	?/?/2001	3/?/2004	from 1200 to 440 = -63%	from 1.5 to 4.7 = up 213%	3/24/2007	3/5/2010
Dry woodland	8	Quarry	3/?/2001	3/?/2005	from 800 to 360 = -55%	from 0.9 to 0.9 = no change	3/12/2009	
Dry woodland	9	Chilton Creek	3/?/2003	4/4/2006	from 760 to 600 = -21%	from 1.8 to 2.1 = up 17%	3/18/2010	
Dry woodland	10	Chilton Creek	?/?/2003	4/4/2006	from 720 to 440 = -39%	from 3 to 2.7 = -10%	3/18/2010	
Dry woodland	11	Russell Mt.	?/?/2003	3/29/2006	from 1160 to 160 = -86%	from 0.6 to 0.5 = -17%	3/23/2010	4/3/2013
Dry woodland	12	Beaver Pond	?/?/2004	3/27/2007	from 1200 to 360 = -70%	from 3.2 to 5.1 = up 59%	3/19/2010	
Dry woodland	13	South Chilton	4/4/2006	3/18/2010	from 400 to 0 = -100%	from 0.3 to 1.3 = up 333%		
Dry woodland	14	South Chilton	4/4/2006	3/18/2010	from 920 to 560 = -39%	from 3.1 to 4 = up 29%		
Dry woodland	15	Angel Ridge	3/22/2007	3/12/2010	from 840 to 640 = -67%	from 0.7 to 0.8 = up 14 %		
Dry woodland	16	Angel Ridge	3/22/2007	3/12/2010	from 920 to 560 = -94%	from 1.2 to 8.3 = up 592%		
Dry woodland	17	Peavine	3/10/2009	3/21/2012	from 120 to 40 = -67%	from 1.4 to 2.0 = up 43%		
Dry woodland	18	Peavine	3/10/2009	3/21/2012	from 240 to 160 = -33%	from 1.5 to 2.1 = up 40 %		
Dry woodland	19	Peavine	3/10/2009	3/21/2012	from 920 to 800 = -13%	from 7.5 to 7.7 = up 3%		
Dry woodland recovery goals and avg. results		Reduce the density of pole trees (2.5-15 cm dbh) by at least 30% within two growing seasons after 2nd burn; (80% C.I.)		Total pole tree reduction = 53% Decrease (N=19 plots with 2 fires)		Total increase in average number of species (per quadrat) in the herbaceous layer = 54% (N=19 plots with 2 fires)		Increase the average number of species (per quadrat) in the herbaceous layer by at least 40% within two growing seasons after the second burn (90% C.I.)

OZAR Monitoring Type	Plot #	Burn Unit	1st Burn	2nd Burn	% reduction of pole-size trees per hectare, 2nd yr after 2nd burn	% increase in avg # of native herbaceous species per 1 meter quadrat	3rd Burn	4th Burn
Glade	1	Brandewiede	3/?/2000	3/?/2003	goal is at least -40% from 920 to 1080 = up 17%	goal is at least +40% from 4.4 to 14.2 = up 223%	3/27/2009	4/3/2013
Glade	2	Brandewiede	3/?/2000	3/?/2003	from 1960 to 1000 = -40%	from 2 to 11.2 = up 460%	3/27/2009	4/3/2013
Glade	3	Little Booming Shoal	3/?/2000	3/?/2004	from 1880 to 1200 = -36%	from 2 to 5.2 = up 160%	plot did not burn in 07, but did 3/5/2010	
Glade	4	Booming Shoal II	?/?/2001	3/?/2004	from 160 to 160 = no change	from 9.4 to 8.8 = -7%	plot did not burn in 07, but did 3/5/2010	Cedar cut in 2013 & partially burned w snow.
Glade	5	Booming Shoal II	?/?/2001	3/?/2004	from 1360 to 720 = -47%	from 9.2 to 10.4 = up 13%	3/24/2007	
Glade	6	Booming Shoal II	?/?/2001	3/?/2004	from 600 to 560 = -7%	from 17 to 13.6 = -20%	plot did not burn in 07, but did 3/5/2010	Cedar cut in 2013 & partially burned w snow
Glade	7	West Thorny	3/?/2001	3/?/2003	from 1920 to 680 = -65%	from 7.8 to 10.2 = up 31%	plot did not burn in 09, but did 4/3/2013	
Glade	8	Quarry	3/?/2001	3/?/2005	from 640 to 440 = -31%	from 7.4 to 9 = up 22%	plot did not burn in 09,	
Glade	9	Russell Mt.	?/?/2003	3/29/2006	from 2600 to 2040 = -22%	from 6.2 to 8.8 = up 42%	3/23/2010	4/3/2013
Glade	10	Lower Thorny	3/?/2002	4/3/2013	Data due in 2014	Data due in 2014		
Glade	11	Chilton Creek	3/?/2003	4/4/2006	from 1360 to 160 = -88%	from 6.4 to 5.4 = -16%	3/18/2010	
Glade	12	Chilton Creek	3/?/2003	4/4/2006	from 1640 to 360 = -78%	from 6.8 to 9.2 = up 35%	3/18/2010	
Glade	13	Russell Mt.	?/?/2003	3/29/2006	from 1800 to 800 = -56%	from 3.6 to 5.4 = up 50%	3/23/2010	4/3/2013
Glade	14	Russell Mt.	?/?/2003	3/29/2006	from 2960 to 2400 = -19%	from 6.2 to 8.2 = up 32%	3/23/2010	4/3/2013
Glade	15	Beaver Pond	3/?/2004	plot did not burn in 07, but did 3/19/2010	from 1840 to 1760 = -4%	from 12.2 to 11 = -10%		
Glade	16	Vance/Barnett Mt.	3/24/2011	none	NA	NA		
Glade	17	Mill/Buzzard Mt.	3/?/2004	3/24/2010	from 2600 to 2280 = -12%	from 8 to 9 = up 13%	4/13/2013	
Glade	18	Mill/Buzzard Mt.	3/?/2004	3/24/2010	from 1200 to 800 = -33%	from 6.4 to 7 = up 9%	4/13/2013	
Glade	19	Peavine	3/10/2009	3/21/2012	from 600 to 480 = -20%	from 12.8 to 20.2 = up 58%		
Glade	20	Peavine	3/10/2009	3/21/2012	from 360 to 280 = -22%	from 8.8 to 9.0 = up 2%		
Glade	21	Alley	3/13/2012		NA	NA		
Glade	22	Alley	3/13/2012		NA	NA		
Glade	23	Vance/Barnett Mt.	3/24/2011		NA	NA		

Glade recovery goals and avg. results	Reduce the density of pole trees (2.5-15 cm dbh) by at least 40% within two growing seasons after 2 nd burn ; (80% Confidence Interval.)	Total pole tree reduction = 26% Decrease (N=18 plots with 2 fires)	Total increase in average number of species (per quadrat) in the herbaceous layer = 24.2% (N=18 plots with 2 fires)	Increase the average number of species (per quadrat) in the herbaceous layer by at least 40% within two growing seasons after the second burn (90% C.I.)
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The data we obtained from the 2 Riddell's goldenrod plots (10m x 25m) at Ozark National Scenic Riverways (OZAR), showed a population increase of 878% (from 115 to 1,125) over pre-management numbers. In the Ozarks, Riddell's goldenrod (*Solidago riddellii*), is a rare but characteristic fen plant that is dependent on significant sunlight and wet/damp organic soil in order to produce viable seed. In the absence of the historic fire regime, the Riddell's goldenrod population at the Mill Mt. fen was being shaded out by invasive eastern red cedars (see photo 1).

The OZAR fuels crew cut the cedars and pile burned them during the winters of 2012 and 2013. The fen also received a broadcast burn on 4/13/2013. The response of the native grasses and wildflowers was tremendous (see following photos). I plan to use this data in a future Fire Success Story.





Buffalo National River (BUFF)

Monitoring Unit	Management Objective (Restoration)	Monitoring Results (XX% confidence interval)	Objective Achieved?	Year Last Analysis Completed (Range of data years included in analysis)
BUFF, Glade/Transition	Reduce pole density (2.5 – 15 cm dbh) by 60% after 10 years of burning; (80% C.I.)	Total pole tree reduction = 20% decrease (n=8 plots, 2 fires)	No	2013 2001-2013
	Increase the average number of native species in the herbaceous layer by at least 40% within two growing seasons after the second burn; (90% C.I.)	No change in the average number of species (per quadrat) in the herbaceous layer. (n=8 plots, 2 fires)	No	2013 2001-2013
	Reduce new growth of eastern red cedar by 95% after three consecutive burns (90% C.I.)	Reduced new growth eastern red cedar by 100% (n=6 plots, 2 fires)	Yes	2013 2001-2013
BUFF, Dry Woodland	Reduce pole-sized tree density (2.5-15 cm dbh) by 60% after 10 years of burning; (80% C.I.)	64% Reduction (n=8 plots, 8 – 9 years after 1 st fire)	Yes	2013 2001-2013
	Reduce overstory-sized tree density to open vista with a target density of 74 trees/hectare after 20 years (80% C.I.)	295 tph = no reduction (n=8 plots, 8 – 9 years after 1 st fire)	NA, first burns with plots were in 2004, but reaching goal is unlikely.	2013 No 20 yr data 2001 - 2013
	Reduce live tree stems/acre by 60 % over 10 years of burning (90% C.I.)	52% Reduction (n=8 plots, 8 – 9 years after 1 st fire)	No, because no additional burns are planned before 10 years.	2013 2001 - 2013

The following Table titled BUFF Fire Effects, All Plots Meeting or Approaching Evaluation Criteria, contains the individual plot data that the previous summary table is based on.

BUFF Fire Effects, All Plots Meeting or Approaching Evaluation Criteria							
Plot Type	Plot #	Burn Unit & Year of 1st burn	Analysis based on data from	Written goal is 60% reduction of pole-sized trees (2.5-15cm dbh) per hectare after 10 yrs of burning (with a statistical confidence interval of 80%)	Written goal is 40% increase in avg # of native herbaceous species per 1m ² by 2nd growing season after 2nd burn (90% C.I.)	Written goal is 95% reduction of eastern red cedar seedlings (<1.99m tall & <2.4cm DBH, no defined area) after 10 yrs of burning (C.I. 90%)	Glade plots had implied goal for 60% reduction of pole-sized cedar trees (2.5-15cm dbh) per hectare after 10 yrs of burning (with a statistical confidence interval of 80%)
Glade	1	Lower Buff Wilderness 04	2008	From 2520 to 2000 = -20%	From 6 to 8.2 = up 37%	From 324 to 0 = -100%	From 120 to 120 = no change
Glade	2	Lower Buff Wilderness 04	2013	2640 to 2040 = -23%	6 to 6 = No change	0 to 0 = null	120 to 160 = up 33%
Glade	3	Lower Buff Wilderness 04	2008	1320 to 1200 = -9%	Plot did not meet analysis criteria because it did not burn twice	11655 to 0 = -100%	400 to 400 = no change
Glade	4	Lower Buff Wilderness 04	2008	720 to 520 = -28%	5.2 to 4.6 = down 12%	162 to 0 = -100%	440 to 440 = no change
Glade	5	Lower Buff Wilderness 04	2008	840 to 880 = +5%	10 to 9.8 = down 2%	162 to 0 = -100%	160 to 240 = up 50%
Glade	6	Lower Buff Wilderness 04	2008	2040 to 1760 = -14%	3.6 to 6.2 = up 72%	0 to 0 = null	480 to 440 = down 8%
Glade	7	Lower Buff Wilderness 04	2008	640 to 560 = -12%	Plot did not meet analysis criteria because it did not burn twice	1133 to 0 = -100%	360 to 320 = down 11%
Glade	8	Lower Buff Wilderness 04	2008	1320 to 920 = -30%	7.2 to 6.6 = down 8%	324 to 0 = -100%	80 to 80 = no change
Glade	9	Pruitt 05	2013	1360 to 200 = -85%	7.4 to 7.2 = down 3%	486 to 162 = -67%	480 to 0 = down 100%
Glade	10	Pruitt 05	2013	720 to 360 = -50%	5.4 to 7.2 = up 33%	12,302 to 162 = -99%	560 to 320 = down 43%
Glade recovery goals and avg. results				Avg. pole-sized tree reduction = 20% decrease for 10 plots (80% C.I.), data is for 1, 2, or 3 burns in 8 to 9 yrs.	Avg. increase in number of herbaceous species (per 1m ² quadrat) = 0% for 40 quadrats in 8 plots based on the data from 2nd yr after 2nd burn & 90% C.I.	Avg. reduction of eastern red cedar seedlings = 90% (90% C.I.). Calculated as seedlings per acre	Avg. % change in pole-sized cedar trees = 3.5% increase for 10 plots (80% C.I.), data is for 1, 2, or 3 burns in 8 to 9 yrs.
Plot Type	Plot #	Burn Unit & Year of 1st burn	Analysis based on data from	Written goal is 60% reduction of pole-sized trees (2.5-15cm dbh) per hectare after 10 yrs of burning (with a statistical confidence interval of 80%)	Woodland plots had no goal established for increasing the avg # of native herbaceous species.	Written goal is to reduce tree density to open vista with a target density of 74 overstory-sized trees per hectare after 20 yrs (80% C.I.)	Written goal is reduce live stems/acre by 60% after 10 yrs of burning (90% C.I.)
Dry woodland	1	Lower Buff Wilderness 04	2008	From 2280 to 1240 = -46%	From 1.9 to 3.5 = up 84%	From 210 to 210 = no change	From 2490 to 1450 = -42%
Dry woodland	2	Lower Buff Wilderness 04	2013	2480 to 570 = -77%	1.3 to 2.5 = up 92%	270 to 310 = +15%	2750 to 920 = -67%
Dry woodland	3	Lower Buff Wilderness 04	2013	1760 to 320 = -82%	0.8 to 2.4 = up 200%	370 to 330 = -11%	2130 to 650 = -69%
Dry woodland	4	Lower Buff Wilderness 04	2008	1560 to 600 = -62%	1.4 to 5.2 = up 271%	510 to 530 = +4%	2070 to 1130 = -45%
Dry woodland	5	Lower Buff Wilderness 04	2013	2240 to 1200 = -46%	2.1 to 3.1 = up 48%	240 to 320 = +33%	2480 to 1520 = -39%
Dry woodland	6	Lower Buff Wilderness 04	2013	1800 to 400 = -78%	0.5 to 2.1 = up 320%	230 to 240 = +4%	2030 to 600 = -70%
Dry woodland	7	Lower Buff Wilderness 04	2008	1680 to 240 = -86%	1.8 to 2.9 = up 61%	170 to 160 = -6%	1850 to 400 = -78%
Dry woodland	8	Pruitt 05	2013	1200 to 280 = -77%	4.1 to 7.8 = up 90%	360 to 260 = -28%	1560 to 540 = -65%
Dry woodland recovery goals and avg. results				Avg. pole-sized tree reduction = 64% decrease for 8 plots (80% C.I.), data is for 2 or 3 burns in 8 to 9 yrs.	Avg. increase in number of herbaceous species (per 1m ² quadrat) = 94% for 80 quadrats in 8 plots based on 2nd yr after 2nd burn data & 90% confidence interval	Avg of 295 tph preburn & 295 tph after 2 or 3 burns in 8 or 9 yrs = no change	Avg. live tree reduction = 52% decrease for 8 plots (90% C.I.), data is for 2 or 3 burns in 8 to 9 yrs.

BUFF data analysis interpretation Note that 6 of the 8 glade plots, and 7 of the 8 woodland plots, that are used in this analysis are in the Lower Buffalo Wilderness (LBW). The LBW prescribed fire unit was burned in 2004, 2007, and 2013. These 15 plots provide the majority of the data that indicate how well BUFF is meeting its park-wide fire management objectives. Readers are strongly encouraged to download the 11-page supplement to this Ozark Highlands Fire Ecology Annual Report that is titled 2013LowerBuffaloWildernessFireEffectsAnalysis.

Understanding the LBW fire effects is key to understanding the overall fire effects analysis for BUFF.

Glade/Woodland Transition Monitoring Type

1.) Reduce pole-sized tree density by 60% after 10 years of burning.

The woodland plot data shows that we are 80% certain that we achieved at least a 20% reduction in the density of pole-sized trees after 8 or 9 years since the initial prescribed fire. Although 10 years have not passed, there will not be any data collected in the next year or two that will result in achieving the objective of reducing pole-sized tree density by 60% after 10 years of burning.

It should also be noted that in 2012 the 2 glade plots at Pruitt received mechanical tree removal in accordance with a commercial contract to cut “all hardwood and cedar trees 9-inch and below”. That is why the 2 glade plots at Pruitt had significantly greater reductions in pole-sized trees than the LBW plots.

Additional analysis of the glade data showed 80% certainty that there was a 3.5% increase in pole-sized cedar tree density. This is regrettable, especially since cedars are typically responsible for diminishing fire intensity during March burning in the Ozarks.

2.) Increase native herbaceous plant species richness by 40% two seasons after the second application of fire.

Data from 8 plots shows that we are 90% certain that we had a 0% increase in native herbaceous plant species richness by the second growing season after the second application of prescribed fire. Due to the FY2013 requirement that FEMO travel be funded out of Rx Fire Project Budgets, we will no longer be able to monitor plots the second growing season after a burn. This problem in funding FEMO travel potentially makes the above written objective at BUFF unattainable for some plots.

The fact that only 1 of the 8 glade plots in the LBW has burned in all 3 of the prescribed fires, and 2 of the 8 LBW glade plots only burned once, could help explain why on average there has been no change in species richness.

3.) Reduce eastern red cedar (*Juniperus virginiana*), new growth (seedling-sized trees), by 95% after three consecutive burns.

Data from 8 plots shows that we are 90% certain that we had a 90% reduction of cedar seedlings after 1 or 2 prescribed burns. The only glade plot that burned 3 times (#2), had no cedar seedlings when the pre-burn data was collected. Consequently, it appears extremely likely that by the time these plots burn 3 times the objective of a 95% reduction will be achieved.

Dry Woodland Monitoring Type

1.) Reduce pole-sized tree density by 60% after 10 years of burning.

The woodland plot data shows that we are 90% certain that we achieved at least a 64% reduction in the density of pole-sized trees after just 8 or 9 years since the initial prescribed fire.

2.) Increase in native herbaceous plant species richness by 40% two seasons after the second application of fire (This is currently not a written objective of the Buffalo National River Fire Effects Monitoring Plan). Data from 8 plots shows a 90% certainty of a 94% increase in native herbaceous plant species richness by the second growing season after the second application of prescribed fire. In my opinion, this should have been the #1 goal for woodland restoration, and the other monitoring goals should have been in support of understanding how to achieve the restoration of species richness.

3.) Reduce overstory-sized tree density to open vista with a target density of 30-50 trees/acre (74-126 trees/hectare) after 20 years.

Data from 8 plots after 8 to 9 years since the initial burn indicate no change in the density of overstory-sized trees. Furthermore, it is highly unlikely that the density of overstory-sized trees will be reduced to the target density after 20 years.

4.) Reduce live tree stems /hectare by 60% after 10 years of burning.

The woodland plot data shows that we are 90% certain that we achieved at least a 52% reduction in the number of live tree stems per hectare. Although reducing total live trees stems is a worthy goal, there are already written goals to report on pole-sized tree reduction and over-story-sized tree reduction. Therefore, the total live-stems-per-hectare goal is somewhat redundant information. In a future rewrite of the Buffalo National River Fire Effects Monitoring Plan it would be advisable to replace this reporting goal with a goal to report on changes to herbaceous species richness.

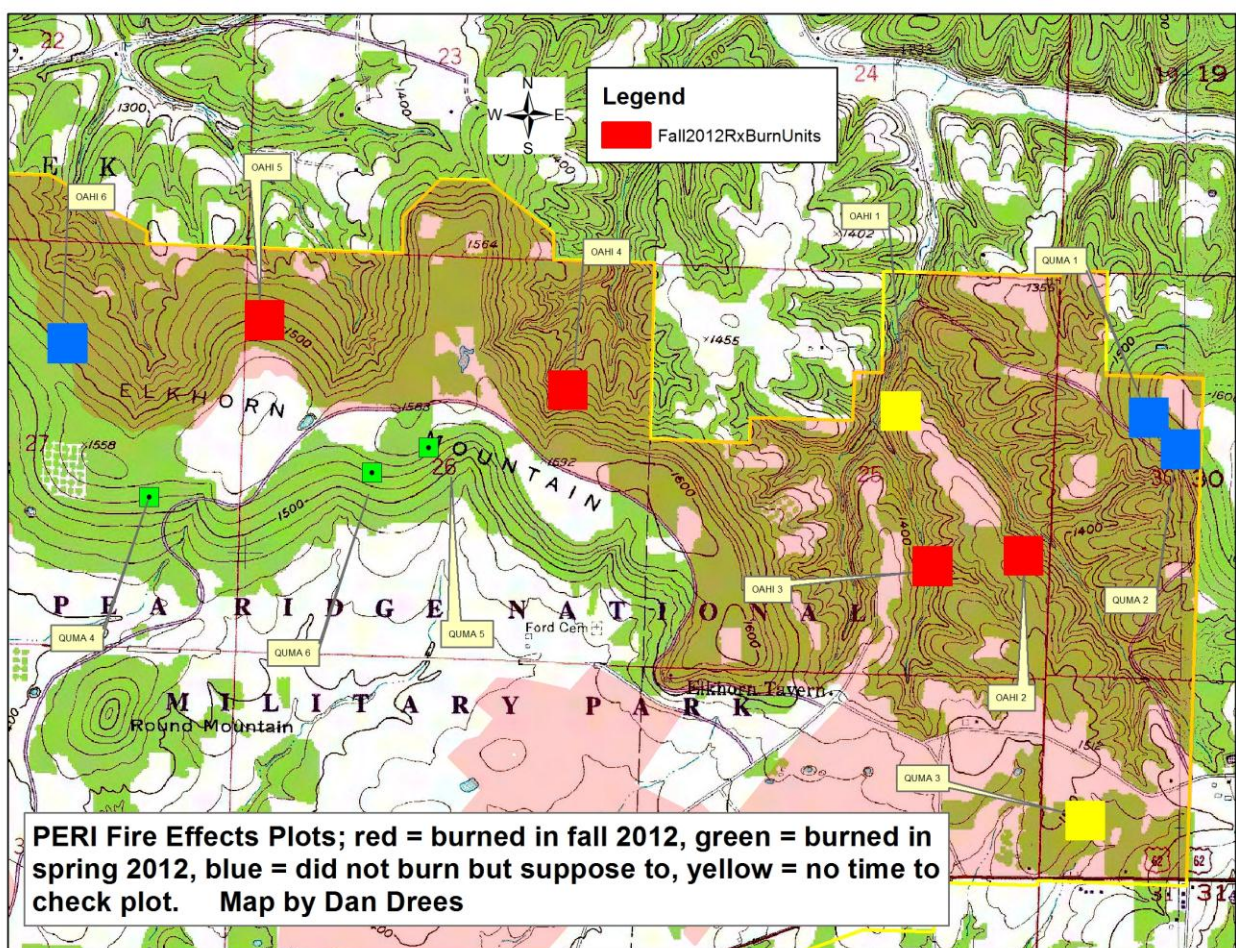
Pea Ridge National Battlefield (PERI)

Monitoring Unit	Management Objective (Restoration)	Monitoring Results (XX% confidence interval)	Objective Achieved?	Year Last Analysis Completed (Range of data years included in analysis)
PERI, Oak Hickory Forest/Woodland	Reduce mean density of pole-sized trees (2.5-15cm dbh) by 50-70% after four burns; (80% C.I.)	Reduced mean density of pole-sized trees (2.5-15cm dbh) by 23% after 1to 2 burns. (n=5 plots, 1 burn = 3 plots, 2 burns = 2 plots)	NA, some units with 2 burns & some with 1	2013 No 4 burn data yet.
	Increase mean density of oak seedlings and/or resprouts by 300-500% after four burns. (80% C.I.)	Increased mean density of oak seedlings and/or resprouts by 2,360% after 1to 2 burns. (n=5 plots, 1 burn = 3 plots, 2 burns = 2 plots)	Yes, assuming that these initial results are maintained after the 4 th burn.	2013 No 4 burn data yet.
PERI, Post oak-blackjack oak savannah/woodland	Reduce mean density of pole-sized trees (2.5-15cm dbh) by 50-70% after four burns; (80% C.I.)	Reduced mean density of pole-sized trees (2.5-15cm dbh) by 22% after 1 burn1to 2 burns. (n=6 plots, 1 burn = 4 plots, 2 burns = 2 plots)	NA, some units with 2 burns & some with 1	2013 No 4 burn data yet.
	Increase mean percent cover of native herbaceous species by 60-100% after four burns (80% C.I.)	No change after 1or 2 burns. (n=6 plots, 1 burn = 4 plots, 2 burns = 2 plots)	NA, some units with 2 burns & some with 1	2012 No 4 burn data yet.

PERI data analysis interpretation – After 4.5 years without any of the 12 FMH plots at PERI being burned, PERI became a beehive of Rx burning starting in the fall of 2011 and continuing through the fall of 2012. Three plots were burned in 2 units prior to the 2012 field season and 9

plots were burned in several units in the fall of 2012. Regrettably, I was not aware that any of these units were going to be burned. Notification that these units had been burned came several days to several weeks afterwards. When word of the fall burns arrived, the Lead Monitor had 1 day left to work before furlough, we had no crew, and I was scheduled for a 2 week vacation. Consequently, I notified the FMO at BUFF that if any fuel (Brown's) lines were going to get read at PERI, he would have to send the BUFF Module to collect the data. That did not happen.

In late-June 2013, the FEMO crew was funded for a 5-day trip to PERI to collect data from the 9 plots that supposedly burned the previous autumn. The crew collected data from 4 plots that burned and found that 3 plots had not burned. The crew ran out of time and was unable to check 2 of the plots that may have burned. See embedded map below.



PERI Oak-Hickory (Dry) Woodland Restoration Objectives

1. **Reduce mean density of pole-sized trees (2.5-15cm dbh) by 50-70% after four burns; (80% Confidence interval)**

Data from 5 plots shows 80% certainty of achieving at least a 23% reduction in the density of pole-sized trees after 1 or 2 prescribed fires. The previous analysis of this

objective occurred after 3 plots had burned one time and shown a pole-sized tree reduction of 18%.

2. Increase mean density of oak seedlings and/or resprouts by 300-500% after four burns. (80% C.I.)

Data from 5 plots shows 80% certainty of achieving at least a 2,360% increase in oak seedlings and/or resprouts after 1 or 2 prescribed fires. The previous analysis of this objective occurred after 3 plots had burned one time and shown an increase of 24%.

PERI Post Oak-Blackjack Oak (Very Dry) Woodland Restoration Objectives

3. Reduce mean density of pole-sized trees (2.5-15cm dbh) by 50-70% after four burns; (80% Confidence interval)

Data from 6 plots shows 80% certainty of achieving at least a 22% reduction in the density of pole-sized trees after 1 or 2 prescribed fires. The previous analysis of this objective occurred after 5 plots had burned one time and shown a pole-sized tree reduction of 6%.

4. Increase mean percent cover of native herbaceous species by 60-100% after four burns. (80% C.I.)

Data from 6 plots shows 80% certainty that there has been no change in the percent cover of native herbaceous species after 1 or 2 prescribed fires. The previous analysis of this objective occurred after 5 plots had burned one time and showed no change.

In my opinion, the objective to obtain a 60 – 100% increase in percent cover of native herbaceous species is the best of the 4 written fire management objectives for PERI. Typically, the restoration of native herbaceous species cover and species richness is near the top of vegetation objectives for fire-dependent natural communities such as woodlands, prairies, glades, etc.

Although I consider native herbaceous restoration the best of the 4 primary written objectives of the PERI Fire Monitoring Plan, in my opinion the objective to obtain a 60 – 100% increase will be very challenging to achieve with fire alone. Often, woodlands on very dry growing sites have experienced significant encroachment by eastern red cedars prior to the reintroduction of fire.

Typically, these cedars have reached a sufficient size that makes them invulnerable to the moderate fire intensities that fire managers can safely apply. Consequently, in most situations, mechanical thinning of the cedars is essential to getting the fastest and most significant restoration of the herbaceous layer. However, fire managers should remember that cured cedar slash tremendously elevates fire intensity.

This greatly elevated fuel-loading is important to plan for, both from a safety aspect and a woodland restoration aspect. If large amounts of cedar slash are consumed as part of a typical leaf-litter ground fire the resulting mortality of mature woodland trees could be catastrophic. Fire managers should be familiar with several options they have for reducing cedar infested woodlands while maintaining the characteristic woodland canopy trees.

Hot Springs National Park (HOSP)

Monitoring Unit	Management Objective (Restoration)	Monitoring Results (XX% confidence interval)	Objective Achieved?	Year Last Analysis Completed (Range of data years included in analysis)
HOSP, Dry Woodland (Oak/Hickory/Pine)	Reduce the density of pole trees (2.5-15 cm dbh) by at least 30% within two growing seasons after 2 nd burn; (80% C.I.)	Total pole tree reduction = 47% (n=11 plots, 1 fire)	Yes	2011

No fire effects monitoring trips were made to HOSP in 2013. No prescribed burns with monitoring plots have been conducted at HOSP since 2011.

B. Fire ecologist accomplishments and areas of focus

This section deals with roles and functions of the ecologist. Identify accomplishments and/or focus areas along with a rough estimate of the amount of time spent in these areas (see table format and example below). This includes planning documents produced or reviewed (e.g. fire management plans, monitoring plans, prescribed fire or mechanical treatment plans, etc.), presentations given and audience, meetings and task groups attended, contracts reviewed, interagency collaboration efforts, volunteer hours managed, and scientific or research publications produced.

Table 4. Fire Ecologist 2012 Accomplishments/Focus Areas

Category	% Time	Accomplishments and/or areas of activities
1. Planning	9%	• Made updated fire operations maps for all 3 of the 2013 prescribed burns at OZAR. Made maps (NEPA, Operations, & Vicinity) for 1 proposed burn unit expansion and 4 new proposed burn units. Calculated numerous acreage figures, coordinates, and other GIS-related elements to be incorporated into Rx burn plans and operations. • 7 days scouting new fire-management acres in the Thorny Creek, Mill/Buzzard, Jerktail Mt., Macy/Reed & Pulltite Rx units. • Attended the Fire Management Coordination Team meeting with staff from the MO. Dept. of Conservation to review our two 2013 dual-agency Rx burns. • Wrote Booming Shoals Burn Plan Amendment.
2. Presentations	7%	• Gave 2 presentations & moderated a fire workshop at the MO. Natural Resources Conference. • 4 presentations of the Fire Ecology of the Current River Watershed for; the OZAR fuels crew, U. of MO. Forestry Field Course, TNC, & OZAR fire effects crew. • Wrote Thorny Creek Fire Success Story for OZAR. • Developed custom handouts & led 1 day of OZAR burn units tours for U. of MO forestry field camp (Stegall Mt., Denning Hollow, & Mill/Buzzard). • Toured journalist through Rx units for Bird Conservation Magazine article. • Developed custom handouts & lead a 1-day fire ecology field trip of several OZAR Rx units for 50 staff from the MO. Dept. of Conservation's Wildlife Division. • Provided a tour of the Stegall Mt. Rx unit for the Southern Illinois Univ. Forestry Field Course. • PowerPoint program and 2 tall larkspur Rx unit tours for MOBOT genetic researchers. • Prepared OZAR Rx fire effects data presentation for Resource Mgt. staff.
3. NPS Meetings/ task groups	6%	• Defended wilderness Rx unit at BUFF from attempt to stop the burn. • Meetings and coordination with OZAR resource management on several issues. • Frequent meetings and coordination with OZAR fire staff on numerous issues. • Served as Fire's rep on the OZAR Safety Committee. • Served as chairman of the Kelley inholding acquisition committee at OZAR. • Attended several supervisor's meetings at OZAR.
4. Interagency work	1%	• Attended several meetings with Pioneer Forest staff and Board of Directors to present data from our previous joint Rx burns and plan the 1,831-acre Jerktail Mt. Rx burn for 2015. • Attended the MO. Dept. of Conservation's Fire Mgt. Coordination Team meeting in order to help coordinate established and future interagency burn units. • Attended 2 meetings of the Current River Conservation Opportunity Area.
5. Wildfire assignments	1%	• FFT1 on 3 local wildfires (4 operational periods)
6. Prescribed fire projects	7%	• 3 Rx fires at OZAR, all as FEMO. • 1 day burning cured cedar piles.
7. Non-fire fuels projects	1%	• 5 days cutting cedars off the Booming Shoals glades • Mapped & calculated acreage for several mechanical cedar removal projects.
8. Research	3%	• Hired and supervised a graduate intern to coordinate research on the ecology of Ozark tall larkspur populations, (80% of these are known from OZAR). • Assisted in collecting monitoring data from tall larkspur populations at OZAR.
9. Data collection	19%	• 28 days in the field with plot reads and rare plant searches in Rx burn units. • Rare plant discovery at Lower BUFF Wilderness with report to AR rare plant database.
10. Data entry	0%	• All data entry was accomplished by the FEMO crew.
11. Data analysis	19%	• Worked on 2013 data analysis for OZAR and BUFF.
12. Supervision /Admin	15%	• Supervision, performance appraisal plans, & PA's for each of my 5 staff. • Botany training, travel, payroll, etc.

		Recruiting and hiring for 4 employees to fill 3 types of positions.
13.Training	4%	Ozark Botany, Red-carded, Fireline Safety refresher, USERRA, FISSA, Discrimination & Whistleblowing in the Workplace, VET-FHM, 3 DOI/OSHA on-line training courses, Approving Official and Cardholder mandatory charge card trainings, mandatory 10 hours of annual training for Supervisors, EEO course.
14. Travel out-of-park for plot or project work	4 %	3 trips to BUFF totaling 11 days.
15.Miscellaneous	4%	- Submitted detailed weekly reports to FMO. 2 Fire monitoring trip reports were submitted to BUFF. - Functioned as the GIS map maker for the OZAR Fire Shop. - Duties as acting FMO

B. Fire ecologist accomplishments and areas of focus

B. 1 Planning

B.1.a Fire Operations Plans

Updated the Thorny Creek and Mill/Buzzrd Rx maps to include updated cultural resource exclusions. Produced a detailed Jerktail Mt. area trip report that included a map with several cultural exclusion features, including a previously unrecorded cemetery and pictures of that cemetery. Wrote most of the Booming Shoals Burn Plan Amendment so that we could burn cedar slash with snow on the ground.

B.1.b. Budgets

Applied for and received two grants totaling \$15,870 to support the 2013 work of our tall larkspur research intern.

Wrote a portion of the National Science Foundation grant request that resulted in Lincoln University receiving funding to develop field botanists. Partially replaced one of OZAR's missing seasonal FEMO's lost to budget cuts by hosting one of the Lincoln U. botany interns.

Wrote a major portion of the successful OZAR grant request to the Rocky Mt. Elk Foundation that provided \$7,500 to help fund fireline placement research for a new 1,836-acre burn unit.

Wrote a successful OZAR grant request to the National Wild Turkey Federation that provided \$2,500 to help fund fireline placement research for a new 1,836-acre burn unit.

Attended numerous meetings related to the ever-evolving FY2013 budget cuts. Because of budget cuts we were not able to refill our vacant GS-6 Assistant Lead Monitor position and 2 of our GS-5 Fire Effects Monitors.

B.1.c. New or expanded burn units

I spent 7 days helping to scout, flag, and GPS new firelines, cultural exclusions, and other notable elements across significant expansions of the Mill/Buzzard Rx unit and the creation of the Thorny Creek Rx unit.

B. 2. Presentations

B.2.a. MO. Natural Resources Conference (MNRC)

Prepared and presented MNRC program titled, *Your Chinkapin Oak Woodlands May be a Storehouse for Rare Plants, a Case Study from the Current River Watershed*. Served as moderator for MNRC Workshop titled, *Prescribing Fire For Woodland Restoration: How Is Success Measured?* Prepared and presented MO Natural Resources Conference (MNRC) program titled, *Recent monitoring and new discoveries of American barberry (Berberis Canadensis) at ONSR*.

B.2.b. OZAR Fire Ecology Program

Gave 4 presentations of my Fire Ecology of the Current River Watershed program for the OZAR fuels crew, U. of MO. Forestry Field Course, The Nature Conservancy Rx Fire crew, & OZAR fire effects crew.

B.2.c. Fire Success Story

Wrote a Fire Success Story about the Thorny Creek Rx Burn at OZAR (see p. ?).

B.2.d. Burn units tours

At the request of the U. of MO. Forestry Field Course, I prepared handouts and talks for a 1-day tour of our Mill/Buzzard, Denning, and Stegall Mt. prescribed burn units. I was also asked to give this same tour to a field ecology class from the U. of Illinois.

B.2.e. Bird Conservation Magazine article

Spent 2 days touring a journalist from the American Bird Conservancy (ABC) through some of our Rx units for an article on glade/woodland restoration for ABC's Bird Conservation magazine (40,000 print copies + distributed on-line). Provided photos and supporting data for article.

B.2.f. Rx unit tour for MO. Dept. of Conservation (MDC)

Prepared handouts and gave 2 presentations on the fire ecology of the Stegall Mt. area for 50 MDC staff.

B.2.g. Rx unit tour for S. I. U.

Provided a tour of the Stegall Mt. Rx unit for the Southern Illinois Univ. Forestry Field Course.

B.2.h. Tall larkspur presentations for genetic researchers

Presented the OZAR tall larkspur PowerPoint program for 5 plant genetics researchers from the MO. Botanical Garden (MoBOT) and showed them 2 of our Rx units with larkspur. Met with the group to discuss getting the genetics project to the next level of analysis.

B.2.i. Fire effects data update for meeting with Resource Management

Organized our OZAR fire effects data analysis into a PowerPoint program and was prepared to present it at a meeting between all of the fire staff and all of the RM staff but all of the other staff overran their speaking allotments.

B.3 NPS Meetings/task groups

B.3.a. OZAR Fire Operations

On average, I met weekly with the OZAR FMO to discuss fire operations strategic and operational planning. I am very grateful that the OZAR FMO optimizes the biodiversity benefits of prescribed burning as part of the fuel load reduction strategy at OZAR.

B.3.b. Safety Committee

Safety Committee chairwoman required all members to complete 3 on-line safety courses.

B.3.c. Inholding Committee

Continued to serve as chairman of a committee to investigate acquisition of two important inholdings within the park. This involved site visits to assess and GPS important resources, make maps, coordinate meetings, and write update reports.

B. 4. Interagency work

B.4.a. Pioneer Forest (Pioneer Forest owns over 100,000 acres within or adjoining OZAR's park boundary).

Wrote a significant portion of the grant request (including maps), that led to Pioneer Forest receiving a \$97,135 grant from the Wildlife Conservation Society in order to conduct prescribed fire operations with NPS on Jerktail Mt.

Met with the Chief Forester for Pioneer Forest at our interagency Devils Well Rx unit and evaluated the level of fire damage to merchantable timber in advance of the Pioneer Forest Board of Director's field trip. Pioneer's forester said on a scale of 0-10 the timber damage was a 2 and that he felt the timber damage was very acceptable given the Rx fire's habitat improvement for tall larkspur.

Produced twenty 9-page handouts, wall maps, and other presentation graphics for the Pioneer Forest Board of Director's field trip to our joint NPS/Pioneer Devils Well Rx unit. Produced and presented a PowerPoint program on the NPS/Pioneer partnership Rx burns at Welch Lodge, Devils Well, and proposed for Jerktail Mt. Answered questions from the Pioneer Board regarding the proposed Jerktail Mt. Rx unit.

Produced a report to Pioneer Forest on the 2012 monitoring of tall larkspur.

B.4.b. MO. Dept. of Conservation (MDC)

When an MDC Forester failed to submit both the Thorny Creek and Mill/Buzzard burn plans to the MDC Fire Mgmt. Coordination Team (FMCT) by the required deadline, I got the deadline extended and got the burn plans submitted. At my FMO's request, I attended the MDC FMCT meeting and shepherded these new plans through the approval process by our partners.

B. 5. Wildfire assignments

I was FFT1 on 3 OZAR wildfires.

B. 6. Prescribed fire projects

Served as FEMO on 3 OZAR prescribed burns (3 days) and helped with interior ignitions/mop-up (4 days). Served 1 day as a FFT1 doing cedar pile ignitions.

B. 7. Non-fire fuels projects

Served for 5 days as a FALB cutting cedars on 2 of the Booming Shoals glades. The FMO's decision to cut the cedars at Booming Shoals was based on the fire effects data that showed that fire alone was not achieving our objectives.

B. 8. Research

B. 8. a. Tall larkspur genetic research permit

Followed up on an NPS research permit to allow the Missouri Botanical Garden to process tall larkspur genetic samples from across its national range to determine if our disjunct local population was genetically distinct. Genetic analysis of the local and national specimens are still on-going.

B. 9. Data collection

B. 9. a. Plot reads

Assisted the crew with 28 days of plot reads at OZAR and BUFF. I often worked in the field with the skeletal remains of the FEMO crew because Angela was gone 40 days due to wildfire deployments, Ryan was gone for 20 days, and both Charity and Simone finished on 8/8. The data we worked hard to collect was critical to the Thorny Creek Fire Success Story, the trip report and analysis of the Lower Buffalo Wilderness burn, and the future Mill/Buzzard Fire Success Story.

B.9.b. Trelease's larkspur and kudzu found

Produced detailed trip reports for BUFF in regards to our week in the Lower Buffalo Wilderness (LBW) and a week in Pruitt. These reports provided timely notification of our discovery of a significant population of the nationally-rare fire dependent Trelease's larkspur (*Delphinium treleasei*) in LBW, no hog sign in LBW, and a bad kudzu outbreak in the Pruitt Rx unit. Trelease's larkspur had not been previously recorded from LBW.

B.10. Data entry

All data entry was accomplished by the FEMO crew.

B. 11. Data analysis

Completed more data analysis in 2013 than any previous year. However, the Ozark Society's 2013 opposition to prescribed burning in the Lower Buffalo Wilderness at BUFF created the need to do substantial amounts of additional data analysis and report writing. The need to write numerous grant requests, and the 3-week government shut down, robbed time that I would have preferred to put into data analysis. 2013 data analysis from OZAR and PERI are not as in-depth as I would have preferred.

B. 12. Supervision/Admin

B. 12. a. HR duties

Budget cuts, a hiring freeze, and other challenges made recruiting and hiring a daunting endeavor again. Nevertheless, all 4 of my seasonal staff in 2013 reported to work on my requested EOD date. Despite this success, the requirement that I do more of my own HR work and try to stay current on a constantly changing matrix of HR requirements is far more time consuming for me than when I worked with our in-park HR people.

I had the privilege to supervise and write performance appraisals for 5 very talented colleagues. All 5 final PA's were completed on time, and included detailed dialogue with the employee.

B. 13. Training

B. 13. a. Botany

I was unable to hire a contractor to teach our week-long Ozark botany training in 2013 due to budget reductions. Fortunately, my wife is qualified to teach this course and she agreed to do it again in 2013. Of course, I had to repay her by completing numerous projects that she wanted.

B. 15. Miscellaneous

B. 15a. GIS Mapping

Mapped all wildfire perimeters and made all of the prescribed burn operations maps for OZAR. I also make a large number of maps for our strategic planning of new or expanded burn units. I assisted the MWR Fire GIS Specialist with OZAR's requirement to participate in the StarFire pilot program.

Responded to a request by OZAR RM and I&M to identify a cedar slashing project area as a rainy day work area for the EPMT.

C. Fire effects crew accomplishments and areas of focus

Table 5. Fire Effects Crew 2013 Accomplishments/Focus Areas

Category	% Time	Notes
FMH plots	45	Estimated amount of time spent collecting plot data; includes any preparation time.
WUI plots	0	NA
CBI plots	0	
Other plot work	4	Fire-dependent rare plant plots.
Wildfire assignments	7	LM was FFT2 on wildfires in UT, MN, and ID (18 operational periods). LM was FALB on wildfire3 in CA (18 operational periods). Seasonal employee Ryan Manuel was FFT2 on wildfires in ID (18 operational periods). LM was Engine boss trainee on 1 local wildfire (1 operational period).
Prescribed fire projects	6	LM was Engine Boss trainee on 3 OZAR burns and 1 TNC burn.
Non-fire fuels projects	5	LM and 2 seasonal employees served as fallers on 8 acres of glade restoration cedar cutting.
Travel out-of-park for plot or project work	2	Include <u>travel time only</u> for distant, multi-day plot/project work requiring a travel authorization (Note: include data collection or project time associated with these trips in the plot or project categories above)
Data entry	20	Estimated amount of time spent entering data from paper to PC
Data analysis	0	
Supervision/Ad min	6	LM typically supervised crew during plot reads. LM handled all of the travel and most of the crew taining.
Training	5	LM had S-230, 2-day Rare Mo. plant ID workshop, 2-day Operational Leadership Course, Less Lethal LE training, mandatory 10 hours of annual training for Supervisors, EEO course, 2-day Timber Quality & Rx Fire Workshop, ENOP task book development, Ozark Botany, Red-carded, Fire Safety refresher, USERRA, FISSA. Seasonal staff had a mix of S-130/190, I-100, I-700. All had Ozark Botany, fireline refresher, and PT
Miscellaneous	0	

D. Additional Program Information

Table 6. Planning – 2013

Park	Does Park have written Desired Future Conditions?	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?
Buffalo National River	no	Draft 2002	0	0
Hot Springs National Park	no	None	0	0
Ozark National Scenic Riverways	no	Completed 2000 Partially revised 2007	0	0
Pea Ridge National Military Park	no	Draft 2003	0	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*
Buffalo National River	100%	40%	1	0	0	0
Hot Springs National Park	NA	NA	NA	0	0	0
Ozark National Scenic Riverways	75%	33%	3	2	0	0
Pea Ridge National Military Park	37%	37%	0	0	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?*
Buffalo National River	3	1	0	
Hot Springs National Park	0	0	0	
Ozark National Scenic Riverways	5	1	1 prepared but other staff used up all of scheduled meeting time.	Yes, BUFF, HOSP, OZAR, & PERI analyzed from 1 install on Drees laptop
Pea Ridge Military Park	0	0	0	

Table 9. Research – 2013

Park	Are research needs identified in FMP or Monitoring	# of Proposals Submitted in 2013	# of Proposals Funded in 2013	# of Research Projects Supported in 2013*	Additional Comments

	Plan?				
Buffalo National River	no	0	0	0	
Hot Springs National Park	no	0	0	0	
Ozark National Scenic Riverways	yes	1	1	1	park-requested tall larkspur project ; significant park-involvement
Pea Ridge National Military Park	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.

E. 2014 Direction

The Ozark Highlands Fire Effects Monitoring (FEMO) Crew plans for the near future are to continue collecting high quality data from recently burned units. Importantly, this includes species level recognition of immature grasses and forbs, since recovery of herbaceous species richness and abundance are our best measures of success. Maintaining existing levels of data collection, management, and analysis continues to be more daunting as OZAR FEMO budgets and staffing continue to decline. Additionally, OZAR is plagued by a serious shortage of seasonal housing and what is available is in very poor condition.

Due to the FY2013 requirement that FEMO travel be funded out of Rx Fire Project Budgets, we will no longer be able to monitor plots the second growing season after a burn. This makes some of the existing written objectives at BUFF and HOSP unattainable. Consequently, starting in 2013 these parks will only have fire effects monitoring data the first year after a burn, and even then only **if** the AR FMO reserves enough money in the project budget to pay for the travel expenses.

F. Optional Information Include any additional material not already covered in the sections above:

The 2013 Thorny Creek Fire Success Story from OZAR is being attached as an additional upload.

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.