



Barrens to Bayous Fire Monitoring Network 2013



A. Summary

The Barrens to Bayous fire effects crew exemplified the word flexibility in the year 2013. Travel restrictions and budgetary constraints lead to some creative work solutions. The fire effects crew participated in 13 prescribed burns throughout the region, providing operational support as FFT2, FFT1, ATVO, READ, FIRB(T), and FEMO. Immediate post-burn assessments were conducted at LIRI, HOBE and NATR for a total of 19 plots. Annual fire effects plot reads were limited to those accessible during work day hours, without going into travel status. At the Natchez Trace Parkway, 90% of the annual plot reads were accomplished and 3 modified rapid assessment plots were installed within an unburned treatment unit. At GUIS, 10% of the scheduled plot reads were completed during a non-fire project. The crew installed and read 2 new FMH plots at Shiloh National Military Park in Tennessee, anticipating a first-entry spring burn in 2014. Due to travel restrictions, the crew was unable to fulfill 47% of monitoring responsibilities for the year. However, even with a severely curtailed travel budget, the crew read 53 long-term vegetation plots in 2013. Three crewmembers spent a combined 9 pay periods at Gulf Islands National Seashore wrapping up the Deepwater Horizon Oil Spill All-hazard response, in the roles of resource advisor and/or documentation unit leader. The primary function of the READ position during this phase of the clean-up was to monitor avian impacts from the oil spill.

Supporting the NATR fuels staff, crewmember William Hilton assisted at Tishomingo State Park as FALB in order to mitigate hazard tree risk in several prescribed fire units. William and Jesse Burton traveled to CANA on a 30 day severity assignment in the spring. The crew was actively involved with local wildfires as well, in the roles of FFT2, FFT1, FALA, FALB and ICT5(T). Requests for national wildfire assistance arrived late in the season with Carol Fields, Jesse, and William filling positions as FFT1, HECM and FALB. These handcrew and helicopter suppression assignments were in California, Oregon, Montana, Alaska, Washington, Virginia and West Virginia.

All members of the crew taught segments of S130/190 and S-212 courses for AmeriCorps volunteers. Jennifer Falkey taught all divisions of Natchez Trace Parkway First Aid/CPR. She also assisted with the teaching of local community college students the Introduction to Wildland Fire course (S-130/190). Carol assisted with the RX-310 and FEM classes at the Advanced Fire Academy in Birmingham, Alabama. Jesse presented fire ecology and monitoring findings at the 10th Mammoth Cave Science Consortium in Kentucky. In May, the crew was given the Achievement in Adaptive Management, 2012 Fuels & Ecology Award. While last year presented many budgetary challenges, 2013 also provided many operational and educational development endeavors.

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

Park	Monitoring Type	Type Code	Plot Type	Pre-burn 2013	Immed. Post 2013	Post-burn/Annual 2013	Annual Total (2013)	Total Plots
Gulf Islands National Seashore	Sand Pine - Scrub Oak	PICL	FMH Forest Plot	0	0	0	0	12
	Longleaf - Slash Pine	PIPA	FMH Forest Plot	0	0	0	0	12
	Pitcher Plant Savannah	SAAL	FMH Forest Plot	0	0	1	1	1
	Fuels Monitoring	FUELS	Fuel Plot	0	0	0	0	4
Mammoth Cave National Park	Redcedar – Oak Glade	JUVI	FMH Forest Plot	0	0	0	0	7
	Indiangrass Grassland	SONU	FMH Grass Plot	0	0	0	0	8
	Big Bluestem Grassland	ANGE	FMH Grass Plot	0	0	0	0	5
	Oak – Hickory Woodland	OAHI	FMH Forest Plot	0	0	0	0	9
	Chestnut Oak Woodland	QUMO	FMH Forest Plot	0	0	0	0	3
	Fuels Monitoring	FUELS	Fuel Plot	0	0	0	0	4
	Old Field	OLFI	FMH Forest Plot	0	0	0	0	2
Little River National Preserve	Shortleaf Pine Forest	PIEC	FMH Forest plot	0	5	0	5	12
	Green Pitcher-plant Bog	SAOR	FMH Forest Plot	0	5	0	5	6
	Chestnut Oak Forest	QUMO	FMH Forest Plot	0	0	0	0	7
Natchez Trace Parkway	Oak – Hickory Woodland	OAHI	FMH Forest Plot	0	1	5	6	6
	Post Oak Savanna	QUST	Mod. F. Plot [†]	3	5	0	8	6
	Redcedar Encroached Prairie	JUVI	FMH Brush Plot	0	0	4	4	4
	Loblolly Pine Forest	PITA	FMH Forest Plot	0	0	7	7	14
	Redcedar Encroached Prairie	BLACK BELT	FMH Grass Plot	0	0	4	4	4
	Tennessee Barrens	TNBA	Mod. F. Plot [†]	0	0	0	0	3
	Japanese Grass Invaded Streamside Forest	MIVI	FMH Grass Plot	0	0	10	10	10
Horseshoe Bend NMP	Mixed Montane Longleaf Forest	PIPA	FMH Forest Plot	0	3	0	3	5
Stones River National Battlefield	Little Bluestem Fields	SCSC	FMH Grass Plot	0	0	0	0	15
	Central Basin Barrens	ANTE	FMH Grass Plot	0	0	0	0	9
	Grassland Restoration Areas	ANVI	FMH Grass Plot	0	0	0	0	10
	Fuels Monitoring	FUELS	Fuel Plot	0	0	0	0	3
	Redcedar Woodland	JUVI	FMH Forest Plot	0	0	0	0	1
Russell Cave NM	Chestnut Oak Forest	QUMO	FMH Forest Plot	0	0	0	0	1
Vicksburg NMP	Exotics Monitoring	VICK	Photo Plot	0	0	0	0	6
Shiloh Military Park	Oak-Hickory Woodland	SHIL	FMH Forest Plot	2	0	0	0	2
Total				5	19	31	53	191

[†]See 2011 B2B Annual Report for plot layout and methods.

Help was also provided by the NATR Fire Management Suppression and Fuels programs, NATR Natural Resource Specialist, SCA volunteer, and LIRI Resource Management staff. Their field support greatly aided the crew this past year.

Table 2. Fire Ecology Staffing 2013

Ecologist and Monitors	Starting Date	Ending Date	# of Pay Periods	READ Qualified	Training and Development
Jesse Burton Ecologist	01/01/13	12/31/13	26	Yes	Annual Fire/Saw Refresher, B3, 4th Fire Behavior and Fuels Conference, S-131/133, FFT1(T) on western handcrew assignment, FALB(T) on eastern handcrew assignment, ICT5(T) during CANA severity, Attained FFT1, FIRB(T) taskbook initiated
Carol Fields Lead Monitor	01/01/13	12/31/13	26	Yes	Annual Fire/Saw Refresher, B3, (2) 30 day details to Deepwater Horizon Response as READ
Jennifer Falkey Monitor	01/1/13 9/08/13	06/01/13 12/31/13	11 8 (18 total*)	Yes	Annual Fire/Saw Refresher, B3, S-133, Emergency Medicine and Trauma Conference, Documentation Unit Leader (DOCL) Taskbook Initiated, 30 day DOCL assignment, FALA Taskbook Completed
William Hilton Monitor	2/10/13 9/08/13	6/29/13 12/31/13	10 8 (18 total*)	Yes	Annual Fire/Saw Refresher, B3, S-131/133, 30 day CANA severity assignment, FALB(T) on western handcrew assignment, FALB Taskbook Completed, FFT1and HECM taskbooks initiated

*Number of pay periods worked may not include additional time worked on wildfire and all-hazard incidents.

**Jesse Burton & Carol Fields serving as
FALB(T) and FFT1 on the Smoke Hole
Fire, Monongahela National Forest, WV.
November, 2013**

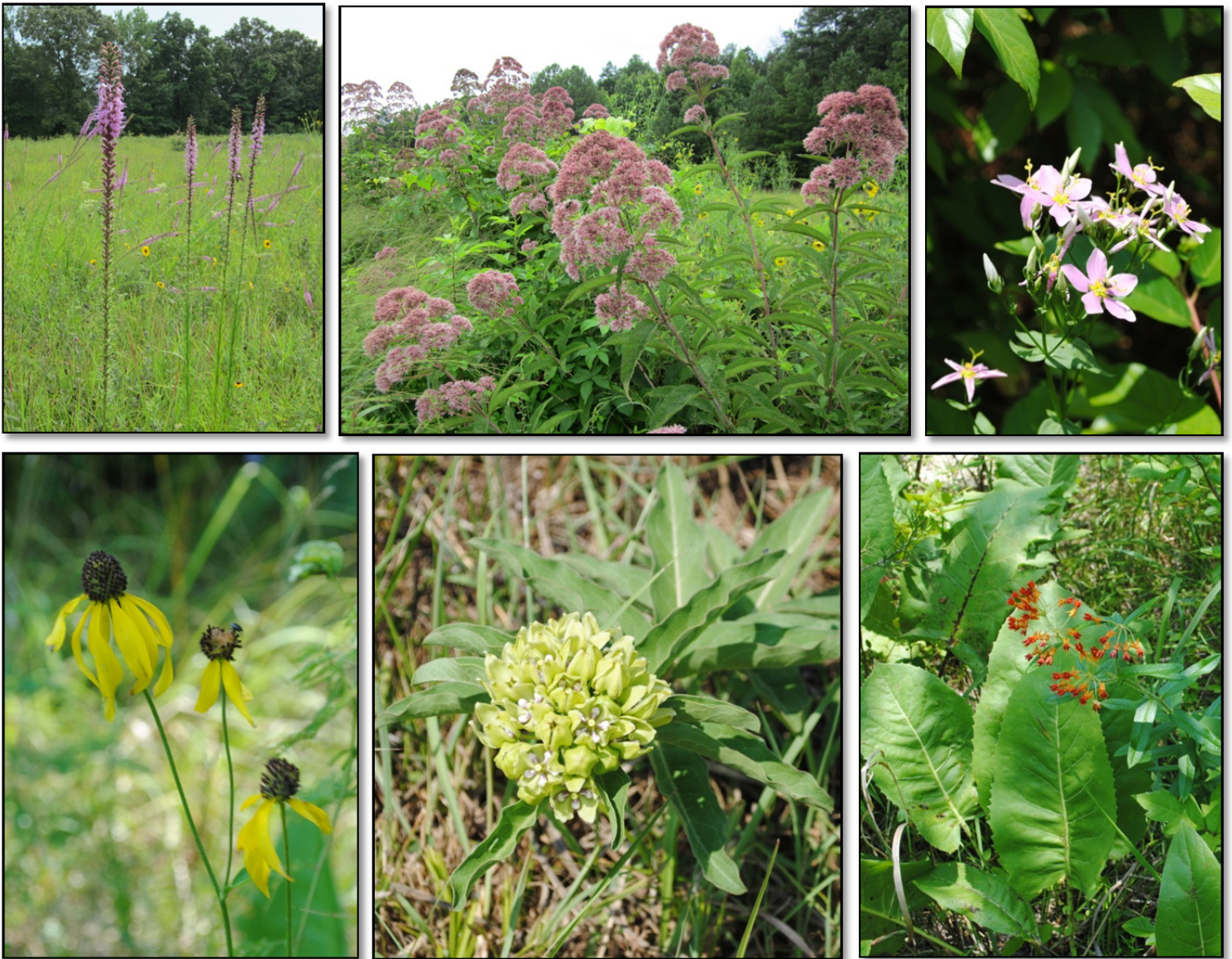


**Will Hilton working with an interagency handcrew on the Kelly
Fire, Beaver Head – Deer Lodge National Forest, MT.
August, 2013**



Table 3. Management Objectives and Monitoring Results 2013

The monitoring results for this report are broken down by park in the following pages. Data entry is current up to the end of calendar year 2013 and all analyses conducted this year have used the most recent data entered and checked. Results are reported with 80% confidence intervals of the mean unless otherwise noted. Basic formulas for each analysis are now displayed in the management objectives column. Significant changes in monitoring results are in **bold** font. An underlined number of plots denote that minimum sample sizes have been achieved. Estimations of minimum sample size were conducted in 2010 with the 'SS Two Samples' tool created by Ken Gerow (available online at www.statsalive.com). Sample sizes needed with current variance are given in brackets when minimum size has not been achieved. When brackets are not given, variance and correlation of samples do not yet allow for an estimate of minimum sample size.



Shade intolerant forbs rely on disturbance processes, such as fire, in order to persist in the Southeastern United States. Clockwise from top left: Blazing Star (*Liatis* sp.); Queen-of-the Meadow (*Eupatorium fistulosum*); Rose Pink (*Sabatia angularis*) Grey Headed Coneflower (*Ratibida pinnata*); Green Antelopehorn (*Asclepias viridis*); Prairie Dock (*Silphium terebinthinaceum*) and Butterfly Milkweed (*Asclepias tuberosa*).

Table 3.1. Summary of Long-term Monitoring Results at Gulf Islands National Seashore

Vegetation Type	Management Objectives (Restoration)	Monitoring Results (80% Confidence Intervals)	Objective Achieved?	Year Analysis Completed (Range)
Sand Pine – Scrub Oak (FPICL1D07)	20-40% litter and duff reduction immediate post-burn $\frac{\beta_{Post} - \text{before } \beta}{\text{before } \beta}$	Decrease of Duff = 14.9 % (± 26 %) after 1 st fire <i>n</i> =8 [32], 3 burn units 1.1 % (± 58 %) after 2 nd fire <i>n</i> =6 [25], 4 burn units 54.5 % (± N/A) after 3 rd fire <i>n</i> =1, 1 burn units Decrease of Litter = 42.0 % (± 19 %) after 1st fire <i>n</i> =8, 3 burn units +20.0 % (± 98 %) after 2nd fire <i>n</i> =6 [42], 4 burn units 8.7 % (± N/A) after 3 rd fire <i>n</i> =1, 1 burn units	Uncertain Data are highly variable, may be confounded by hurricanes Ivan, Dennis, & Katrina [Objective to be changed in 2013 to reflect long-term management of fuel loading]	2012 (2000-2012)
	40-60% reduction of pole-sized trees by 2 nd year after 3 rd burn $\frac{\beta_{YR02} - 00Pre}{00Pre}$	Pole density reduction= 9.6 % (± 4 %) after 1st fire <i>n</i> =10, 5 burn units 21.8 % (± 8 %) after 2nd fire <i>n</i> =3, 2 burn units	Uncertain Plots have not been burned three times and objective reduction has not been met	2010 (2000-2010)
	20-40% increase in herbaceous cover by 2 nd year after 3 rd burn $\frac{\beta_{YR02} - 00Pre}{00Pre}$	Increase in relative cover = 96.1 % (± 65 %) after 1st fire <i>n</i> =8 [80], 4 burn units 210.7 % (± 124 %) after 2nd <i>n</i> =3 [230], 2 burn units)	Yes/Uncertain Plots have not burned three times	2010 (2000-2010)
Longleaf – Slash Pine Savanna (FPIPA1D07)	50-90% hardwood pole reduction by one Year after the 3 rd burn. $\frac{\beta_{YR01} - 00Pre}{00Pre}$	Density Reduction = 59.3 % (± 15 %) after 1st fire <i>n</i> =9, 4 burn units 67.6 % (± 15 %) after 2nd fire <i>n</i> =9, 4 burn units 82.6 % (± N/A %) after 3 rd fire <i>n</i> =1, 1 burn units	Yes All plots have not burned three times	2010 (2000-2010)
	20-40% litter and duff reduction immediate post-burn $\frac{\beta_{Post} - \text{before } \beta}{\text{before } \beta}$	Decrease of Duff = 14.2 % (± 15 %) after 1 st fire <i>n</i> =8 [18], 3 burn units 19.2 % (± 15 %) after 2nd fire <i>n</i> =10 [18], 4 burn units 42.3 % (± 12 %) after 3rd fire <i>n</i> =8, 3 burn units 28.3 % (± 30 %) after 4 th fire <i>n</i> =3, 2 burn units Decrease of Litter = 61.9 % (± 6 %) after 1st fire <i>n</i> =8, 3 burn units 59.7 % (± 13 %) after 2nd fire <i>n</i> =10 [19], 4 burn units 38.6 % (± 28 %) after 3rd fire <i>n</i> =8 [68], 3 burn units) +36 % (± 99 %) after 4th fire <i>n</i> =3 [68], 2 burn units)	Yes Reductions of litter with initiation of Rx fire and duff reductions occurred in later treatments [Objective to be changed in 2013 to reflect long-term management of fuel loading]	2012 (2000-2012)
	20-40% increase of herbaceous cover by 2 nd year after 3 rd burn.	Increase in cover = 36.9 % (± 32 %) after 1 st fire <i>n</i> =7 [13], 3 burn units 147.5 % (± 82 %) after 2nd fire <i>n</i> =6 [191], 3 burn units)	Yes/Uncertain Increase in graminoid and forb cover by second burn; however, plots	2010 (2000-2010)

	$\frac{\beta_{YR02} - 00Pre}{00Pre}$		have not burned three times	
	Limit mortality of longleaf and slash pine to 20%	Density Reduction = 12.0 % (± 13%) after 1 st fire <i>n=11, 4 burn units</i> 20.8 % (± 22 %) after 2 nd fire <i>n=6 [22], 3 burn units</i>	Uncertain Data are highly variable	2010 (2000-2010)
	$\frac{\beta_{YR02} - 00Pre}{00Pre}$			
Pitcherplant Savannah (FSAAL1G010)	Decrease litter and duff loading by 20-40% immediate post-burn	Decrease of Duff = 12.5 % (± 14 %) after 1 st fire <i>n=4, 1 burn units</i> 11.8 % (± 0 %) after 2nd fire <i>n=2, 1 burn units</i> 19.0 % (± N/A %) after 3 rd fire <i>n=1, 1 burn units</i>	Yes/Uncertain Plots do not reach minimum 20% duff reductions per treatment.	2012 (2001-2012)
Wet Pine Savanna/Mesic Flatwoods Fuels (added to increase sample size of fuels analysis)	$\frac{\beta_{Post} - before \beta}{before \beta}$	Decrease of Litter = 63.2 % (± 5 %) after 1st fire <i>n=4, 1 burn units</i> 23.3 % (± 72 %) after 2 nd fire <i>n=2, 1 burn units</i> 17.4 % (± N/A %) after 3 rd fire <i>n=1, 1 burn units</i>	[Objective to be changed in 2013]	
	Limit mortality of overstory pine trees to less than 20% measured 2 years post burn	Density Reduction = 4.5 % (± N/A %) after 1 st fire <i>n=1, 1 burn units</i> 25.0 % (± N/A %) after 2 nd fire <i>n=1, 1 burn units</i>	Yes/Uncertain* Mortality after 2 nd fire is likely a result of hurricanes Ivan, Dennis, & Katrina	2010 (2001-2010)
	$\frac{\beta_{YR02} - 00Pre}{00Pre}$			
	Reduce pole tree density by 40-90%	Density Reduction = 0 % (± N/A %) after 1 st fire <i>n=1, 1 burn units</i> 16.7 % (± N/A %) after 2 nd fire <i>n=1, 1 burn units</i>	No/Uncertain* Pole densities were very low at pre-burn levels (< 50 per/acre)	2010 (2001-2010)
	$\frac{\beta_{YR02} - 00Pre}{00Pre}$			
	Reduce shrub density by 40-90%	Density Reduction = +108 % (± N/A %) after 1st fire <i>n=1, 1 burn units</i> +92.5 % (± N/A %) after 2nd fire <i>n=1, 1 burn units</i>	No/Uncertain*	2010 (2001-2010)
	$\frac{\beta_{YR02} - 00Pre}{00Pre}$			
	Cause no net decrease in cover of yellow trumpets (<i>Sarracenia alata</i>)	Increase in cover = 100 % (± N/A %) after 1 st fire <i>n=1, 1 burn units</i> 100 % (± N/A %) after 2 nd fire <i>n=1, 1 burn units</i>	Yes/Uncertain* Only one plot is installed in this monitoring type	2010 (2001-2010)
	$\frac{\beta_{YR02} - 00Pre}{00Pre}$			
	Increase herbaceous component of the understory by 20-40% measured 2 years after the 3rd burn	Increase in cover = -1.4 % (± N/A %) after 1st fire <i>n=1, 1 burn units</i> -36.6 % (± N/A %) after 2nd fire <i>n=1, 1 burn units</i>	No/Uncertain* Only one plot is installed in this monitoring type and plot has not burned three times	2010 (2001-2010)
	$\frac{\beta_{YR02} - 00Pre}{00Pre}$			

*No statistical analysis was conducted on the FSAAL1G01 plots because of the limited number of plots.



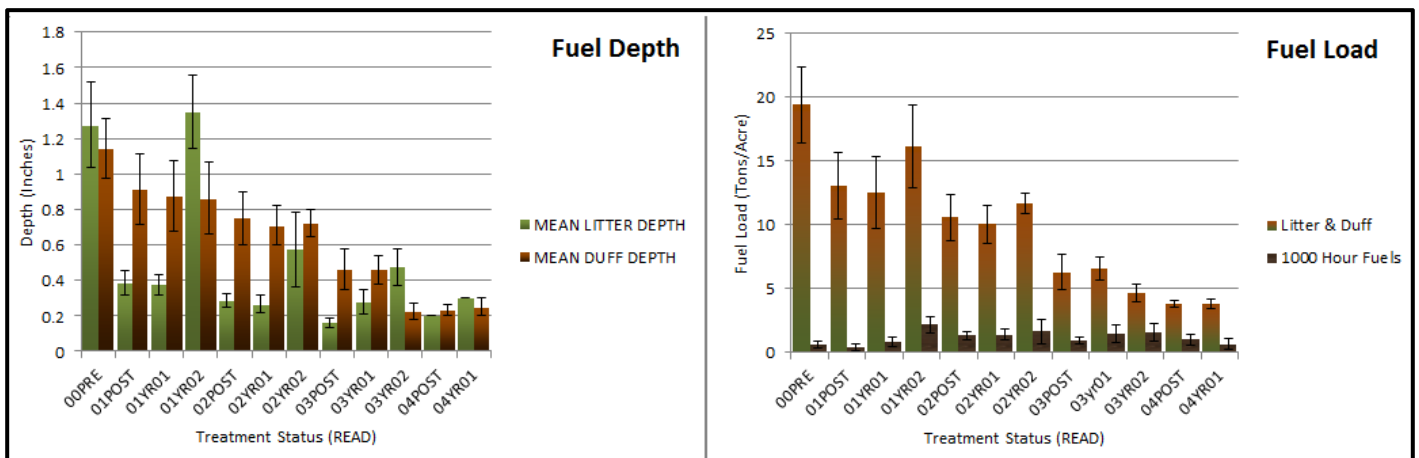
Sand Pine Scrub (PICL06) after 2 burns and 12 years, Naval Live Oaks (NLO), FL (GUIS)

Live fuel moisture analysis immediately prior to prescribed fire in the Park Unit, Davis Bayou, MS, (GUIS)

January 7, 2012



Longleaf – Slash Pine Savanna (PIPA06) after 4 burns and 11 years, NLO, FL (GUIS)



Depths and loading for primary fuel constituents of Naval Live Oaks' longleaf – slash pine savanna (PIPA) over the last 10 years. There has been an 82% reduction in litter & duff fuel depth (inches) and an 80% reduction in load (tons/acre) from 00PRE to 04POST. Hurricanes Ivan and Katrina are responsible for the significant increase in 1,000 hour fuels between 01YR01 and 02POST monitoring. Subsequent burning is beginning to reduce coarse woody debris to pre-hurricane levels.

Table 3.2. Summary of Long-term Monitoring Results at Horseshoe Bend National Military Park

Vegetation Type	Management Objectives (Restoration)	Monitoring Results (80% Confidence Intervals)	Objective Achieved?	Year Analysis Completed (Range)
Mixed Montane Longleaf Pine Forest (FPIPA1D07)	Decrease density of all pole trees by 20-90% as measured 1 year post burn $\frac{\beta_{YR01} - 00Pre}{00Pre}$	Density Reduction = 16.7 % (± 23 %) after 1 st fire <i>n</i> =5 [19], 4 burn units 59.0 % (± N/A %) after 2 nd fire <i>n</i> =1, 1 burn units	Uncertain	2010 (2004-2010)
	Decrease duff and litter loading by 40-90% as measured immediately post burn $\frac{\beta_{Post} - before \beta}{before \beta}$	Decrease of Duff = 2.3 % (± 13 %) after 1 st fire <i>(n</i> =5, 4 burn units) +53.2 % (± 7.5 %) after 2nd fire (<i>n</i>=5, 2 burn units) +46.8 % (± N/A %) after 3rd fire (<i>n</i>=1, 1 burn units) Decrease of Litter = 38.5 % (± 16 %) after 1st fire <i>n</i>=5 [6], 4 burn units) 55.2 % (± 9 %) after 2nd fire <i>n</i>=5, 2 burn units) 42.7% (± N/A %) after 3 rd fire <i>(n</i> =1, 1 burn units)	Yes/Uncertain Litter Objectives have been met, however duff load has increased since monitoring began	2013 (2004-2013)
	Limit mortality of overstory longleaf pine (<i>Pinus palustris</i>) trees to less than 10% as measured 2 years post burn $\frac{\beta_{YR02} - 00Pre}{00Pre}$	Density Reduction = 4.8 % (± 4 %) after 1 st fire <i>n</i> =2 [7], 2 burn units 18.2 % (± N/A %) after 2 nd fire <i>n</i> =1, 1 burn units	Yes/Uncertain Not all plots have been monitored two years post	2010 (2004-2010)
	Cause no net gain in percent cover of exotic plants as measured one year and five years post burn $\frac{\beta_{YR01} - 00Pre}{00Pre}$	Increase in cover = 0.0 % (± N/A %) after 1 st fire <i>(n</i> =5, 4 burn units) 0.0 % (± N/A %) after 2 nd fire <i>(n</i> =1, 1 burn units)	Yes No exotic species have been detected in FPIPA1D07 plots and no plots have been monitored five years post-burn	2010 (2004-2010)



Mixed Montane Longleaf Pine Forest (PIPA01) after two fires and eight years.
October 27, 2004 & October 18, 2012

(HOBE)

Table 3.3. Summary of Long-term Monitoring Results at Little River National Preserve

Vegetation Type	Management Objectives (Restoration)	Monitoring Results (80% Confidence Intervals)	Objective Achieved?	Year Analysis Completed (Range)
Shortleaf Pine Forest (FPIEC1DG09)	25-80% reduction in pole-sized trees by 3 rd burn $\frac{\beta YR01 - 00Pre}{00Pre}$	Density Reduction = 6.2 % (± 4 %) after 1 st fire <u>n=11</u> , 4 burn units 36.0 % (± 20 %) after 2 nd fire <u>n=9</u> [27], 4 burn units 69.1 % (± 20 %) after 3 rd fire <u>n=4</u> [14], 2 burn units	Yes	2010 (1999-2010)
	25-50% increase native grass and forb cover $\frac{\beta YR02 - Earliest Read}{Earliest Read}$	Increase in Cover = 225.2 % (± 103 %) after 1 st fire <u>n=5</u> , 2 burn units 194.5 % (± 136 %) after 2 nd <u>n=6</u> , 3 burn units 418.2 % (± 129 %) after 3 rd <u>n=2</u> , 1 burn units	Yes	2010 (1999-2010)
	50% reduction in duff, litter, and downed woody fuel by 3 rd burn $\frac{\beta Post - 00Pre}{00Pre}$	Decrease of Duff = 0.6 % (± 12 %) after 1 st fire <u>n=12</u> , 6 burn units 43.6 % (± 8 %) after 2 nd fire <u>n=6</u> , 2 burn units 37.4 % (± 23 %) after 3 rd fire <u>n=5</u> , 3 burn units Decrease of Litter = 51.3 % (± 6 %) after 1 st fire <u>n=12</u> , 6 burn units 56.6 % (± 14 %) after 2 nd fire <u>n=6</u> , 2 burn units 78.6 % (± 4 %) after 3 rd fire <u>n=5</u> , 3 burn units Decrease in Total Wood = +15.1 % (± 23 %) after 1 st fire <u>n=12</u> , 6 burn units +63.5 % (± 54 %) after 2 nd fire <u>n=6</u> [13], 2 burn units +117 % (± 75 %) after 3 rd fire <u>n=5</u> [31], 3 burn units	Uncertain Objective has been achieved for litter fuel loading; however, duff has had limited reductions and total woody debris is increasing during initial treatments [Objective to be changed in 2013]	2010 (1999-2010)
Green Pitcherplant Bog Forest (FSAOR1G10)	30-90% decrease in shrub cover by second year after 3 rd burn $\frac{\beta YR02 - Earliest Read}{Earliest Read}$	Decrease in cover = 29.3 % (± 12 %) after 2 nd fire <u>n=6</u> , 3 burn units 32.1 % (± 25 %) after 3 rd fire <u>n=2</u> [3], 1 burn units +61.6 % (± 56 %) after 4 th fire <u>n=2</u> [6], 1 burn units	Uncertain All plots must burn 3 times	2010 (1998-2010)
	20% increase cover of green pitcherplant (<i>Sarracenia oreophila</i>) by second year after 3 rd burn $\frac{\beta YR02 - Earliest Read}{Earliest Read}$	Increase in cover = 21.4 % (± 26 %) after 2 nd fire <u>n=6</u> [18], 3 burn units 80.1 % (± 26 %) after 3 rd fire <u>n=2</u> [26], 1 burn units 70.1 % (± 90 %) after 4 th fire <u>n=2</u> , 1 burn units	Yes/Uncertain Plots have not burned 3 times and high variability due to low numbers of individuals along transects; additional methods have been added to these plots to address this issue	2010 (1998-2010)
	30-90% decrease in pole-sized trees by second year after 3 rd burn	Pole reduction = 13.2 % (± 21 %) after 1 st fire <u>n=3</u> [5], 1 burn units 57.8 % (± 15 %) after 2 nd fire <u>n=5</u> [10], 3 burn units	Yes Local park staff is also applying mechanical treatment to pole	2010 (1998-2010)

	<u>$\beta YR02 - 00Pre$</u> <i>00Pre</i>	68.7 % (± 20 %) after 3 rd fire <i>n=3 [20], 2 burn units</i> 58.3 % (± 34 %) after 4 th fire <i>n=2 [7], 1 burn units</i>	size trees	
Chestnut Oak Forest (FQUM01G10)	20-60% reduction in pole-sized trees	Density Reduction = 37.6 % (± 14 %) after 1 st fire <i>n=4 [19], 3 burn units</i> 41.0 % (± 0 %) after 2 nd fire <i>n=2 [6], 1 burn units</i> 69.0 % (± 17 %) after 3 rd fire <i>n=2 [7], 1 burn units</i>	Yes/Uncertain All plots must burn and have annual read to reach minimum sample size	2010 (2002-2010)
	<u>$\beta YR01 - 00Pre$</u> <i>00Pre</i>			
	25-50% increase native grass and forb cover	Increase in Cover = 145.1 % (± 197 %) after 1 st fire <i>n=4 [10], 3 burn units</i> 383.7 % (± 105 %) after 2 nd fire <i>n=2, 1 burn units</i> 0.0 % (± 0.0 %) after 3 rd fire <i>n=2, 1 burn units</i>	Uncertain All plots must burn and have annual read to reach minimum sample size	2010 (2002-2010)
	<u>$\beta YR01 - 00Pre$</u> <i>00Pre</i>			



First burned in 1999, this green pitcher-plant bog (SAOR01) has been treated 5 times over the last 13 years. Understory tree density was reduced after the initial treatments; however, subsequent dormant season fire has only appeared to limit height of persistent resprouts. The wet nature of these Southern Appalachian Low Mountain Seepage Bogs in the early spring greatly reduces fire intensities when surrounding upland mixed forests burn well. (LIRI)



Chestnut oak forest (QUMO34) after 2 burns and 6 years. (LIRI)

Table 3.4. Summary of Long-term Monitoring Results at Mammoth Cave National Park

Vegetation Type	Management Objectives (Restoration)	Monitoring Results (80% Confidence Intervals)	Objective Achieved?	Year Analysis Completed (Range)
Oak-Hickory Forest (FOAHI1D09)	Decrease density of shade tolerant pole trees by 30-90% ¹ $\frac{\beta YR01 - 00Pre}{00Pre}$	Density Reduction = 58.5 % (± 15 %) after 1st fire n=7 [9], 5 burn units	Yes Density of shade intolerant species significantly reduced by > 30%, All plots must burn and be monitored during annual read to meet min sample size	2010 (2005-2010)
	Limit mortality of overstory trees to less than 20% $\frac{\beta YR01 - 00Pre}{00Pre}$	Density Reduction = 7.4 % (± 5 %) after 1st fire n=7, 5 burn units	Yes	2010 (2005-2010)
	Increase native herbaceous cover by 10-25% by 1 year after the 3 rd burn $\frac{\beta YR02 - 00Pre}{00Pre}$	Increase in cover = 148.3 % (± 63 %) after 1st fire n=7, 5 burn units	Yes All plots have experienced increases in herbaceous cover; however, plots have not burned 3 times	2010 (2005-2010)
	Reduce total fuel load by 25-50% immediately postburn. $\frac{\beta Post - before \beta}{before \beta}$	Decrease in total fuels = 33.3 % (± 10 %) after 1st fire n=7, 5 burn units	Yes Reduction objective does not fall outside range of confidence	2010 (2005-2010)
Redcedar Glade Forest (FJUUV1D09)	Reduce litter, duff, and downed woody fuel load by 25-50% $\frac{\beta Post - before \beta}{before \beta}$	Decrease of Duff = +24.1 % (± 32 %) after 1st fire n=7 [9], 4 burn units 25.7 % (± 32 %) after 2 nd fire n=3 [25], 1 burn units Decrease of Litter = 46.3 % (± 10 %) after 1st fire n=7 [21], 4 burn units 31.3 % (± 27 %) after 2 nd fire n=3 [27], 1 burn units Decrease in Total Wood = 3.4 % (± 19 %) after 1 st fire n=7 [8], 4 burn units 36.5 % (± 27 %) after 2 nd fire n=3 [4], 1 burn units	No/Uncertain Significant reductions in litter fuel loading; however, duff and downed woody fuels do not yet show responses to treatment [Objective to be changed in 2013]	2010 (2002-2010)
	Reduce pole-sized trees by 40-60% $\frac{\beta YR01 - 00Pre}{00Pre}$	Density Reduction = 12.3 % (± 12 %) after 1 st fire n=6, 3 burn units	No This objective is being reevaluated as very low fire intensities are advised for this ecotype	2010 (2002-2010)
	Limit mortality to overstory species to less than 20% $\frac{\beta YR01 - 00Pre}{00Pre}$	Density Reduction = +2.2 % (± 4 %) after 1 st fire n=6, 3 burn units	Yes	2010 (2002-2010)

	<i>00Pre</i>			
Chestnut Oak Woodland (FQUM01D09)	Decrease density of shade tolerant pole trees by 30-90 % ¹ $\frac{\beta_{YR01} - 00Pre}{00Pre}$	Density Reduction = 33.3 % (± N/A %) after 1 st fire <i>n=1, 1 burn units</i>	Yes/Uncertain Limited sample size	2010 (2000-2010)
	Limit mortality of overstory trees to less than 20 % $\frac{\beta_{YR01} - 00Pre}{00Pre}$	Density Reduction = 4.0 % (± N/A %) after 1 st fire <i>n=1, 1 burn units</i>	Yes/Uncertain Limited sample size	2010 (2000-2010)
	Reduce total fuel load by 25-50 % after 3 burns $\frac{\beta_{Post} - before \beta}{before \beta}$	Decrease in total fuels = 20.2 % (± 7 %) after 1st fire <i>n=3, 2 burn units</i> +14.4 % (± N/A %) after 2st fire <i>n=1, 1 burn units</i>	Yes/Uncertain Significant reduction in total fuels; however, fuels not reduced by > 25% after first treatment	2010 (2000-2010)
	Increase native grass and forb cover by 10-25 % after 3 burns $\frac{\beta_{YR01} - 00Pre}{00Pre}$	Increase in cover = -68.3 % (± 18 %) after 1st fire <i>n=2, 1 burn units</i> 21.7 % (± N/A %) after 2 nd fire <i>n=1, 1 burn units</i>	Uncertain Limited sample size and plots have not burned three times	2010 (2000-2010)
Indian Grass Grassland (BSONU1T02)	Reduce density of shade tolerant seedlings 30% to 60% one year after second fire ² $\frac{\beta_{YR01} - 00Pre}{00Pre}$	Density Reduction = 39.1 % (±21 %) after 1 st fire <i>n=3 [20], 1 burn unit</i> 45.8 % (±25 %) after 2nd fire <i>n=2 [4], 1 burn unit</i>	Yes/Uncertain Reductions are occurring; however, >30% is not outside the confidence interval	2010 (2002-2010)
	Reduce density of shrubs 30% to 60% one year after second fire $\frac{\beta_{YR01} - 00Pre}{00Pre}$	Density Reduction = 35.3 % (±9 %) after 1st fire <i>n=3, 1 burn unit</i> 23.2 % (±54 %) after 2 nd fire <i>n=2 [43], 1 burn unit</i>	Uncertain Significant reduction occurred after first treatment; however, all plots must burn 2 two times	2010 (2002-2010)
	Cause no net gain in percent cover of exotic plants after five years of burning ³ $\frac{\beta_{YR02} - 00Pre}{00Pre}$	Increase in cover = 156.1 % (± 136 %) after 1 st fire <i>n=3, 1 burn units</i> 371.2 % (± 550 %) after 2 nd fire <i>n=2, 1 burn units</i>	Uncertain Plots have not burned 5 times and minimum sample size not met	2010 (2002-2010)
	Increase relative cover of Indiangrass (<i>Sorghastrum nutans</i>) 15% after five years of burning $\frac{\beta_{YR02} - 00Pre}{00Pre}$	Increase in cover = 534.6 % (± 319 %) after 1 st fire <i>n=3, 1 burn units</i> 81.9 % (± 142 %) after 2 nd fire <i>n=2, 1 burn units</i>	Uncertain Plots have not burned 5 times and minimum sample size not met	2010 (2002-2010)

¹ Shade intolerant species include *Carya*, *Pinus*, and *Quercus* genera. Density analyzed for all other species.

² Density analyzed for *Acer*, *Juniperus*, *Sassafras*, and *Ulmus* genera.

³ Exotics in SONU plots include; *Digitaria* spp., *Kummerowia* spp., *Lespedeza cuneata*, *Lonicera japonica*, *Microstegium vimineum*, *Ligustrum* spp., and *Setaria* spp.

Big Bluestem Grassland (BANGE1D02)	Cause no net gain in percent cover of exotic plants as measured one year and five years post burn $\frac{\beta YR01 - 00Pre}{00Pre}$	Decrease in cover = 56.4 % (± 12 %) after 1st fire <i>n=2, 1 burn units</i> 96.3 % (± 1 %) after 2nd fire <i>n=2, 1 burn units</i>	Yes Limited sample size and all plots must burn	2010 (2000-2010)
	Decrease invading woody species by 30% as measured 1-year post burn $\frac{\beta YR01 - 00Pre}{00Pre}$	Density Reduction = +38.5 % (± 135 %) after 1 st fire <i>n=4 [13], 1 burn unit</i> 49.7 % (± 5 %) after 2nd fire <i>n=2 [4], 1 burn unit</i>	Yes/Uncertain Limited sample size and all plots must burn	2010 (2000-2010)
Old Field (FOLFI1D08)	Increase density of oak and hickory seedlings after three burns, as measured one year post-burn $\frac{\beta YR01 - 00Pre}{00Pre}$	Density Increase = N/A	Uncertain Plots have not had annual read (limited travel budget in CY2013)	2011 (2011-)
	Reduce density of shade tolerant pole by greater than %50 after three burns $\frac{\beta YR01 - 00Pre}{00Pre}$	Density Reduction = N/A	Uncertain Plots have not had annual read (limited travel budget in CY2013)	2011 (2011-)
	Reduce total fuel load by >25 % after 3 burns $\frac{\beta Post - before \beta}{before \beta}$	Decrease in total fuels = 7.1 % (± 19 %) after 1 st fire <i>n=2, 1 burn units</i>	Uncertain Plots have not burned 3 times	2012 (2011-2012)



Mammoth Cave NP Chestnut Oak Woodland (QUM031) after 2 fires and 10 years.



Big Bluestem Grassland (ANGE03) after 2 fires and 12 years. Since its last fire in 2007, shrub and tree encroachment is rapidly occurring at this restored Kentucky Barren site at Chaumont Prairie. (MACA)

Table 3.5. Summary of Long-term Monitoring Results at Natchez Trace Parkway

Vegetation Type	Management Objectives (Restoration)	Monitoring Results (80% Confidence Intervals)	Objective Achieved?	Year Analysis Completed (Range)
Mixed Loblolly Pine Forest (FPITA1D09)	Reduce total fuel load by 20-40% immediately post-burn $\frac{\beta_{Post} - \text{before } \beta}{\text{before } \beta}$	Total fuel reduction = 40.2% (± 5 %) after 1st fire <i>n=12, 7 burn units</i> 2.0 % (± 15 %) after 2 nd fire <i>n=6 [9], 2 burn units</i> 4.6 % (± 17 %) after 3 rd fire <i>n=6 [8], 2 burn units</i> 28.4 % (± 14 %) after 4th fire <i>n=4 [7], 2 burn units</i>	Yes Significant reduction after 1 st and 4 th burns; however, only first treatment exceeds 20 % reduction	2010 (2001-2010)
	Reduce conifer poles (2.5-15.0 cm dbh) > 25% one year after 3 rd fire $\frac{\beta_{YR01} - 00Pre}{00Pre}$	Density reduction = 8.3 % (± 10 %) after 1 st fire <i>n=4 [10], 3 burn units</i> +12.5 % (± 14 %) after 2nd fire <i>n=4 [11], 2 burn units</i> 41.7 % (± 29 %) after 3rd fire <i>n=4 [34], 2 burn units</i> 33.3 % (± 33 %) after 4 th fire <i>n=3 [15], 2 burn units</i>	Yes/Uncertain Significant reduction after 3 rd treatment and few plots now contain conifer poles	2010 (2001-2010)
	Cause no net gain in percent cover of exotic plants after 5 burns ⁴ $\frac{\beta_{YR01} - \text{earliest read}}{\text{earliest veg. read}}$	Average reduction = +10.0 % (± 3.1 %) after 1st fire <i>n=2, 2 burn units</i> + 1.5 % (± 1.5%) after 2nd fire <i>n=2, 1 burn unit</i> 5.8 % (± 3.4 %) after 3 rd fire <i>n=4, 2 burn unit</i>	Uncertain All existing plots must burn to meet sample size and plots containing exotic species have not experienced five treatments	2010 (2001-2010)
Black Belt Prairie (BJUVI1D06)	25-50% reduction of redcedar (<i>Juniperus virginiana</i>) density after 5 years of burning $\frac{07YR01 - 00Pre}{00Pre}$	Density reduction = 86.2 % (± 17 %) after 7th fire <i>n=4 [18], 1 burn units</i>	Yes Significant reduction after 7 th burn, data not available immediately after 5 th burn	2011 (2002-2011)
	20-40% reduction in woody exotic species density by 4 th burn $\frac{07YR01 - 00Pre}{00Pre}$	Density reduction = +1580 % (± N/A %) after 7th fire <i>n=4, 1 burn units</i>	No Plots are highly variable in exotic species density and plots that did not have exotics now do	2011 (2002-2011)
Black Belt Savanna (FQUST1D09)	Increase cover of native herbaceous plants by >200% after three burns $\frac{\beta_{YR01} - 00Pre}{00Pre}$	Native Herb Cover = N/A	Uncertain Plots have not yet been monitored one year post burn	2011 (2011- _)
	Reduce mean density of pole-sized trees by >50% after 3 burns $\frac{\beta_{YR01} - Pre00}{Pre00}$	Density reduction = N/A	Uncertain Plots have not yet been monitored one year post burn	2011 (2011- _)

⁴ Exotics in PITA plots include; privet (*Ligustrum spp.*), Japanese honeysuckle (*Lonicera japonica*), & and others.

Oak-Hickory Woodland (FOAHI1D09)	Reduce litter and duff load by 30-40% after 3 burns $\beta_{Post-00Pre}$ $00Pre$	Duff Reduction = 52.1 % (± 8) after 1 st fire $n=3$, 2 burn units Litter Reduction = 66.3 % (± 21) after 1 st fire $n=3$ [7], 2 burn units	Yes All plots must burn three times to meet minimum sample size requirements	2010 (2006-2010)
	Reduce mean density of pole-sized trees by 20-30% after 3 burns $\beta_{YR01-Pre00}$ $Pre00$	Density reduction = 19.8 % (± 7 %) after 1 st fire $n=3$ [5], 2 burn units	Yes/Uncertain Plots have not been burned three times and all plots must burn to meet minimum sample size requirements	2010 (2006-2010)
Japanese Grass Invaded Streamside Forest (FMIVID09)	Decrease percent cover of Japanese grass (<i>Microstegium vimenium</i>) by 50% one year post treatment $\beta_{YR02-Pre00}$ $Pre00$	Cover reduction = 90.0 % (± 4 %) 1 st treatment $n=10$, 1 burn units	Uncertain A significant reduction occurred; however, there was no significant difference in the control and the experimental plots	2010 (2007-2010)



Mixed Loblolly Pine Forest (PITA12) after two fires & six years. Rocky Springs, MS (NATR)



First-entry prescribed fire within a xeric post oak – chestnut oak – shortleaf pine woodland, Freedom Hills Unit, AL.

QUEST10 (NATR)
November 14, 2013

Table 3.6. Summary of Long-term Monitoring Results at Stones River National Battlefield

Vegetation Type	Management Objectives (Restoration)	Monitoring Results (80% Confidence Intervals)	Objective Achieved?	Year Analysis Completed (Range)
Little Bluestem Grassland (GSCSC1G02)	Reduce exotic ⁷ species cover by 20-70% after 5 burns $\frac{\beta YR01 - 00Pre}{00Pre}$	Exotic Cover Reduction = 42.5 % (± 17%) after 1 st fire <i>n</i> =11 [27], 3 burn unit	Yes/Uncertain Significant reductions in exotic species after one burn; however, plots have not been burned five times and include additional treatments such as mowing and herbicide	2010 (2003-2010)
	Increase native grass and forb cover by 20-50% after 3 fires $\frac{\beta YR01 - 00Pre}{00Pre}$	Native Herb Cover = 14.1 % (± 18%) after 1 st fire <i>n</i> =11 [21], 3 burn unit	Uncertain All plots must burn three times	2010 (2003-2010)
Central Basin Glades (GANTE1D05)	Reduce exotic ⁵ and eastern redcedar cover by 20% by 5 years post-burn $\frac{\beta YR01 - 00Pre}{00Pre}$	Exotic Cover Reduction = 0.0 % (± 23%) after 1 st fire <i>n</i> =8 [41], 1 burn unit -11.5 % (± 25%) after 2 nd fire <i>n</i> =8 [104], 1 burn unit Redcedar Reduction = 82.4 % (± 11 %) after 1 st fire <i>n</i> =8 [23], 1 burn unit 73.1 % (± 17 %) after 2 st fire <i>n</i> =8 [22], 1 burn unit	Yes/Uncertain Redcedar is being reduced; however, significant reductions in exotic cover have not yet occurred Plots have not been monitored five years post burn	2010 (2003-2010)
	Increase native herbaceous species cover and diversity ⁶ by 20-75% $\frac{\beta YR01 - 00Pre}{00Pre}$	Native Herb Cover = -16.7 % (± 8%) after 1 st fire <i>n</i> =8, 1 burn unit -26.1 % (± 10%) after 2 nd fire <i>n</i> =8, 1 burn unit Native Herb Richness = -37.4 % (± 4%) after 1 st fire <i>n</i> =8, 1 burn unit -38.2 % (± 8%) after 2 nd fire <i>n</i> =8, 1 burn unit Native Herb Diversity = -15 % (± N/A%) after 1 st fire <i>n</i> =1, 1 burn unit -15.5 % (± N/A%) after 2 nd fire <i>n</i> =1, 1 burn unit	No/Uncertain Native species have not increased in cover; however, this may be a result of changes in the seasonality of monitoring and misidentification of species in the past Native herbaceous cover, richness, and diversity was reassessed during the growing season in 2010 resulting in increases of -14.8%, +5.7%, +12.6% respectively	2010 (2003-2010)

⁵ Exotics include *Albizia julibrissin*, *Kummerowia* spp., *Leucanthemum vulgare*, *Ligustrum sinense*, *Lonicera japonica*, *Paspalum dilatatum*. *Lespedeza cuneata* is present at the site(s) but is not included in the current analysis as it may have been misidentified in previous reads.

⁶ Calculations conducted on relative changes in plots' herbaceous species richness and then on total change in diversity utilizing Shannon's diversity index.

Table 4. Fire Ecologist 2012 Accomplishments/Focus Areas

Category	Percent Time	Accomplishments and/or areas of activities
Planning	23%	<i>Reviewed 2014 STRI, GUIIS, & NATR Burn Plans</i> <i>Fire Monitoring Plan and review of FMP for MACA</i> <i>Wrote and Maintained Sec. 7 (ESA) Compliance concerning Rx Projects</i> <i>Assisted with PEPC compliance documentation</i> <i>Consultation, compliance, and site visits for Rx burns</i> <i>Write and review PMIS Natural Resources fund requests</i> <i>Generate and check burn unit maps for Monitoring Network for SER Fire GIS</i>
Presentations	2%	<i>Fire ecology presentations for AmeriCorps crews</i> <i>Assist with fire ecology and fire effects sections in local SI30/190 courses</i> <i>Presented summary of fire monitoring to MACA Science Conference</i> <i>Lead field exercises with local community college's dendrology course</i> <i>Organize and draft SER fire ecology and monitoring poster for workforce realignment committee</i>
NPS Meetings/ task groups	2%	<i>Attended park meetings with resource management staff at local and multiple network parks</i> <i>Attended regional and national fire conference calls</i>
Interagency work	2%	<i>Member of Tennessee and Mississippi Rx Fire Councils</i> <i>Information sharing with U.S. Forest Service, U.S. F.W.S., and TN Div. of Nat. Areas</i> <i>Reviewed manuscripts for Interagency Conference Proceedings</i> <i>Meetings with local federal and state cooperators regarding operational logistics</i>
Wildfire assignments	28%	<i>Served as FFT2, FFT1(T), FEMO, HECM(T), ICT5(T), FALA, & FALB(T)</i> <i>NATR wildfire incidents in MS, AL, & TN</i> <i>30-Day Severity Assignment at CANA/Merritt Island NWR, FL</i> <i>Handcrew Assignment to OR & WA as FFT1(T)</i> <i>Handcrew Assignment to WV & VA as FFT1/FALB(T)</i>
Prescribed fire projects	5%	<i>Served as FFT2, FEMO, FFT1(T), FALA, ATVO, & FIRB(T)</i> <i>NATR, HOBE, & LIRI</i>
Non-fire projects	1%	<i>Assisted with WUI vegetation monitoring, clearing, & saw work</i>
Research	5%	<i>Reviewed, summarized, and shared historical and recent ecological literature</i> <i>Assisted with historic fire regime mapping for MACA</i> <i>Correspondence with FWS and Universities to summarize T&E plants research</i>
Data collection	7%	<i>Assisted with the collection of FMH, non-FMH vegetation, and fuel moisture data</i> <i>Installed FMH and modified fire effects plots</i> <i>Calibration of fuel moisture monitoring equipment</i>
Data entry	3%	<i>Assisted with entering backlogged data and made corrections to data in FFI Troubleshooting database issues</i>
Data analysis	5%	<i>Performed statistical tests and analysis of fire effects data</i> <i>Summarized and shared fire effects data with USGS and NPS I&M Networks</i>
Supervision/Admin	5%	<i>Supervised fire effects monitors, training, payroll, & misc.</i> <i>Timesheets, travel, and other administrative paperwork</i>
Training	4%	<i>Physical Training, Firefighter Refresher, and other safety programs</i> <i>Aviation Safety (A-101, 104, 105, 106, 108, 110, 113), Introduction to Fire Effects (Rx-310), & Fire Fighter Type I (S-131, 133)</i> <i>FISSA, No FEAR Act, Vet Employee, DOI Charge Card, GSA Smartpay, Communicating Across Cultures, Emotional Intelligence, Sec. 508, & Developing Codes of Ethical Conduct</i>
Travel out-of-park for plot or project work	1%	<i>Brief trips to MACA and STRI for fire monitoring planning or wildfire assessments</i> <i>Plot installations at SHIL prior to initiating FY2014 Rx project</i>
Miscellaneous	8%	<i>Collected, identified, and preserved plant specimens for long-term reference</i> <i>Served as Fire Ecology Associate Editor for Natural Areas Journal</i> <i>Peer reviewed manuscripts concerning fire ecology, disturbance, and fire management in a diversity of journals and publications</i>

Assisted with wildland fire outreach tasks (parades, programs, etc.)
 Electronic Daily Logs submitted to FMO
 Wrote paper summarizing a decade of fire effect monitoring at MACA for the 10th
 Mammoth Cave Research Symposium proceedings

C. Fire effects team accomplishments and areas of focus

Table 5. Fire Effects Crew 2013 Accomplishments/Focus Areas

Category	Percent Time	Notes
FMH plots	15%	Monitored 53 standard FMH Plots
WUI plots	0%	No scheduled WUI plots for 2013
CBI plots	2%	Assisted SHEN with CBI plots
Other plot work	1%	Duff and live vegetation fuel moisture monitoring Assist with NPS I&M plots, NATR Breeding Bird Survey
Wildfire assignments	16%	Served in variety of roles including: FFT2, FFT1, FEMO, HECM, FALB - NATR wildfire incidents - Wildfire assignments in Montana, Alaska, California, Oregon, Virginia and West Virginia
Prescribed fire projects	10%	Served in variety of roles including: FFT2, ATVO, FFT1, FEMO, ENB(T), EMT(B) NATR, LIRI, HOBE Assisted with burn unit prep work Consultation for Rx burns
Non-fire fuels projects	2%	NATR Blackbelt Restoration, exotic, and hazard fuels removal projects Assisted with WUI vegetation clearing/saw work Americorps Crew Project Lead
Travel out-of-park for plot or project work	2%	Installed FMH plots at SHIL
Data entry	13%	Entered and scanned FMH and other fire effects data
Data analysis	1%	Fuels Analysis
Supervision/Admin	4%	Payroll, travel authorization/voucher, etc.
Training	5%	Firefighter Refresher First Aid/CPR Emergency Medicine and Trauma Conference
Miscellaneous	30%	All-hazard Assignments to Deepwater Horizon Oil Spill Co-Instructed in house First Aid/CPR course for fire management Collected, identified, and preserved plant specimens for long-term data collection consistency and reference NATR Recycling Committee Herpetile and Bat Monitoring Taught segments of S-130/190, RX-310 and FEM classes Organized local Audubon Christmas Bird Count Wrote PMIS proposal for funds

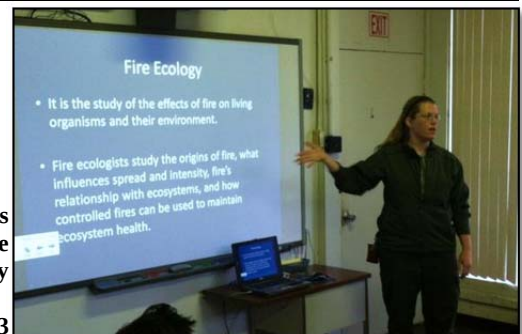


Hilton participating in engine drills and orientation with engine module leader Robert Vick

Tombigbee National Forest,
 June 25, 2013

Falkey teaching AmeriCorps
 wildland fire crews the
 importance of fire ecology

April 11, 2013



D. Additional Program Information

Table 6. Planning - 2013

Park	Does Park have written DFCs? (yes or no)	Date Park-level Monitoring Plan completed (or revised)	Number of Project- or Community-level Monitoring Plans	BAER Plan Assists in 2013
Abraham Lincoln Birthplace NHP	No	N/A	0	0
Chickamauga and Chattanooga NMP	No	N/A	0	0
Cumberland Island National Seashore	No*	N/A	0	0
Fort Donelson National Battlefield	No*	N/A	0	0
Gulf Islands National Seashore	No*	2010 (Draft)	0 (3)†	0
Horseshoe Bend National Military Park	No	N/A	0 (1)	0
Jean Lafitte NHP and Preserve	No	N/A	0	0
Little River Canyon National Preserve	No	N/A	0 (3)	0
Mammoth Cave National Park	No	2013 (Draft)	0 (6)	0
Natchez Trace Parkway	No	2007	0 (6)	0
Russell Cave National Monument	No	N/A	0 (1)	0
Shiloh National Military Park	No*	N/A	0 (1)	0
Stones River National Battlefield	No*	N/A	0 (3)	0
Vicksburg National Military Park	No*	N/A	0	0

*Does not have written DFCs that have measurable objectives for park vegetation, but does have general desired landscape goals.

†Number in brackets represents number of Monitoring Type Descriptions (FMH 4).

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*
Gulf Islands National Seashore	100%	100%	1	0	0	0
Horseshoe Bend National Military Park	100%	100%	2	0	0	0
Little River Canyon National Preserve	100%	100%	1	0	0	0
Mammoth Cave National Park	100%	100%	0	0	0	0
Natchez Trace Parkway	100%	70%	14	1	0	0
Shiloh National Military Park	100%	100%	1	0	0	0
Stones River National Battlefield	100%	100%	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. (Most fire effects monitoring is conducted on previous year's projects)

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?*
Cumberland Island Nat. Seashore	0	0	0	No
Gulf Islands National Seashore	0	0	0	Yes
Horseshoe Bend NMP Park	1	1	0	Yes
Jean Lafitte NHP and Preserve	0	0	0	No
Little River Canyon National Pres.	0	1	0	Yes
Mammoth Cave National Park	0	1	1	Yes
Natchez Trace Parkway	2	0	0	Yes
Russell Cave National Monument	0	0	0	No
Shiloh National Military Park	0	1	0	Yes
Stones River National Battlefield	0	1	0	Yes
Vicksburg National Military Park	0	0	0	No

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
Cumberland Island National Seashore	No	0	0	0	
Gulf Islands National Seashore	Yes	0	0	0	
Horseshoe Bend National Military Park	No	0	0	0	
Jean Lafitte NHP and Preserve	No	0	0	0	
Little River Canyon National Preserve	No	0	0	0	
Mammoth Cave National Park	Yes	0	0	2	Ongoing research concerning fire and Indiana bat habitat/LIDAR vegetation mapping & presettlement vegetation map
Natchez Trace Parkway	Yes	0	0	0	
Shiloh National Military Park	No	0	0	0	
Stones River National Battlefield	No	0	0	0	
Vicksburg 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. 2013 Direction

Budget

The Barrens to Bayous fire effects crew spent considerable amounts of time assisting with out of network incident response in 2013, partly as a measure to assist with cost savings. One subject to furlough employees was adjusted to 13 pay periods in FY2013, due to funding cuts. We will continue to implement cost saving measures such as consolidated monitoring trips, utilizing alternative housing/camping when available, and limiting purchases. Other options that will have to be visited will be the prioritization of Parks and/or monitoring types. All members of the crew will be working closely with both fire management and resource management staff to ensure management objectives are being met and the adaptive management process is being implemented.



Helianthus mollis is one of dozens of prairie endemics that rely on fire and/or mowing within the Natchez Trace for its survival. NATR, AL, Summer 2013

New Plans & Programs

The Natchez Trace Parkway and Cumberland Island National Seashore FMPs have

been updated and are out for review. Ongoing projects include the final revisions of the Mammoth Cave National Park FMP and determining needs for remaining network parks. Nearly all FMPs for parks in this monitoring network are either expired or will expire in the near future. During this update period Barrens to Bayous Fire Monitoring Network will continue to provide resources when available to assist with these plans. In addition, many parks are also in need of Fire Monitoring Plans. As time allows, these plans are being revised and/or drafted. The network will work closely with regional staff to ensure prioritization of programs and monitoring where needed. The Barrens to Bayous Fire Monitoring Network hopes to organize the installation and monitoring of fire effects plots at Cumberland Island National Seashore in 2014.



Acting Superintendent Dale Wilkerson presenting the fire ecology staff with the 2012 Fuels and Ecology Award



Serving as a squad boss trainee, Jennifer provides guidance and leadership for the new AmeriCorps wildland fire crew during prescribed fire operations.

April 8, 2013

F. Optional Information

Prescribed Fire Monitoring Report Summaries for 2013

Summarized below from CY2013 FEMO reports is additional information regarding prescribed fire for the parks within the network. The descriptions are only intended to be brief summaries. For additional information please contact a member of the monitoring network to obtain a complete FEMO Report.

Horseshoe Bend National Military Park – Northwest Complex & Interior Complex- March 26, 2013

On March 26, two simultaneous prescribed fires were conducted at Horseshoe National Military Park (HOBE). The prevailing natural resource contained within the Northwest Complex is the remnant mountain longleaf pine (*Pinus palustris*), an unquestionably fire dependent species, and its accompanying ecosystem. This pine species is found on upper slopes within mixed hardwood species and is at risk of local extirpation due to excessive duff buildup and excessive stand densities. These conditions create an environment unfavorable for longleaf pine recruitment and favorable for severe wildfires.

Tree species that characterize the target fuel type within the Northwest complex include oaks (*Quercus spp.*), pines (*Pinus taeda* & *P. echinata*), and hickory (*Carya spp.*). Species less adapted to fire that are invading these sites and contributing to excessive stand densities and understory shading include sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), beech (*Fagus grandifolia*), and exotic privet (*Ligustrum spp.*). The habitat within the Interior Complex is similar; however, it lacks any remnant longleaf and has additional mesic species such as the occasional beech in the overstory.

It is anticipated that the application of prescribed fire will allow for the establishment of longleaf pine seedlings by removing dense shade-tolerant hardwoods and removing some of the accumulated duff layer. This project is a fulfillment of the HOBE Fire Management Plan to reduce hazardous fuels, while preserving the Park's cultural, historic, and natural resources. Secondary benefits include the creation of an esthetically true landscape and increasing biodiversity. Prescribed fire is an essential process in maintaining and restoring many of the plant associations found within these burn units.



Longleaf restoration area within NW Complex



Typical fire behavior on mid to lower slopes

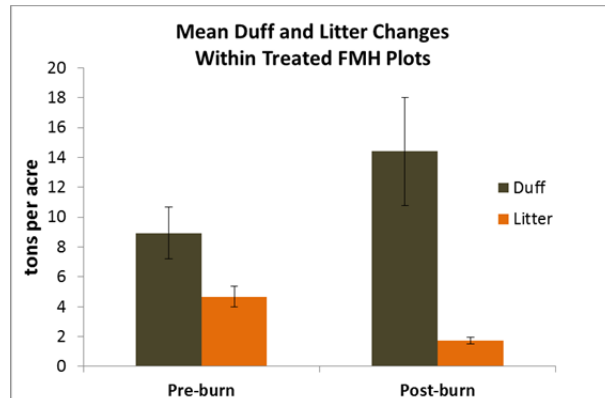
On the day of the burn, atmospheric conditions were cooler and more humid than weather indices predicted and fire behavior reflected this. Rates of spread ranged from 1-3 feet with flame lengths of 6-8 inches. Fire intensities were predictably higher on the Northwest Complex than the Interior Loop due to the structural differences in the units. Overall, the first-order fire effects are very similar to previous burns at HOBE. FMH monitoring indicates that the objective to “Reduce litter load by > 50% as measured immediately post-burn” was successful. Less than 10% within the mixed longleaf monitoring plots remained unburned. We scouted the day following the burn and

estimated the total burned area to be roughly 80%. Although little to no duff was burned, we also found that there were no “hot spots” at the base of mature longleaf pines. Two FMH monitoring plots were burned during the two prescribed fires (PIPA02, 03, & 05).

Discussion

All ecological and fuels objectives were achieved for this prescribed fire. According to NOAA’s Advanced Hydrologic Prediction Services roughly $\frac{3}{4}$ - 1 inches of rain fell on the HOBE area from March 23 through the 24th, giving the park a wetting rain two days prior to the burn on the 26th. Winds from the north dried surface fuels very effectively those two days. KBDI was less than 300 on the day of the burn.

Long-term management of these sites should consider late growing season fire (August-October) in order to better manage resprouting hardwoods. Duff depths at these sites also need reductions in order for longleaf pine to have effective regeneration. Under cautiously controlled conditions, fire personnel should consider burning under *slightly* dryer conditions, providing a unit has recently been treated by a typical dormant season burn (< 2 years). These conditions may be more common in the late growing season.



Litter fuel loading was reduced approximately 60% post-burn. However, since the last fuel measurements conducted in 2010 and 2011, mean duff fuel loading has increased approximately 60% or $\frac{1}{2}$ inch.



Since the FMH plot was installed in 2005, reductions in understory tree density are apparent. Scheduled long-term monitoring for 2014 will allow for the quantification of these predicted changes.

Original Report - Jesse Burton

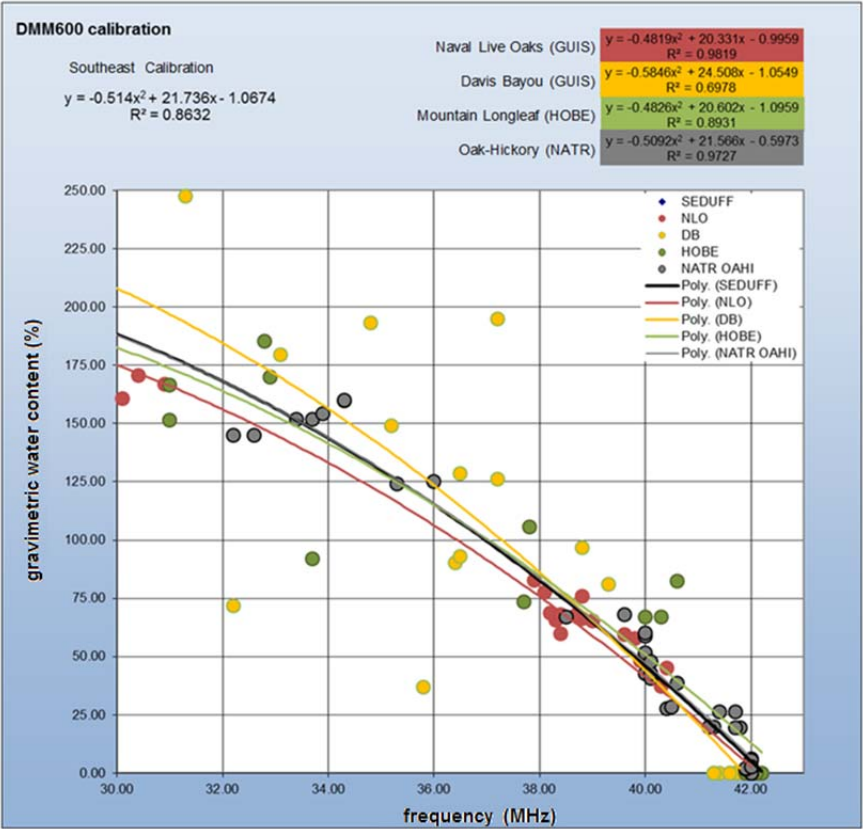
Duff Moisture Meter Calibration Equations

Over the years, it has become increasingly apparent that measures of duff moisture contents prior to prescribed fire treatments can be important for achieving various objectives and smoke mitigation. The Barrens to Bayous Fire Monitoring Network has a Campbell Scientific Duff Moisture Meter (DMM600). However, it became apparent after some informal use and comparisons to oven dried samples, that the standard calibrations would not be adequate for use in our monitoring types. Below is an example and description of the user-defined calibrations that were made in order to suit the needs of the SER fire management office and wildland fire modules.



The DMM600 is now being utilized to monitor trends in duff moisture content in network parks with substantial duff accumulations, such as Gulf Islands National Seashore and Horseshoe Bend National Military Park.

The standard calibration of this unit converts the measurements taken to volumetric water content. Four monitoring types were selected for calibration. Samples were collected and utilized as recommended by the [DMM600 Instruction Manual](#). In order to better suit the needs of fire operations, and to make better comparisons, the calibrations were run using values of gravimetric content. While not ideal for the design of this device, after careful calibrations in the lab, the results are more than adequate. Sample readings may even surpass many of the other methodologies used in the past (excluding oven drying).



Regression equations for four monitoring types in three NPS units. The NLO samples include both PICL and PIPA FMH monitoring types in GUIS. Davis Bayous samples were collected within the SAAL monitoring type. The mountain longleaf samples were taken within the HOBE PIPA monitoring type. NATR oak-hickory samples included both OAH and PITA monitoring types.

We quickly found that some monitoring types had lower R² values, suggesting predictability of the meter’s input formula to estimate water content. However, when all of the monitoring types are combined, we found little distinction in the four southeastern duff types. This fact, combined with the occasional challenge of changing the DM600’s calibration in the field, led us to select the equation resulting from all samples gathered (*N* = 101 measurements).

Future monitoring of gravimetric duff moisture content will be occasionally checked against oven dried measurements to ensure long-term predictability.

	C0	C1	C2
SEDUFF	-1.067	21.736	-0.514
FL_NLO	-0.9959	20.331	-0.4819
MSSAAL	-1.0549	24.508	-0.5846
ALPIPA	-1.0959	20.602	-0.4826
MSOAH	-0.5973	21.566	-0.5092

Input variables for DMM600