



Northeast Region National Park Service Fire Ecology Annual Report Calendar Year 2013

Summary

The Mountains to the Sea fire effects monitoring crew had a busy 2014. The crew monitored at seven NPS units throughout the Northeast and National Capitol Region, including Appomattox Court House National Historical Park, Saratoga National Historical Park, Fredericksburg and Spotsylvania National Military Park, Richmond National Battlefield Park, Catocin Mountain Park (NCR), Gettysburg National Military Park, and Shenandoah National Park. A total of 91 plots were inventoried, including 19 forest FMH plots, 16 brush FMH plots, 24 Inventory and Monitoring brush transects, 8 rapid assessment plots and 24 CBI plots (Table 1a).



Fire backs off the Ridge on the Jarman Gap prescribed fire, Shenandoah National Park, March 2013.

Fire Ecology staff supported numerous prescribed fires throughout the spring and summer. Notable projects included a 500 acre forested unit at Shenandoah National Park and the first ever prescribed fire at Gettysburg National Military Park. Personnel served as FEMO's, FFT2's and FIRB.



Lead Monitor Steve Paull conducts an immediate post-burn read of the Jarman Gap prescribed fire.

Shenandoah hosts annual collaboration with Southern Appalachian and Barrens to Bayous fire effects monitoring crews studying the effects of the 2012 Neighbor Mountain Wildfire.

Shenandoah was the host site for the annual NE/SE Fire Effects Summit. Crew members from the Southern Appalachian fire effects monitoring crew and Barrens to Bayous visited Shenandoah to examine the 2012 Neighbor Mountain fire. This collaboration, now in its third year, is an excellent forum for the sharing of experience, ideas, and monitoring protocols. The group focused on reading CBI plots and also discussed the Southern Appalachians alternative monitoring protocol or Landscape Fire Effects Mapping. There was much interest in this evolving protocol among group members and it will be tested at Shenandoah in 2014.



From left to right, Carol Fields (NATR), Missy Forder (SHEN), Monica Phillips (SHEN), Matt Wood (GRSM), Cynthia Worthington (SHEN), Bob Dellinger (GRSM), Steve Paull (SHEN).

SHEN Fire Ecology supports Gettysburg 150th Battle Anniversary Commemorative Event.



SHEN E-41 in front of the Pennsylvania monument at Gettysburg National Military Park.

Fire ecologist Missy Forder and crew member Cynthia Worthington supported the Eastern Incident Management Team with a fire engine during the Gettysburg 150th Battle Anniversary Commemorative Event. The crew performed diverse tasks including first aid response, traffic control, parking and fire patrol. Fire danger was moderate throughout the event with occasional precipitation; however, live cannon firing demonstrations resulted in small ignitions of grassy areas. The crew was particularly busy with first aid contacts and EMS response during the Pickett's Charge where 40,000 people (many elderly and dressed in period appropriate attire) commemorated the charge across the battlefield.

Former under-secretary, author John Mclean and Deemer Scholars visit 2012 Neighbor Mountain Fire

Fire Ecologist Missy Forder, Lead Fire Effects Monitor Steve Paull and seasonal monitor Cynthia Worthington led a field trip to the 2012 Neighbor Mountain Fire for the Deemer Scholars internship program. This program is overseen by Mark Rey, former under-secretary for natural resources and environment. In that position Mr. Rey oversaw the U.S. Department of Agriculture's Forest Service and Natural Resources Conservation Service. Students enrolled in this program from Michigan State and Mississippi State participate in internships with federal natural resources agency and non-governmental organizations and learn about natural resources policy in Washington D.C. The hike through the Neighbor Mountain fire provided students with an introduction to NPS fire policy, wildfire tactics, a first-hand view of fire effects and an overview of additional natural resources issues. Author, speaker and educator John N. Mclean also joined the group and provided insight on his recent book.



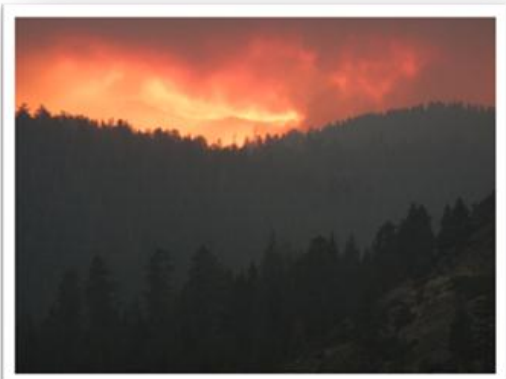
Deemer scholars examine a high severity ridge in the 2012 Neighbor Mountain fire.



VA Interagency T2IA Crew 52, Ackerson Meadow, Rim Fire, CA

Fire Effects crew serves on a T2IA handcrew on the Rim Fire in Yosemite National Park.

Fire Ecologist Missy Forder, Lead Fire Effects Monitor Steve Paull and Fire Effects crew member Cynthia Worthington participated in a two week detail on the Rim Fire. Missy served as the CRWB(t) and completed her taskbook while Steve and Cynthia served as FFT2 crew members and completed their FEMO taskbooks. This was an outstanding assignment with extremely active fire behavior and a diverse array of assignments. Fire effects crew member Lane Gibbons also went on a two week detail to fires in Utah, Oregon and Idaho while crew member Monica Phillips went on a two week detail with the Augusta Interagency Hotshot Crew.



Fire approaching Tioga Road in Yosemite National Park.

Table 1a. Fire Effects Plot Workload (2013) and Total Plots Installed							
Park	Monitoring Type	Type of Plot (FMH, photo point, other)	Pre-burn 2013	Imm. Post 2013	Post-burn 2013	Annual Total (2013)	Total Plots
Appomattox Courthouse NBP	White Oak	FMH Forest Plot	0	0	0	0	3
	Mixed Grassland	FMH Brush Plot	0	0	0	0	8
Catoctin Mountain Park	Pine-Oak	FMH Forest Plot	0	0	0	0	2
	Mixed Grassland	Rapid assessment	8	0	0	8	8
Delaware Water Gap NRA	Mixed Grassland	FMH Brush Plot	0	0	0	0	10
Fredericksburg & Spotsylvania NMP	White Oak	FMH Forest Plot	3	0	0	3	3
	Mixed Grassland	FMH Brush Plot	0	0	0	0	14
New River Gorge NRA	Xeric Oak Mesic Oak	FMH Forest Plot	0	0	0	0	4
Richmond NBP	Loblolly Pine	Photo points	0	0	0	0	4
	Loblolly Pine	FMH Forest Plot	0	0	2	2	2
	Mixed Grassland	FMH Brush Plot	0	0	2	2	13
Saratoga NHP	Mixed Grassland	FMH Brush plots	0	0	14	14	15
Shenandoah NP	Pine-Oak	FMH Forest Plot	0	4	4	8	13
	Xeric Oak	FMH Forest Plot	0	3	3	6	9
	Mesic Oak	FMH Forest Plot	0	0	0	0	3
	Neighbor Mtn	CBI	-	-	19	19	15
	Smith Run	CBI	-	-	5	5	15
	Big Meadows	I&M brush transects	-	-	24	24	79
SHEN MTTS Total (without CACO)			11	7	73	91	220

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

Park	Monitoring Type	Type of Plot (FMH, photo point, other)	Pre-	Imm.	Post-	Annual	Total	
			burn 2013	Post 2013	burn 2013	Total (2013)	Plots	
Cape Cod NS	**Monitoring conducted by CACO staff	Lombard Paradise Research Plot (20m x 20m) (Umass / Hollow Research Area NPS Collaborative with Patterson / Crary)	0	12	02	03	124	On going treatments of 27 year repeated burn experiment in S. Truro, MA. First order effects only recorded in 2013.
		Fort Hill Plant germination	0	0	35	35	35	Seeded burn pile footprints reviewed for <i>Schizachyrium</i> seedlings.
		Marconi Heathland Photo Points, Point Intercept, Wx data (day of treatment)	0	0	0	0	0	no data collected on previous year treatment plots in 2013.
		Broom Crowberry Point Intercept, Ocular percent cover estimate, photo	0	0	0	9	9	Nine burn units reviewed in 2013 by Patterson and Crary
		Broom Crowberry Sub-plots reviewed for <i>Corema</i> germination	0	0	35	0	35	Dr. Von Holle (Univ of Central Fla) research, plots were initiated and burned in 2011-12.
		Marconi Heathland Photo Points, Point Intercept, Wx data (day of treatment)	3	3	0	0	3	Slash, cure, burn units (3)
		Pilgrim Springs CACO Monitoring Plot (BAF, Releve, Browns transect)	0	0	0	0	0	by Henderson.
		Rx Burn Photos Photo	10	10	10	0	10	Photo points (25 different area single photo) plots established/taken for CACO 2013 Rx Burn Omnibus Plan.
		CACO Plots (conducted by CACO staff)	13	13	80	44	92	

Table 2. Fire Ecology Staffing 2013

Column1	Starting Date	Ending Date	# of Pay Periods	READ Qualified (Yes or No)	Training and Development
Missy Forder Fire Ecologist	1/1/2013	12/31/2013	26	Yes	Completed CRWB and FIRB taskbooks, WFDSS, S-490 (Advanced Wildland Fire Calculations), S-300 (Intermediate Incident Management System), detail on Rim Fire (CRWB-t), numerous FIRB-t assignments, First Responder credits, UTV refresher, fire refresher.
Steve Paull Lead Monitor	2/10/2013	11/16/2013	20	No	Completed FEMO task book, S-290 (Intermediate Fire Behavior), S-200 (Basic NIMS), S-300 (Intermediate Incident Management System), detail on Rim Fire, (FEMO-t), botany review, fire refresher, defensive driving.
Monica Phillips Crew Member	6/2/2013	9/28/2013	8.5	Yes	Detail Augusta Interagency Hotshot Crew, progress on FFT1 taskbook, HazWoper refresher, fire refresher, defensive driving.
Lane Gibbons Crew Member	6/2/2013	9/28/2013	8.5	No	S-290 (Intermediate Fire Behavior), opened FEMO task book, fire detail out west (UT & OR), HazWoper, botany review, defensive driving, fire refresher.
Cynthia Worthington Crew Member	6/2/2013	9/28/2013	8.5	No	Completed FEMO task book, detail on Rim Fire (FEMO-t), detail at GETT anniversary event, HazWoper, botany review, defensive driving, fire refresher.

Richmond National Battlefield Park

Table 3. Management Objectives and Monitoring Results

Park	Monitoring Unit	Management Objective (80% C.I.) α .2	Monitoring Results	Objectives Achieved?	YR Last Analysis?
Richmond National Battlefield Park	Malvern Hill	Maintain percent cover of woody species <25%	Cool Season Grass Fields Shrub Cover = 4% ($\pm$.2) Tree Cover = 16% ($\pm$ 11)	Yes	2010 (2005 - 2010)
			Warm Season Grass Fields Shrub Cover = 0 Tree Cover = 2 ($\pm$.1)	Yes	
		Percent cover of non-natives grasses and forbs < 25%.	Cool Season Grass Fields Non-Native Grass Cover = 47 ($\pm$ 12) Non-Native Forb Cover = 12($\pm$ 5)	No	2010 (2005 - 2010)
			Warm Season Grass Fields Non-Native Grass Cover = .3 ($\pm$.3) Non-Native Forb Cover = *10($\pm$ 10) *Plot 10 LESCUN	Yes	
		Percent cover of "meadow specialists" native grasses and forbs >75%.	Cool Season Grass Fields Native Grass Cover = 71($\pm$ 12) Native Forb Cover = 43($\pm$ 10)	Yes	2010 (2005 - 2010)
			Warm Season Grass Fields Native Grass Cover = 150($\pm$ 4) Native Forb Cover =13($\pm$ 3)	Yes	
	Cold Harbor	>50% Reduction in pole size (2.5-15cm) tree density after four burns.	Pre: 46 pole trees 03YR02: 22 pole trees	Yes	2010 (2003 - 2010)
		Maintain an open forested stand as it appeared at the time of the battle as measured within one year post burn.	Photopoints on going.	Yes	2010 (2003 - 2010)
		Increase native grasses by >75% after four burns.	Pre: 1.2% 03YR02: 7%	Yes	2010 (2003 - 2010)

Appomattox Court House National Historical Park

Table 3. Management Objectives and Monitoring Results

Park	Monitoring Unit	Management Objective (80% C.I.) α .2	Monitoring Results	Objectives Achieved?	YR Last Analysis?
Appomattox Court House National Historical Park	Ferguson Field Mixed Grassland	Maintain percent cover of woody species <25%	Woody species = 9 ($\pm$ 3)	Yes	2010 (2008 - 2010)
		Percent cover of non-natives grasses and forbs < 25%.	Non-native grass = 38 ($\pm$ 7) Non-native forbs = 10($\pm$ 4)	Yes	2010 (2008 - 2010)
		Percent cover of native grasses and forbs >75%.	Native grasses = 83 ($\pm$ 7) Native forbs = 13 ($\pm$ 4)	Yes	2010 (2008 - 2010)
	NC Woodlot	Short Term: Reduce Fuels: <1/4 inch diameter size class (litter) by 65 - 75%, 1/4 to 1 inch diameter size class by 25% to 50%, 1in to 3 in diameter size class by 10%-25%	Pre-burn plots only.	N/A	N/A
		Short Term: Reduce Density of pole-sized trees by at least 25% as measured within 1 year post burn.	Pre-burn plots only.	N/A	N/A
		Short Term: Limit overstory mortality to <25% as measured 1 year post burn	Pre-burn plots only.	N/A	N/A

Delaware Water Gap National Recreation Area

Table 3. Management Objectives and Monitoring Results

Park	Monitoring Unit	Management Objective (80% C.I.) α .2	Monitoring Results	Objectives Achieved?	YR Last Analysis?
Delaware Water Gap National Recreation Area	Darrones and Silver Spray Units	Percent cover of native grasses and herbs >75%.	PRE Native Grass = 11% (± 2) 01YR01 Native Grass = 15% (± 4) 01YR02 Native Grass = 22% (± 1) PRE Native Herb = 113% (± 13) 01YR01 Native Herb = 95% (± 12) 01YR02 Native Herb = 144% (± 3)	No Yes	2011 (2009 - 2011)
		Percent cover of woody species < 25%.	PRE Native Shrub = 17% (± 2) 01YR01 Native Shrub = 15% (± 3) 01YR02 Native Shrub = 10% (± 1) PRE Non Native Shrub = 0 01YR01 Non Native Shrub = 13% (± 5) 01YR02 Non Native Shrub = 17% (± 2)	No	2011 (2009 - 2011)
		Percent cover of non-natives grasses and forbs < 25%.	PRE Non-native Herbs = 43% (± 8) 01YR02 Non-native Herbs = 25% (± 2) PRE Non-native Grass = 127% (± 12) 01YR01 Non-native Grass = 94% (± 12) 01YR02 Non-native Grass = 101% (± 4)	No	2011 (2009 - 2011)

Cape Cod National Seashore

Table 3. Management Objectives and Monitoring Results

Park	Monitoring Unit	Management Objective (80% C.I.) α .2	Monitoring Results	Objectives Achieved?	YR Last Analysis?
Cape Cod National Seashore	Fire Cache <i>Corema conradii</i>	Fire Cache <i>Corema conradii</i> transplanting	Measure long term cover and health of 40 <i>Corema</i> plants prior to transplanting	ocular estimate only, 50% mortality in prep year 24 (Patterson / Motskin et. al.)	2010
	Lombard Paradise Hollow	Lombard Paradise Hollow	Research, vegetation	on-going	2012
	Heathland Monitoring / Marconi Site Heathland restoration	Remove overstory and maintain heath dominated landscape	Research, burning	on-going, Univ FLA (Von Holle, principle invest.)	2012
	Broom Crowberry burn	Heathland Monitoring / Marconi Site Heathland restoration	Establish pre-treatment baseline data for 35 area heathland restoration in the Marconi area, seed-scarify-burn plots, document results	in prep year 3 (Patterson et. al.)	2012
	Heathland /Hunting summers plots	Broom Crowberry burn	Determine if spring, summer or fall burning favors <i>Corema conradii</i> , three each 03 acres plots were burned (2.7 acres)	yes	2012
	Pilgrim Springs	Reduce fine fuels by 50%	Following treatments will be needed in 3-7 years (Rx fire)		

Shenandoah National Park

Table 3. Management Objectives and Monitoring Results

Park	Monitoring Unit	Management Objective (80% C.I.) α .2	Monitoring Results	Objectives Achieved?	YR Last Analysis?
Shenandoah National Park	Big Meadows	Maintain the cultural open landscape.	Analysis in progress. Completed by SHEN Botany.	Yes	NCR 2008 (1998 - 2008)
	Joint monitoring effort with SHEN Botany and Fire Effects.	Examine changes in vegetation over time in response to management.	Analysis in progress. Completed by SHEN Botany.	Yes	NCR 2008 (1998 - 2008)
		Monitor Northern Blue ridge Mafic fen plant community which contains a significant amount of the parks rare plant species.	Analysis in progress. Completed by SHEN Botany.	Yes	NCR 2008 (1998 - 2008)

Shenandoah National Park

Table 3. Management Objectives and Monitoring Results

Park	Monitoring Unit	Management Objective (80% C.I.) α .2	Monitoring Results	Objectives Achieved?	YR Last Analysis?
Shenandoah National Park	Pine-Oak / Xeric Oak	60% reduction in fuel loading after 2-4 burns.	35% reduction in total fuel loading after one treatment.	litter and duff, but not large fuels	2013 (2010 - 2013)
	Pine-Oak	80% reduction of mesic pole size trees after 2-4 burns.	63% ($\pm 4\%$) reduction after one burn	No, but only one treatment	2013 (2010 - 2013)
		Duff depth less than 1.5 inches after 2-4 burns.	1.78 in post burn	No, but only one treatment	2013 (2010 - 2013)
		40% reduction in overstory tree density after 2-4 burns.	4% (± 2) reduction after one burn	No, but only one treatment	2013 (2010 - 2013)
		Post burn shrub cover <10% after 2-4 burns.	To early to measure	N/A	N/A
		≥ 51 stems of yellow pine seedlings per FMH plot (0.0125 acre) 5 years post burn.	To early to measure	N/A	N/A
	Xeric Oak	80% reduction of mesic pole size trees after 2-4 burns.	57% ($\pm 4\%$) after one burn	N/A	2013 (2010 - 2013)
		40% reduction in overstory tree density after 2-4 burns.	23% ($\pm 8\%$) after one burn	Yes	2013 (2010 - 2013)
		Post burn shrub cover <10% after 2-4 burns.	To early to measure	N/A	N/A
		Oaks > 3 feet tall: > 5 seedling stems per FMH 0.0125 acre plot after 2-4 burns.	To early to measure	N/A	N/A
		Oaks 0.5-3 feet tall: 58-120 seedling stems per FMH 0.0125 acre plot after 2-4 burns.	To early to measure	N/A	N/A
		Oaks < 0.5 feet tall: 120-240 seedling stems per FMH 0.0125 acre plot after 2-4 burns.	To early to measure	N/A	N/A

Saratoga National Historical Park

Table 3. Management Objectives and Monitoring Results

Park	Monitoring Unit	Management Objective (80% C.I.) α .2	Monitoring Results	Objectives Achieved?	YR Last Analysis?
Saratoga National Historical Park	Mixed Grassland Hillside Plots n=5 (Plots 2,3,15,17,20) Plots have burned 4-5 times. The area has burned 8-13 times.	Percent cover of native grasses and herbs >75%.	2006 Native Grass = 84% (± 11) 2010 Native Grass = 100% (± 11) 2011 Native Grass = 110% (± 4) 2013 Native Grass = 135% (± 6)	YES	2013 (2006 - 2013)
			2006 Native Herb = 132% (± 19) 2010 Native Herb = 139% (± 15) 2011 Native Herb = 169% (± 7) 2013 Native Herb = 136% (± 7)	YES	
		Percent cover of woody species < 35%.	2006 Native Shrub = 31% (± 8) 2010 Native Shrub = 28% (± 4) 2011 Native Shrub = 30% (± 3) 2013 Native Shrub = 35% (± 4)	No	2013 (2006 - 2013)
			2006 Non Native Shrub = 10% (± 5) 2010 Non Native Shrub = 7% (± 4) 2011 Non Native Shrub = 10% (± 4) 2013 Non Native Shrub = 9 (± 4)	No	
		Percent cover of non-natives grasses and forbs < 50%.	2006 Non-native Herbs = 41% (± 8) 2010 Non-native Herbs = 46% (± 15) 2011 Non-native Herbs = 40% (± 6) 2013 Non-native Herbs = 28% (± 5)	YES	2013 (2006 - 2013)
			2006 Non-native Grass = .4% ($\pm .2$) 2010 Non-native Grass = 9% (± 4) 2011 Non-native Grass = 22% (± 3) 2013 Non-native Grass = 26% (± 5)	YES	

Saratoga National Historical Park

Table 3. Management Objectives and Monitoring Results

Park	Monitoring Unit	Management Objective (80% C.I.) α .2	Monitoring Results	Objectives Achieved?	YR Last Analysis?
Saratoga National Historical Park	Mixed Grassland Neilson House Plots 2008 n=3 (Plots 5,6,7) 2010 / 2011 / 2013 n=6 (Plots 5,6,7,14,18,24) Plots have burned 1-4 times. The area has burned 1-8 times.	Percent cover of native grasses and herbs >75%.	2008 Native Grass = 95% (± 16) 2010 Native Grass = 117% (± 12) 2011 Native Grass = 132% (± 5) 2013 Native Grass = 168% (± 3)	YES	2013 (2008 - 2013)
			2008 Native Herb = 24% (± 14) 2010 Native Herb = 23% (± 6) 2011 Native Herb = 23% (± 3) 2013 Native Herb = 19 (± 2)	NO	
		Percent cover of woody	2008 Native Shrub = 18% (± 5) 2010 Native Shrub = 21% (± 4) 2011 Native Shrub = 27% (± 3) 2013 Native Shrub = 31% (± 2)	YES	2013
			2008 Non Native Shrub = 2% ($\pm .3$) 2010 Non Native Shrub = .5% ($\pm .2$) 2011 Non Native Shrub = .3% ($\pm .08$) 2013 Non Native Shrub = .8 ($\pm .1$)	YES	
		Percent cover of non-natives grasses and forbs < 50%.	2008 Non-native Herbs = 150% (± 21) 2010 Non-native Herbs = 127% (± 22) 2011 Non-native Herbs = 119% (± 10) 2013 Non native Herbs = 88 (± 9)	NO	2013 (2008 - 2013)
			2008 Non-native Grass = 5% (± 3) 2010 Non-native Grass = 16% (± 5) 2011 Non-native Grass = 15% (± 2) 2013 Non-native Grass = 42 (± 4)	YES	

Saratoga National Historical Park

Table 3. Management Objectives and Monitoring Results

Park	Monitoring Unit	Management Objective (80% C.I.) α .2	Monitoring Results	Objectives Achieved?	YR Last Analysis?
Saratoga National Historical Park	Mixed Grassland Chatfield Farm 2003 n=2 (Plots 11,12, 23) Plots have been burned 1-3 times. Area burned 1-4 times.	Percent cover of native grasses and herbs >75%.	2003 Native Grass = 116% (± 26) 2010 Native Grass = 101% (± 13) 2011 Native Grass = 91% (± 2) 2013 Native Grass = 129% (± 12)	NO	2013 (2003 - 2013)
			2003 Native Herb = 28% (± 2) 2010 Native Herb = 19% (± 7) 2011 Native Herb = 18% (± 3) 2013 Native Herb 33% (± 3)	NO	
		Percent cover of woody species < 35%.	2003 Native Shrub = 42% (± 15) 2010 Native Shrub = 33% (± 2) 2011 Native Shrub = 37% (± 3) 2013 Native Shrub = 27(± 3)	YES	2013 (2003 - 2013)
			2003 Non Native Shrub = 2% ($\pm .3$) 2010 Non Native Shrub = .3% ($\pm .3$) 2011 Non Native Shrub = 0% (± 0) 2013 Non Native Shrub = .3% ($\pm .2$)	Yes	
		Percent cover of non-natives grasses and forbs < 50%.	2003 Non-native Herbs = 74% (± 27) 2010 Non-native Herbs = 74% (± 13) 2011 Non-native Herbs = 92% (± 16) 2013 Non-native Herbs = 101 (± 11)	No	2013 (2003 - 2013)
			2010 Non-native Grass = 2% ($\pm .3$) 2011 Non-native Grass = 1% ($\pm .1$) 2013 Non-native Grass = 9% ($\pm .3$)		

Catoctin Mountain Park

Table 3. Management Objectives and Monitoring Results					
Park	Monitoring Unit	Management Objective (80% C.I.) α .2	Monitoring Results	Objectives Achieved?	YR Last Analysis?
Catoctin Mountain Park	Pine-Oak	60% reduction in fuel loading after 2-4 burns.	Pre-burn plots only.	N/A	N/A
		80% reduction of mesic pole size trees (2.5 - 15 cm dbh) (i.e. red maple (<i>Acer rubrum</i>), blackgum (<i>Nyssa sylvatica</i>), sassafras (<i>Sassafras albidum</i>) after 2-4 burns.	Pre-burn plots only.	N/A	N/A
		Duff depth less than 1.5 inches after 2-4 burns.	Pre-burn plots only.	N/A	N/A
		40% reduction in overstory tree density after 2-4 burns.	Pre-burn plots only.	N/A	N/A
		Post burn shrub cover <10% after 2-4 burns.	Pre-burn plots only.	N/A	N/A
		≥51 stems of yellow pine seedlings per FMH plot (0.0125 acre) 5 years post burn.	Pre-burn plots only.	N/A	N/A

New River Gorge National Recreation Area

Table 3. Management Objectives and Monitoring Results					
Park	Monitoring Unit	Management Objective (80% C.I.) α .2	Monitoring Results	Objectives Achieved?	YR Last Analysis?
New River Gorge National Recreation Area	Xeric Oak	80% reduction of mesic pole size trees (2.5 - 15 cm dbh) (i.e. red maple (<i>Acer rubrum</i>), blackgum (<i>Nyssa sylvatica</i>), sassafras (<i>Sassafras albidum</i>) after 2-4 burns.	Pre-burn plots only.	N/A	N/A
		40% reduction in overstory tree density after 2-4 burns.	Pre-burn plots only.	N/A	N/A
		Post burn shrub cover <10% after 2-4 burns.	Pre-burn plots only.	N/A	N/A
		Oaks > 3 feet tall: > 5 seedling stems per FMH 0.0125 acre plot after 2-4 burns.	Pre-burn plots only.	N/A	N/A
		Oaks 0.5-3 feet tall: 58-120 seedling stems per FMH 0.0125 acre plot after 2-4 burns.	Pre-burn plots only.	N/A	N/A
		Oaks < 0.5 feet tall: 120-240 seedling stems per FMH 0.0125 acre plot after 2-4 burns.	Pre-burn plots only.	N/A	N/A

Fire Ecologist accomplishments and area of focus

Table 4. Fire Ecologist Accomplishments and Area of Focus

Category	Percent Time	Accomplishments and/or areas of activities
Planning	35%	WFDSS
		GEWA FMP, APPA FMP, SHEN FMP, NER FMP Consolidation
		WFPAC
		MTA, Compliance (PEPC, Section 7, 106)
		STARFire data layers
Presentations	10%	Presentation at MTTS FMO and Resource Managers meeting.
		Develop a fire podcast about prescribed fire in SHEN.
		Presentations to SHEN Interp and YCC.
		Fire Success stories.
		Rx Effects
NPS meetings	3%	Deemer Scholars field trip lead.
		Natural Resource Condition Assessment meetings.
		SE/NE Annual Symposium
Interagency	1%	Attend SHEN Natural Resources monthly meetings.
		Appalachian Fire Learning Network meetings, Forest Service
Wildfire	15%	CRWB(t), Two week detail on Rim Fire
		FIRB(t)
		WFDSS
Prescribed Fire	7%	FIRB(t) on multiple prescribed fires.
Non-fire fuels		
Research	2%	Literature research for natural resource managers.
Data collection	2%	SHEN data collection.
Data entry	<1%	Assisted with very little data entry.
Data Analysis	5%	Completed data summaries and analysis for supported parks.
Supervision & Administration	10%	Hire seasonal crew.
		Developed performance standards for permanent and seasonal employees.
Training	5%	Lead, Assistant and seasonal performance evaluations.
		S-490 Advanced Wildland Fire Calculations
		S-300 (Intermediate Incident Management System)
Travel out of park for plot or	2%	Fire Refresher.
		Site visits to develop prescribed fire objectives to GETT, GATE and APCO.
Miscellaneous	3%	GETT 150th celebration

A. Fire Effects crew accomplishments and areas of focus

Table 5. Fire Effects Crew Accomplishments and Areas of Focus

Category	Percent Time	Accomplishments and/or areas of activities
FMH Plots	28%	Forest and grass plots
WUI Plots	0%	
CBI Plots	3%	CBI plots (Neighbor Mountain and Smith Run)
Other Monitoring	11%	Fuel moisture sampling program (SHEN), collaboration with I&M to read Big Meadows fire transects
Wildfire Assignments	14%	Rim Fire (CA), Utah, Oregon, Idaho
Prescribed Fire Projects	7%	FEMO and operational support
Non-fire Fuels Project	2%	Hazard snag removal at Blackrock (SHEN), support during GETT anniversary event
Data Entry	9%	100% of plot data has been entered into FFI and QA/QC for 2013
Data Analysis & GIS	1%	
Supervision & Administration	12%	Lead prepared for season, supervised the crew of three, and maintained time, travel and administrative paperwork
Training	10%	FEMO task books complete (2), S-290 (Intermediate Fire Behavior), S-200 (Basic NIMS), S-300 (Intermediate Incident Management System), detail on Rim Fire (FEMO-t), detail Augusta Interagency Hotshot Crew, detail in Utah/Oregon, HazWoper, botany review, defensive driving, fire refresher
Miscellaneous	3%	SAR, 1-3 hours of physical training a week.

B. Additional Program Information

Table 6. Planning 2013

Park	Does Park have written DFCs? (yes or no)	Date Park-level Monitoring Plan completed (or revised)	Total # of Project or Community-level Monitoring Plans (not just 2013)	Assisted with how many BAER in 2013?
Appomattox Court House NHP	Yes	2008	1	0
Cape Cod NS	No	none	1	0
Catoctin National Park	Yes	none	1	0
Fredericksburg & Spotsylvania NMP	Yes	2011	1	0
Richmond NMP	Yes	2011	1	0
Saratoga NHP	Yes	in progress	1	0
Shenandoah NP	Yes	2013	2	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*
Appomattox Court House NHP	NA	NA	0	0	0	0
Catoctin Mountain Park	100%	100%	1	0	0	0
Cape Cod NS (completed by CACO staff)	100%**	100%**	27	53	3	0
Fredericksburg & Spotsylvania NMP	100%	100%	1	0	0	0
Gettysburg NMP	NA	NA	1	0	0	0
Richmond National Battlefield Park	100%	100%	2	1	0	0
Saratoga NHP	100%	100%	2	1	0	0
Shenandoah NP	100%	100%	2	1	2	1 (Neighbor Mtn)

*Number of treatment units with treatment efforts monitoring conducted. Include pre-burn and post-burn

**Data entry and quality checking performed by the park and data is maintained by park staff.

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?
Appomattox Court House NHP	1	2	1	no
Catoctin National Park (preburn data).	0	1	0	no
Cape Cod NS (completed by CACO staff)	1	1	1	no
Fredericksburg & Spotsylvania NMP (preburn data).	0	4	1	no
Gateway NRA (preburn planning)	0	1	1	no
Gettysburg NMP	1	2	0	no
Richmond National Battlefield Park	1	1	1	no
Saratoga NHP	1	1	0	no
Shenandoah NP	1	15	2	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
Appomattox Court House NHP	yes	0	0	0	
Cape Cod NS (completed by CACO staff)	yes	0	0	0	Research done in house as possible.
Catoctin National Park	yes	0	0	0	
Fredericksburg & Spotsylvania NMP	yes	0	0	0	
Gettysburg NMP	FMP in revision	0	0	0	
Richmond National Battlefield Park	yes	0	0	0	
Saratoga NHP	yes	0	0	0	
Shenandoah NP	yes	0	0	0	

E. 2014 Direction

Monitoring will continue to be evaluated based upon funding and ecological priorities. Emphasis will be placed upon forest plots in high ecological target areas where questions remain.

Parks monitored by the MTTS fire effects crew.

<i>Park</i>	<i>Date of last Rx fire or mechanical treatment</i>	<i>Year Monitored Last</i>	<i>Planned Monitor 2014?</i>	<i>Current level of monitoring?</i>
<i>Acadia NP</i>	<i>2013</i>	<i>2007</i>	<i>May assist I&M 2014</i>	<i>Advisory for photo point / Retired FMH forest plots</i>
<i>Antietam NBP (NCR)</i>	<i>2013</i>	<i>2011 (by park)</i>	<i>No</i>	<i>Retired FMH grassland plots, park conducting monitoring</i>
<i>Appomattox Courthouse NBP</i>	<i>2013</i>	<i>2013</i>	<i>Yes</i>	<i>Grassland and forest plots</i>
<i>Assateague Island NS</i>	<i>2010</i>	<i>2011 (with park)</i>	<i>No</i>	<i>Retired park plots, park not burning</i>
<i>Cape Cod NS</i>	<i>2013</i>	<i>2013 (by park)</i>	<i>No</i>	<i>Assist with park plots</i>
<i>Catoctin Mountain Park (NCR)</i>	<i>Never</i>	<i>2013</i>	<i>Yes</i>	<i>Preburn FMH forest plots installed 2012; grass plots installed 2013</i>
<i>Delaware Water Gap NRA</i>	<i>2013</i>	<i>2011</i>	<i>No</i>	<i>FMH grassland plots</i>
<i>Fredericksburg & Spotsylvania NMP</i>	<i>2012</i>	<i>2013</i>	<i>Yes</i>	<i>FMH grassland plots and FMH forest plots</i>
<i>Gateway NRA</i>	<i>Never</i>	<i>Never</i>	<i>Yes</i>	<i>Preburn plots 2014</i>
<i>Gettysburg NMP</i>	<i>2013</i>	<i>2013</i>	<i>Maybe</i>	<i>Park Monitoring plots.</i>
<i>George Washington Birthplace NBP</i>	<i>Never</i>	<i>Never</i>	<i>No</i>	<i>Advisory FMP, park in planning stages</i>
<i>New River Gorge NRA</i>	<i>2013</i>	<i>2012</i>	<i>Yes</i>	<i>Preburn FHM forest plots installed 2012</i>
<i>Petersburg NBP</i>	<i>2011 (mechanical)</i>	<i>Never</i>	<i>No</i>	<i>Advisory FMP, park in planning stages</i>
<i>Richmond NBP</i>	<i>2013</i>	<i>2013</i>	<i>Yes</i>	<i>FMH forest and grassland plots</i>
<i>Saratoga NHP</i>	<i>2013</i>	<i>2013</i>	<i>No</i>	<i>FMH grassland plots</i>
<i>Shenandoah NP</i>	<i>2013</i>	<i>2013</i>	<i>Yes</i>	<i>FMH forest plots</i>

Shenandoah National Park

2013 Fire Effects Monitoring Annual Report

On April 10th, personnel from the Northeast Region completed the 500-acre Jarman Gap prescribed fire at Shenandoah National Park. The burn was attempted in 2011 and 2012 but was not implemented due to unfavorable weather conditions. The objectives of the prescribed fire included using fire to restore dry oak and pine communities, and significantly reduce hazardous fuels in the urban interface landscape.

Overview

The Jarman Gap unit is approximately 508 acres consisting of oak-heath forest (75%) and pine-oak heath forest (5%). The prescribed burn objectives were to reduce fuel loads (50%), increase yellow pine seedlings, reduce pole-sized fire intolerant species (>70%), reduce overstory trees (25-50%), have 40% cover of native herbaceous plant, and have no net increase in exotic species. The unit is located in the southern district of Shenandoah National Park on the west side of Skyline drive using two drainages as the north and south perimeters. This unit has never been burned. The goal was to use low to moderate intensity fire to achieve the objectives. Fuel moisture samples were collected prior to the burn from four different sites within the plot.



Ignition in the Jarman Gap burn unit.

Goal

Reduce fuel loading by > 50% thereby decreasing the threat of a catastrophic wildfire. Use low to moderate intensity prescribed fire to promote oak and pine recruitment through the reduction of duff depth and the elimination of fire intolerant/shade-tolerant tree species over 3-5 prescribed fires.

Burn Objectives

- Ensure the public experience no injuries.
- Ensure fire personnel receive no lost time injuries.
- Keep the fire within the defined boundaries of the unit.
- Reduce fuel loading by > 50% thereby decreasing the threat of a catastrophic wildfire impacting park neighbors.
- Keep ignition out of sensitive riparian areas.
- Use low to moderate intensity prescribed fire to promote oak and pine recruitment through the elimination of fire intolerant tree species.
- Accommodate trainees into the burn organization.
- Contribute to the preparedness of National Park Service and cooperating agency fire personnel.

Monitoring Objectives

Reference: Mahan CG and Others. 2012. Prioritizing forest communities and areas for the use of prescribed fire at Shenandoah National Park. Natural Resource Technical Report. NPS/SHEN/NRTR—2012/625. National Park Service. Fort Collins, Colorado. Published Report-2191666.

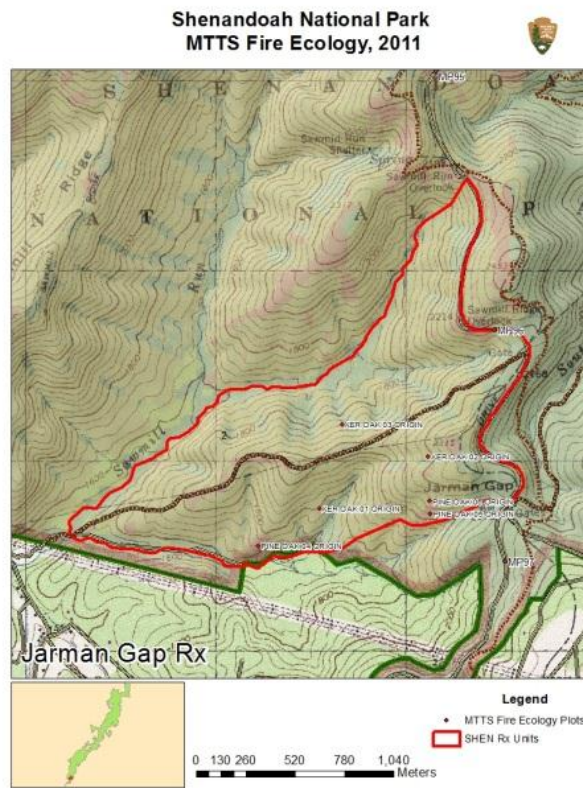
[SHEN_Prescribed_Fire_Mahan_NPS_SHEN_NRTR_2012_625_2191666.pdf](#) See full bibliographic record

Pine Oak Monitoring Type

- 60% reduction in fuel loading after 2-4 burns.
- Duff depth less than 1.5 inches after 2-4 burns.
- 80% reduction of mesic pole size trees after 2–4 burns.
- 40% reduction in overstory tree density after 2–4 burns.
- ≥ 51 stems of yellow pine seedlings per FMH plot (0.0125 acre) 5 years post burn.
- Post fire shrub cover <10% after 2-4 burns.

Xeric Oak Monitoring Type

- 60% reduction in total fuel loading after 2-4 burns.
- Duff depth less than 1.5 inches after 2 -4 burns.
- 80% reduction of mesic pole size trees after 2-4 burns.
- 40% reduction in overstory tree density after 2-4 burns.
- Oaks > 3 feet tall: > 5 seedling stems per FMH 0.0125 acre plot after 2-4 burns
- Oaks 0.5-3 feet tall: 58-120 seedling stems per FMH 0.0125 acre plot after 2-4 burns
- Oaks < 0.5 feet tall: 120-240 seedling stems per FMH 0.0125 acre plot after 2-4 burns.
- Post fire shrub cover <10% after 2- 4 burns.



Phenology Report (S. Paull – 4/10/2013)

The forest within the burn unit is dominated by oak species, particularly chestnut oak (*Quercus prinus*) and scarlet oak (*Quercus coccinea*), with yellow pine gaining dominance on dry ridges and some southern and western aspects. Yellow pine species include pitch (*Pinus rigida*), Table Mountain (*Pinus pungens*), and Virginia (*Pinus virginiana*). Mesic species such as tuliptree (*Liriodendron tulipifera*), red maple (*Acer rubrum*), and sweet birch (*Betula lenta*) are common in coves and drainages. White pine (*Pinus strobus*) is locally abundant along Sawmill Run and its tributary on the southern boundary of the burn unit. The shrub layer is dominated by ericaceous species, particularly mountain laurel (*Kalmia latifolia*), lowbush blueberry (*Vaccinium pallidum*), and black huckleberry (*Gaylussacia baccata*). Budbreak was delayed in 2013 as a result of a cooler-than-average spring in the mid-Atlantic region. A series of snow events blanketed the Blue Ridge in March. While most of the snow was gone by early April, some small patches could still be seen along Skyline Drive on north-facing aspects at the time of the burn. The view of the burn unit from the Drive was one of a forest that appeared to remain in the grip of winter dormancy; however, closer inspection revealed that many plants had experienced budbreak. Both chestnut and scarlet oak were in the early stages of bud elongation; catkins were not yet visible. Black gum (*Nyssa sylvatica*) buds were slightly enlarged but not yet broken. In the shrub layer, blueberry and huckleberry had small green buds, while the flowering meristems of mountain laurel were in the very early stages of elongation. Bear oak (*Quercus ilicifolia*) buds were broken but small. Flowering woody species at the time of the burn included serviceberry (*Amelanchier arborea*) and spicebush (*Lindera benzoin*). Sassafras (*Sassafras albidum*) buds along Skyline Drive were large and conspicuous, but flowering had not yet occurred. Flowering herbs included bloodroot (*Sanguinaria canadensis*), toothwort (*Dentaria* spp.), and hepatica (*Hepatica nobilis*). A return to seasonable temperatures the week of the burn, combined with ample rainfall on the night of April 11, brought about rapid green-up in the days following the prescribed fire.

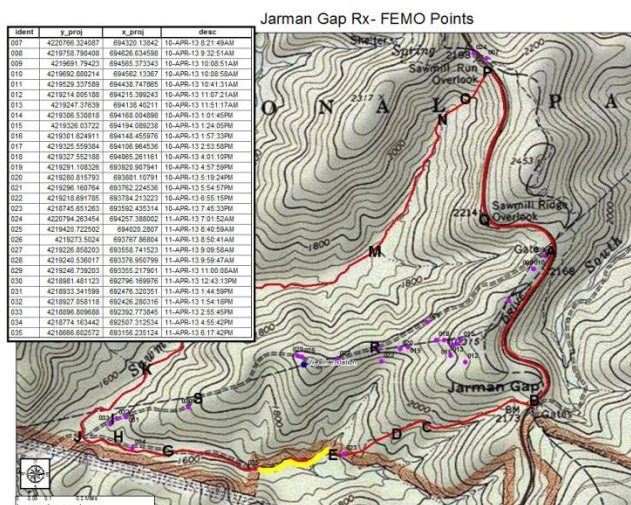
Fuel Moisture Information

Fuels were collected at four locations within the Jarman Gap Prescribed burn area on April 4, 2013. The following table provides the mean fuel moisture content for the samples collected at each of the four plots. GPS coordinates were collected if exact locations were needed.

		Approximate Location	Mean FMC (%)
Fine Dead Fuels	Litter	Between Point B & C (South slope)	8.7
		Point A (North slope)	8.7
		Sawmill Weather Station	5.9
		Point J	9.8
	Duff	Between Point B & C (South slope)	157.3
		Point A (North slope)	176.2
		Sawmill Weather Station	89.2
		Point J	209.9
Woody Fuels	10- hr	Between Point B & C (South slope)	15.5
		Point A (North Slope)	11
		Sawmill Weather Station	10.5
		Point J	15.7
	100-hr	Between Point B & C (South slope)	16
		Point A (North slope)	30.1
		Sawmill Weather Station	73.6
		Point J	18.3
Live Fuels	Kalmia	Between Point B & C (South slope)	115
		Point A (North Slope)	108.9
		Sawmill Weather Station	109.7
		Point J	116.7

Sawmill Weather Station Data (located in the center of the burn unit)

	3 Apr 13	4 Apr 13	5 Apr 13	6 Apr 13	7 Apr 13	8 Apr 13	9 Apr 13	10 Apr 13	11 Apr 13
1-hr	5	6	9	5	8	7	7	6	6
10-hr	5	6	9	5	8	7	7	6	6
100-hr	10	9	16	13	11	10	9	9	9
ERC	33	30	23	31	26	28	28	31	30
BI	52	34	26	30	33	37	40	46	37
KBDI	6	7	2	5	9	17	26	39	55



Fire Behavior Observations (M.Phillips – FEMO(t))

On average ROS of 1-2 chains/hour. Most of the fire we observed was backing. There was also flanking and head fire witnessed throughout the two days of burning.

DATE	TIME	LOCATION	ELEVATION	ASPECT	% SLOPE	FIRE TYPE (B/F/H)	FLAME LENGTH	FLAME ZONE DEPTH	ROS	PRIMARY CARRIER	FUEL MODEL	COMMENTS (SCORCH HEIGHT, % CONSUMPTION, SPOTTING DISTANCE, FUEL CONTINUITY AND ARRANGEMENT, ETC.)
10-Apr-13	950	Test Fire (A)	2180	E	>30	B	<6"		~1ch/hr	Oak Leaf Litter	9	NW Wind. Smoke drifting.
	1000	Test Fire (A)	2180			H	1-2'			Oak Leaf Litter	9	
	1040	GPS 011 (A-B)	2190	N	<5	B	<3"		0.6ch/hr	Oak Leaf Litter	9	
	1330	GPS 015	2280	W	<30	B	3-24"	2"	1.5ch/hr	Oak Leaf Litter	9	Flame height= 6"
	1540	Xeric Oak 2 (Q4-Q1)	2220	SW		B		4"		Oak Leaf Litter	9	Clumps of pines torching and with very dark smoke SE of current location.
	1720	GPS 020	~1800	W/SW	25	F	3-4'	3-4'		Oak Leaf Litter	9	
	1740	Downslope from GPS 020	~1500	S		H	3-4'		18ch/hr	Oak Leaf Litter	9	Short run upslope.
	1820	Downslope from GPS 020	~1500	S		B	1'	4'	3.3ch/hr	Oak Leaf Litter	9	
11-Apr-13	950	GPS 026 (SW of R)	2035	S		B		4-6"		Oak Leaf Litter	9	Backing upslope. Dust devil.
	1310	Pt. S	1800	W	<15	B	1'	3-4'	1ch/hr	Leaf and needle litter	9	Flame height= 2' (mostly 1-hr fuels, some elevated 10-hr fuel)
	1320	Pt. S	1800	W	<15	H	4-5'	5'	7ch/hr	Pine poles, litter	9	
	1345	GPS 031				B			0.5ch/hr		9	
	1445	Pt. I		W	<5	B			2ch/hr	Oak Leaf Litter	9	

Accuracy of Spot Forecast (M. Phillips – FEMO(t))

The April 10-11, 2013 spot forecast for the Jarman Gap Prescribed Burn poorly predicted the temperature and relative humidity. The predicted maximum temperature for Wednesday, April 10th was around 83°F. We observed a high temperature of 88°F. The predicted minimum RH for April 10th was 34% around 1500. We observed an RH of 30% at 1400 and it continued to drop until the lowest RH of 25% was recorded at 1600. A similar trend was seen on Thursday, April 11th. The predicted maximum temperature for April 11th was approximately 81°F. We observed a high temperature of 85°F at 1400. The predicted minimum RH for April 11th was 47% around 1600. We observed an RH of 46% at 1100. The RH continued to drop until a low of 33% was observed at 1400. We also compared the spot forecasts and our weather observations to the Sawmill Ridge weather station, located in the center of the burn unit. The weather station data reflected the weather observations collected throughout the prescribed burn.

Date	Time	Spot Forecast/Expected			Observed/Actual		
		Temperature (°F)	RH (%)	Wind (20ft)	Temperature (°F)	RH (%)	Wind (Eye Level)
10-Apr-13	1100	75	55	W7	76	49	W/NW 2-5
	1300	79	42	W8	80	43	S/SW 2-5
	1500	81	35	SW9	86	33	NW <4
	1700	81	37	SW9	88	27	SW 2-8
11-Apr-13	1000	69	61	SW6	71	58	SW/W 0-4
	1200	75	52	SW7	84	38	S 1-3
	1400	78	48	S8	85	33	S/W 1-5
	1600	80	47	S10	80	38	NW/SW <4



Ignition in the southwest corner of the unit on the second day.

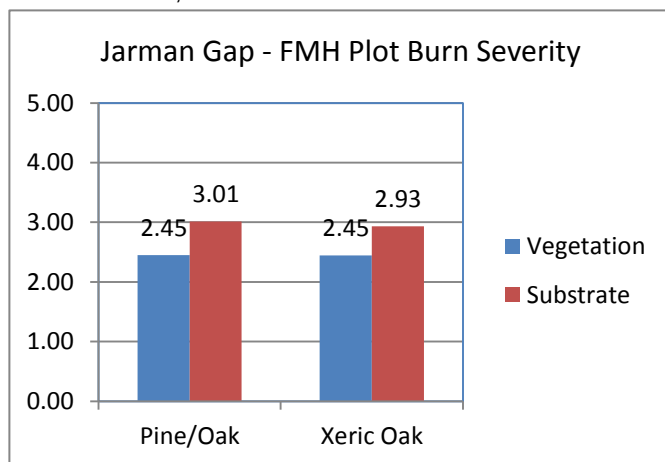
Immediate Post-burn results (as taken from the FEMO report – M. Phillips)

Approximately 90% of the unit was burned. The leaf litter was consumed but the duff layer remains intact for the areas we walked. Overall, the Jarman Gap burn presented low to moderate fire behavior. Thousand and hundred- hour fuels were not consumed, but there was some charring. One and ten hour fuels were still present in the burn area but mostly charred and some areas it appears 1 and 10-hour fuel was consumed. The fire consumed most live seedlings, leaving only a 1-2 inch charred stem above the ground. Charring on live woody vegetation ranges from 0 to 6 feet. Forty foot scorching was observed in some pine dominated areas.

Immediate Post burn severity

Immediate burn severity of the vegetation was light/moderate while severity of the substrate was light.

n=4 Pine-Oak, n=3 Xeric-Oak



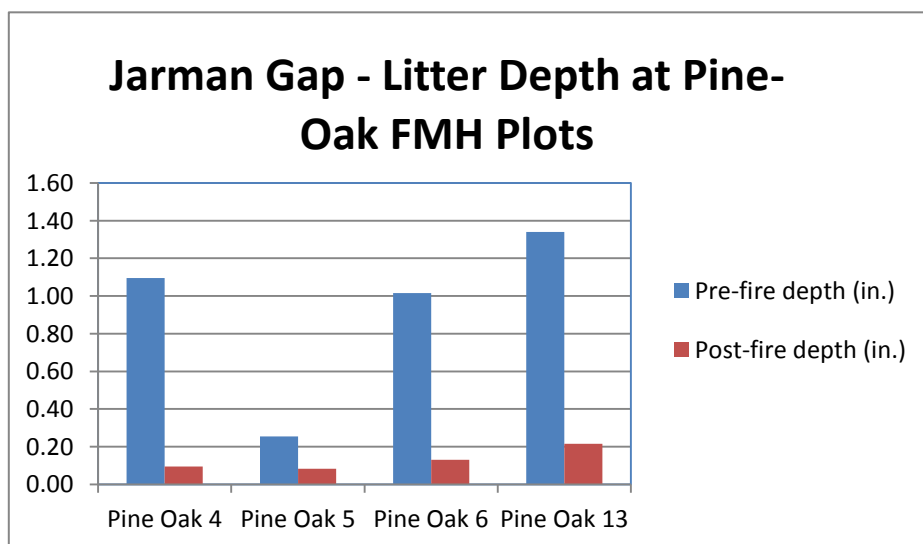
FMH severity scoring:

Severity	Score
0	Not applicable
1	Heavy
2	Moderate
3	Light
4	Scorched
5	Unburned

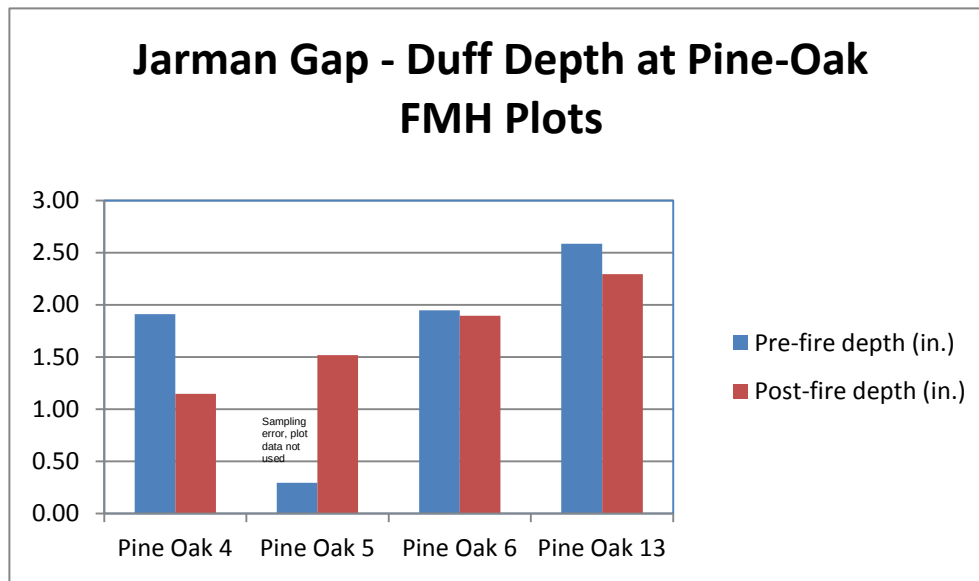
Surface Fuels – Litter and Duff

Pine-Oak plots had an 87% reduction in litter and an 18% reduction in the duff layer. The average depth of litter was 1.15 in pre burn and 0.15 in post burn. Duff was reduced from 2.15 in pre burn to 1.78 in post burn. It should be noted that Plot 5 was removed from the dataset due to apparent errors in pre-burn sampling measurements.

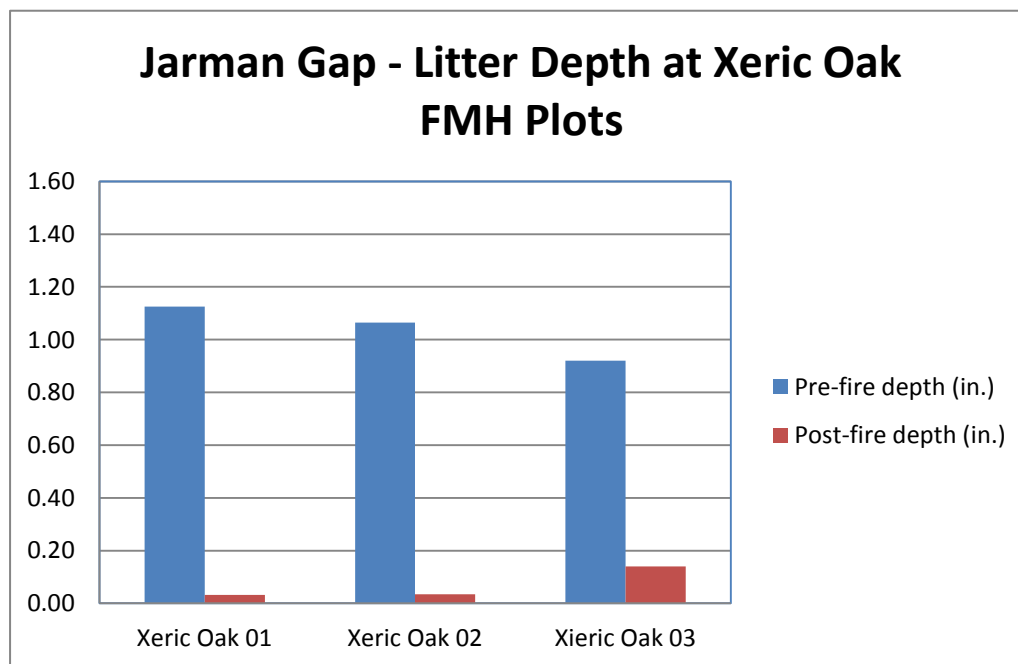
n=4, however n=3 in analysis due to sampling error

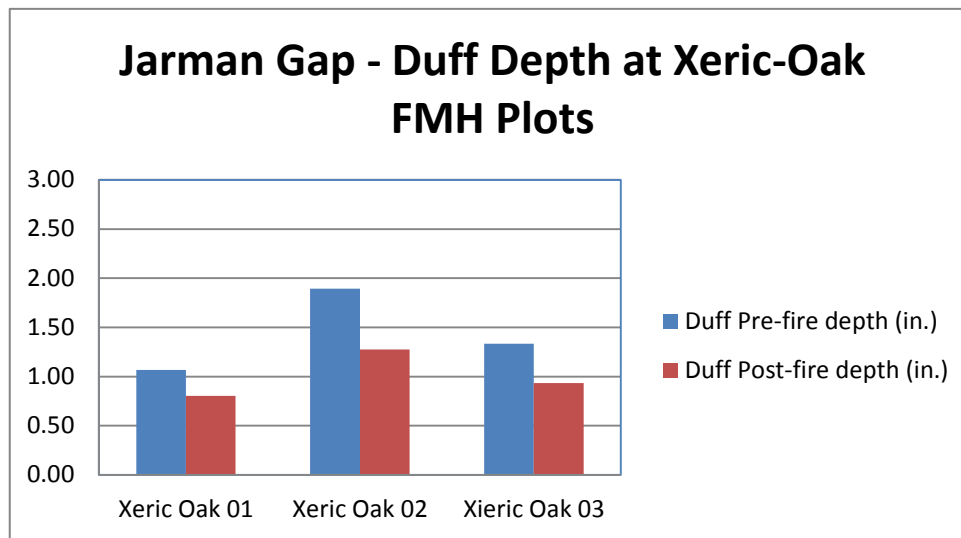


n=4, however n=3 in analysis due to sampling error



Xeric oak plots had a 93% reduction in litter and a 29% reduction in duff layer. The average depth of litter was 1.04 in pre burn and 0.07 in post burn. Duff was reduced from 1.43 in pre burn to 1.00 in post burn. ***Duff is extremely variable; however it is desired to have a duff depth of less than 1.5 inches for yellow pine regeneration.***





Example of immediate post burn severity and litter and duff reduction.



PINOAK 6 Q2-Q3 Day Before Burn, April 10, 2013



PINOAK 6 Q2-Q3 2010 PRE



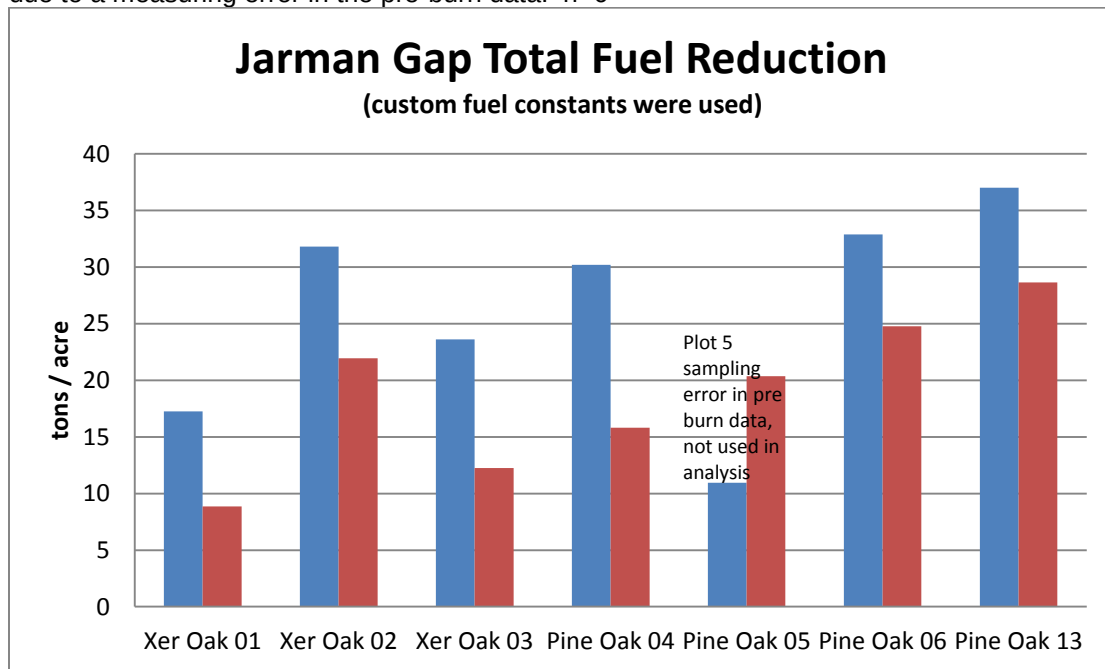
PINOAK 6 Q2-Q3 Post burn, July 7, 2013



PINOAK 6 Q2-Q3 2013 Immediate Post burn

Total Fuel Reduction

After one treatment there was a 35% (± 1) reduction in total fuels. Plot 5 was not utilized in this calculation due to a measuring error in the pre-burn data. $n=6$



Total Fuel Reduction XEROAK 03 Pre and Post burn.



Note that the main reduction was in leaf litter and fine fuels.

Pole and Overstory Tree Density Reduction

Pole Size Trees

After one treatment we saw a 62% (± 2) decrease in pole size (2.5 – 15 cm dbh) trees. The objective was to reduce pole size trees by 80% after 2-4 burns. However, most of these trees have enough carbohydrate storage below ground and re-sprout prolifically from the base, so they are in essence top-killed. In our sampling we found that only 20% of these dead trees do not have re-sprouts. It will take multiple fire treatments over several years to slowly stress these trees and re-sprouts and bring about tree mortality, thus removing them from all strata.

Objective:

80% reduction of mesic pole size trees (2.5 - 15 cm dbh) after 2 – 4 burns.

Result:

After one burn; Pine Oak 63% $\pm 4\%$ (n=4)
Xeric Oak 57% $\pm 4\%$ (n=3)
All Plots 62% $\pm 2\%$ (n=7)

Overstory Trees

After one treatment we saw a 10% decrease in overstory trees (> 15cm dbh). The objective was to reduce overstory trees by 40% after 2-4 treatments.

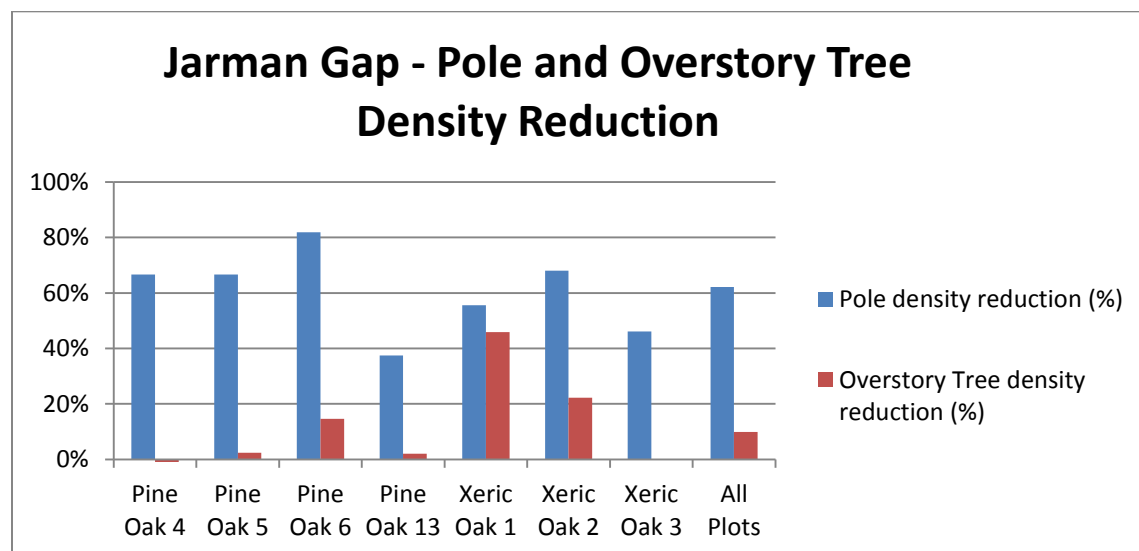
Objective:

40% reduction of mesic pole size trees (2.5 - 15 cm dbh) after 2 – 4 burns.

Result:

After one burn; Pine Oak 4% $\pm 2\%$ (n=4)
Xeric Oak 23% $\pm 8\%$ (n=3)
All Plots 10% $\pm 2\%$ (n=7)

Graph showing the percent reduction of pole size and overstory trees by plot.



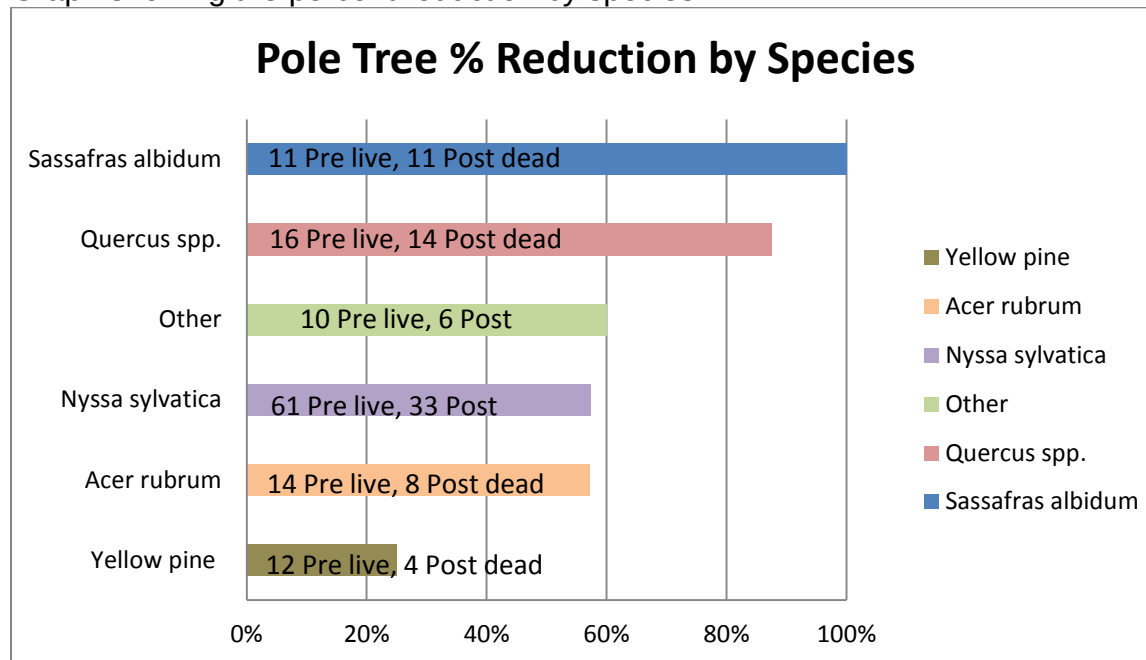
Mesic pole sized trees

Objective:

80% reduction of mesic pole size trees (2.5 - 15 cm dbh) (i.e. *Acer rubrum*, *Nyssa sylvatica*, *Sassafras albidum*) after 2–4 burns.

After one treatment, pole sized *Sassafras* were reduced by 100%, *Nyssa sylvatica* (blackgum) 57%, and *Acer rubrum* (red maple) 57%. *Quercus* (oak) species also had a high mortality 88%. Ideally, we would like to maintain these pole sized oak trees in the sub-canopy. It may have been the intensity of the fire due to the presence of mountain laurel, combined with the fact that it was the first burn, that resulted in this high rate of top-kill. It is likely that many of these trees will re-sprout prolifically from the base and that a low intensity burn every 3-5 years will slowly stress and kill them.

Graph showing the percent reduction by species.



Pole sized mortality at XEROAK 01 Pre burn and Post burn

Saratoga National Historical Park

2013 Fire Effects Monitoring Annual Report

The park has an extremely complex history of mowing, burning and chemically treating vegetation over the last 20 years. The prescribed fire program dates back to the early 1990s.

The Northeast Region Fire Effects Monitoring Crew began monitoring fire effects at the park in 2001. There are 24 plots installed throughout the park, all in fields. In 2010, it was decided to retire 9 of the plots that were primarily located in mown areas. Fifteen plots still remain active as of 2013. Due to varying location, topography and treatments, plots were broken up into three analysis groups.

The first group, the **hillside plots**, are located on steep slopes and are maintained with fire to reduce woody vegetation. Steep slopes are a safety issue and pose a safety hazard when mowing. The second group, **Neilson Farm plots**, are maintained with fire to reduce woody vegetation and also reduce invasive exotic knapweeds. The third group, **Chatfield Farm plots**, are maintained with fire to reduce woody vegetation and control knapweed. The Chatfield Farm fields have been experimentally burned in the summer of 2003 and 2009 to eliminate woody vegetation.

Park Overview

Saratoga National Historical Park is located in the towns of Stillwater and Saratoga, in Saratoga County in upstate New York, about 30 north of the state capital at Albany. Although a neighbor to the highly urbanized "Capital District," the park is rural in character and farming is the major use of adjacent lands. The park comprises 2,912 acres preserving the sites associated with a significant American military victory during the Revolution. In 1777 American forces met, defeated, and forced a major British army to surrender, an event which led France to recognize the independence of the United States and enter the war as a decisive military ally of the struggling Americans. The Battlefield Unit, 2,843 acres, was made part of the national park system in 1938 when Saratoga National Historical Park was authorized by the United States Congress.

Prior to 1760's the predominant vegetative cover was forest with perhaps some meadow/field areas along the river floodplain. Settlement and agriculture brought about great change. By the mid 1800's the forests had been cut leaving only small wood lots, orchards, and forested ravines. Many of the cultivated fields have persisted to present day. There were really no native grasslands comprising the battlefield. Continued agriculture (mostly for forage with agriculture leases), deer browsing, mowing by park staff, and using prescribed fire have helped to maintain these fields. Over the years a few native warm season grasses (predominantly Little Bluestem-*Schizachyrium scoparium*) have been populating these clearings, particularly in the sandy soil areas. Recently Big Bluestem-*Andropogon gerardi*, has appeared, most likely attributed to one of the farmers with the agricultural lease. While native warm season grasses do provide habitat for a suite of grassland birds, the majority of these species are in the fields dominated by non-native grasses and forbs which comprise the important bird area.

Grasslands are comprised of vegetation dominated by bluestem (*Schizachyrium scoparium*), sedge (*Carex* spp.), panic-grass (*Dichanthelium* spp.), fescue (*Festuca* spp., *Schedonorus pratensis*) and Reed Canary Grass - *Phalaris arundinacea*, an invasive exotic. Common forbs include yarrow (*Achillea millefolium*), knapweed (*Centaurea jacea* and *biebersteinii* - an invasive exotic), bedstraw (*Galium* spp.), cinquefoil (*Potentilla* spp.), goldenrod (*Solidago* spp.), and thyme (*Thymus* spp.). Woody species including dogwood (*Cornus racemosa*), black cherry (*Prunus serotina*), buckthorn (*Rhamnus cathartica* - an invasive exotic.), sumac (*Rhus* spp.), brambles (*Rubus* spp.), poison ivy (*Toxicodendron radicans*), viburnum (*Viburnum* spp.), and grape (*Vitis* spp.). Ferns are common to dominant in one field (Field 37, called The Fern Field) and include lady-fern (*Athyrium filix-femina*), sensitive fern (*Onoclea sensibilis*), and royal fern (*Osmunda regalis*).



Goals and Objectives

The Saratoga NHP Fire Management Plan states that the objectives are to “Maintain and rehabilitate park fields, meadows, and historic landscapes through the application of prescribed fire and other techniques.”

Monitoring Objectives 2013 (with input from Linda White on 10/31/2011)

- Reduce 1 and 10 hour, dead and down fuels by $\geq 75\%$ as determined immediately post burn.
- Percent cover of woody species $< 35\%$ as measured following two growing season burns.
- Percent cover of non-natives grasses and forbs $< 50\%$ as measured after 5-7 burns.
- Percent cover of native grasses and forbs $> 75\%$ as measured after 5-7 burns.
- Maintain Knapweed species at ?? % cover as measured after 5-7 burns.

Hillside Plots

Discussion – Hillside Plots

The hillside area has been burned 8-13 times since the start of the prescribed fire program in the early 1990s. *FMH Monitoring Plots have been burned 4-5 times after installation.*

Woody species

Percent cover of shrubs has remained consistently the same throughout the data set. The current percent cover is at the new desired threshold of $< 35\%$. This threshold was raised after re-evaluating the objectives in 2010. Scientific literature supports burning during the late summer-early fall to achieve a higher mortality of woody species. Current treatments appear to be maintaining a consistent shrub cover but not reducing the cover. Native shrub cover in years 2006, 2010, 2011 and 2013 were 31%, 28%, 30% and 35% all within standard error. Non-native shrub cover was 10%, 7%, 10% and 9% respectively. Native tree cover in years 2006, 2010, 2011 and 2013 was 6%, 7%, 7% and 2%, again all within standard error. Non-native tree cover has been negligible, with 2013 results showing $5\%(\pm 1)$.

If a further reduction of woody species is desired by park managers, multiple growing season burns are recommended to achieve this objective. Growing season burning would occur between August and early October when leaves and twigs are consumed and the temperature exceeds 145 degrees Fahrenheit and top kill is imminent. In late summer trees and shrubs prepare for fall senescence and transport carbohydrates, amino acids and other compounds down from the leaves and twigs to the roots. By burning at this critical time period, the plant does not have the nutrients to pass back down to the roots and its ability to start growing the following spring is greatly diminished (Harper *et al.* 2007). Carbohydrate reserves provide an energy source to support growth and respiration when plants are leafless (Loescher *et al.* 1990, Kozlowski 1992). The more reserves, the better an individual will be able to survive stress, whereas depleted reserves can lead to plant death (Kozlowski 1992, Johansson 1993). Late season defoliation causes a decrease in carbohydrate reserves and will impact the vigor of the plant the next growing season (Gregory *et al.* 1986, Loescher *et al.* 1990).

Mowing alone is an inadequate method to reduce woody encroachment because mowing woody saplings encourages aggressive resprouting. A plant's survival response after being cut is to resprout. The plant takes what energy it has remaining in the roots and pushes it above ground to resprouts, grows leaves and begins to photosynthesize again. Timing of cutting can have a significant effect on sprout growth during the first 1-2 years following cutting (Kays 1991, Richburg *et al.* 2004). To have the greatest success reducing woody stems a treatment should be conducted during periods of low carbohydrate storage. This can be immediately after spring flush and followed up by another treatment before carbohydrate levels are replenished (Richburg 2003). Multiple treatments within a growing season can be effective so long as the time between treatments is long enough to allow sprouts to regrow so that the second treatment further depletes reserves (Richburg *et al.* 2004). An effective treatment to reduce woody species is a mechanical treatment following

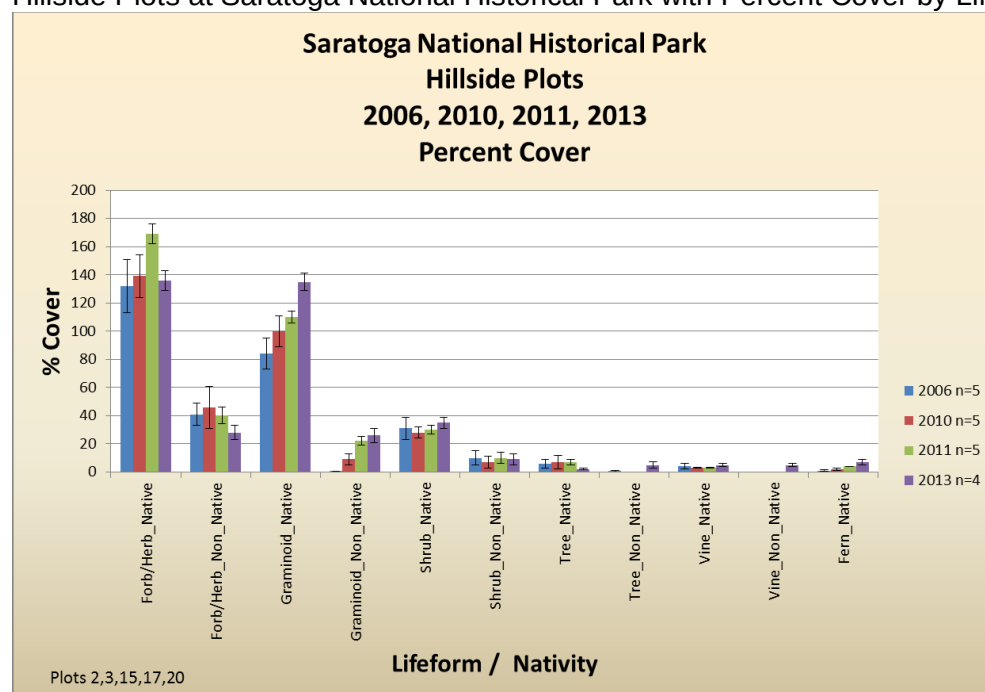
spring flush, followed by a late growing season burn (Richburg 2004). This effectively depletes carbohydrate reserves and removes slash which inhibits wildlife mobility. Current literature supports multiple growing season treatments over multiple years.

Grass and Herbaceous Species

Native grass and herb cover is excellent with Native Herb 136%(±7) and Native Grass 135%(±6) respectively. Prescribed burning appears to be increasing native grass cover and maintaining native herbaceous vegetation. It should be noted that percentages exceed 100% because multiple hits of a native grass or herbaceous vegetation may be recorded at each sampling point. We feel it is important to capture the diversity in the field by reporting this percent cover which may exceed 100%. We have also analyzed relative cover which would not exceed 100% and that information is also available to managers as requested.

Cover of non-native grass is still low at 26% (±5), however it has been increasing throughout the dataset. Non-native herbs are below the desired threshold of <50% with 28% (±5). Plots 2 and 3 at Stop 10 have high concentrations of knapweeds which influence the high amounts of cover.

Hillside Plots at Saratoga National Historical Park with Percent Cover by Lifeform and Nativity.



Hillside Plots Percent Cover and standard error

Lifeform	2006 n=5	2010 n=5	2011 n=5	2013 n=4	2006 se	2010 se	2011 se	2013 se
Forb/Herb_Native	132	139	169	136	19	15	7	7
Forb/Herb_Non_Native	41	46	40	28	8	15	6	5
Graminoid_Native	84	100	110	135	11	11	4	6
Graminoid_Non_Native	0.4	9	22	26	0.2	4	3	5
Shrub_Native	31	28	30	35	8	4	3	4
Shrub_Non_Native	10	7	10	9	5	4	4	4
Tree_Native	6	7	7	2	3	5	2	0.5
Tree_Non_Native	0.4	0	0	5	0.4	0	0	2
Vine_Native	4.4	3	3	5	2	0.5	0.5	1
Vine_Non_Native	0	0	0	5	0	0	0	1
Fern_Native	1	2	4	7	0.5	1	0.1	2

Neilson Farm

Discussion – Neilson Farm

The Nielson Farm area has been burned 3-8 times since the start of the prescribed fire program in the early 1990's. *FMH Monitoring Plots have been burned 1-4 times after installation.*

Native Grass

Native grass cover is excellent with Native Grass at 168% (± 3). Native grass has been steadily increasing from 2008 – 2013 with 95%, 117%, 132% and 168%. Non-native grass cover still remains below the <50% threshold at 42% (± 4). Non-native grass has increased from 2008 with 5%, 16%, 15, to 42% in 2013. It should be noted that percentages exceed 100% because multiple hits of a native grass or herbaceous vegetation may be recorded at each sampling point. We feel it is important to capture the diversity in the field by reporting this percent cover which may exceed 100%. We have also analyzed relative cover which would not exceed 100% and that information is also available to managers as requested.

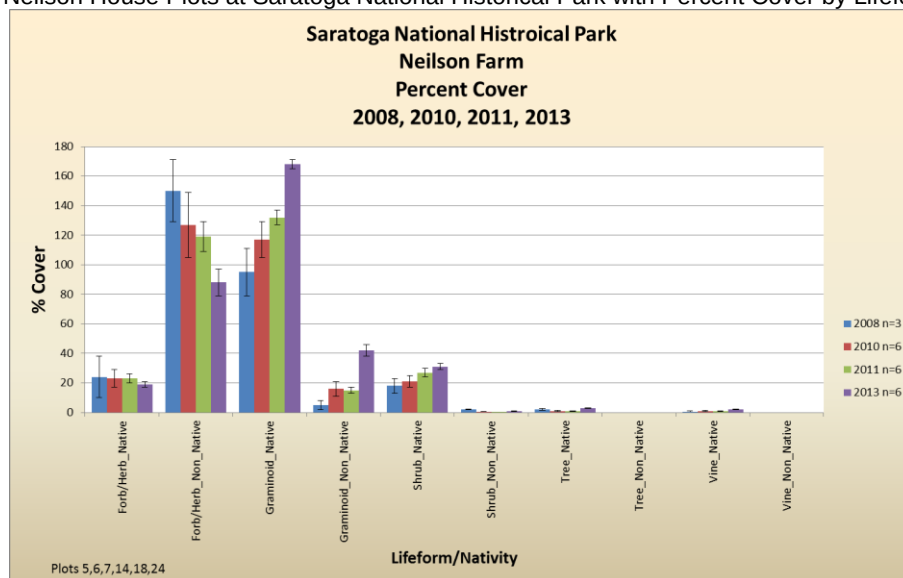
Knapweed

There was a decrease in non-native herbaceous (mainly knapweed) from 150%, 127%, 119% to 88% in 2013. Both native and non-native grasses may be filling the void left by the knapweed. These plots have been treated with herbicide targeting the knapweed and may be treated in 2014.

Woody Vegetation

Native and Non-native shrub cover were below the <35% threshold with 31% (± 2) and .8% (± 1) respectively. Tree cover remains very low.

Neilson House Plots at Saratoga National Historical Park with Percent Cover by Lifeform and Nativity



Nielson House Plots Percent Cover and standard error

Lifeform and Nativity	2008 n=	2010 n=6	2011 n=	2013 n=	2008 se	2010 se	2011 se	2013 se
Forb/Herb_Native	24	23	23	19	14	6	3	2
Forb/Herb_Non_Native	150	127	119	88	21	22	10	9
Graminoid_Native	95	117	132	168	16	12	5	3
Graminoid_Non_Native	5	16	15	42	3	5	2	4
Shrub_Native	18	21	27	31	5	4	3	2
Shrub_Non_Native	2	0.5	0.3	0.8	0.3	0.2	0.08	0.1
Tree_Native	2	1	1	3	0.6	0.5	0.2	0.2
Tree_Non_Native	0	0	0	0	0	0	0	0
Vine_Native	0.6	1	1	2	0.6	0.5	0.2	0.3
Vine_Non_Native	0	0	0	0	0	0	0	0

Chatfield Farm

The Chatfield Farm area has been burned 4 times since the start of the prescribed fire program in the early 1990's. *FMH Monitoring Plots have been burned 1-3 times after installation.*

Native Grass

Native grass cover remains high with 129% (± 12) and non-native grass is low with 9% (± 3). Prescribed burning appears to be maintaining / increasing Native Warm Season Grasses.

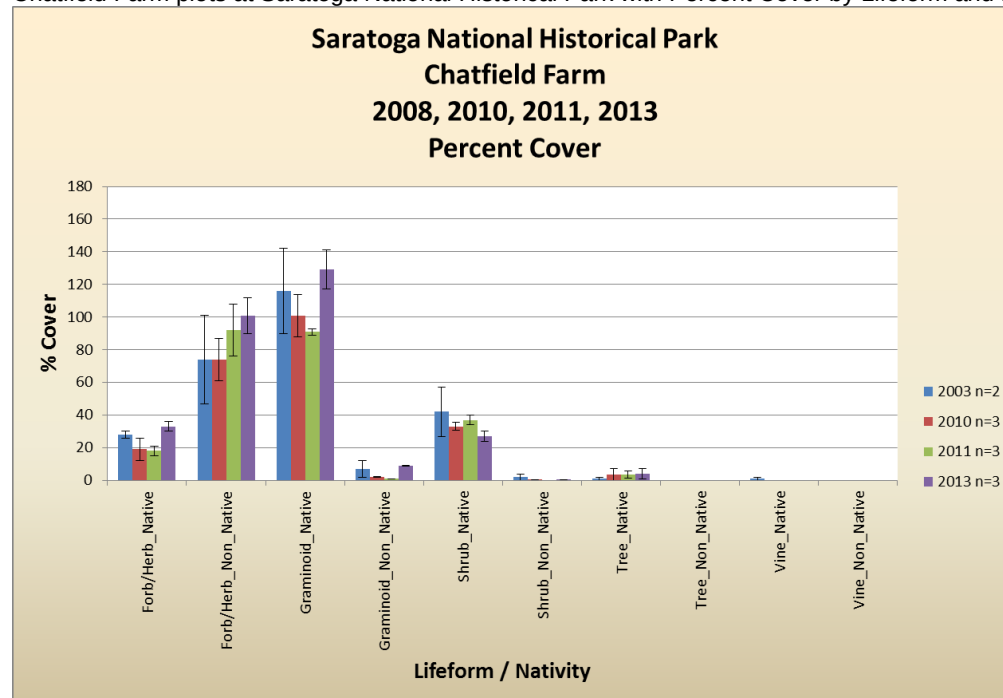
Knapweed

Similar to the Nielson Farm area, non-native herbaceous plants (mainly knapweed) remain high with 101% (± 11). Knapweed has increased from 2003 with 74% (2003), 74% (2010), 92% (2011) and 101% (2013). Native herbs are still outnumbered almost 3:1 by non-native herbs. In 2013, native herbs were measured at 33% (± 3) this however is an increase from 2011 with 18% (± 3).

Woody Vegetation

Woody vegetation is below the 35% threshold in 2013 (27% (± 3)). Woody shrubs show a slight decrease from 2008 with 42%, 33%, 37% and 27%. The area was burned experimentally in the summer 2003 and 2009. Additional growing season burns are recommended as the shrubs combined with the trees approach the 35% threshold.

Chatfield Farm plots at Saratoga National Historical Park with Percent Cover by Lifeform and Nativity.



Chatfield Farm Plots Percent Cover and standard error

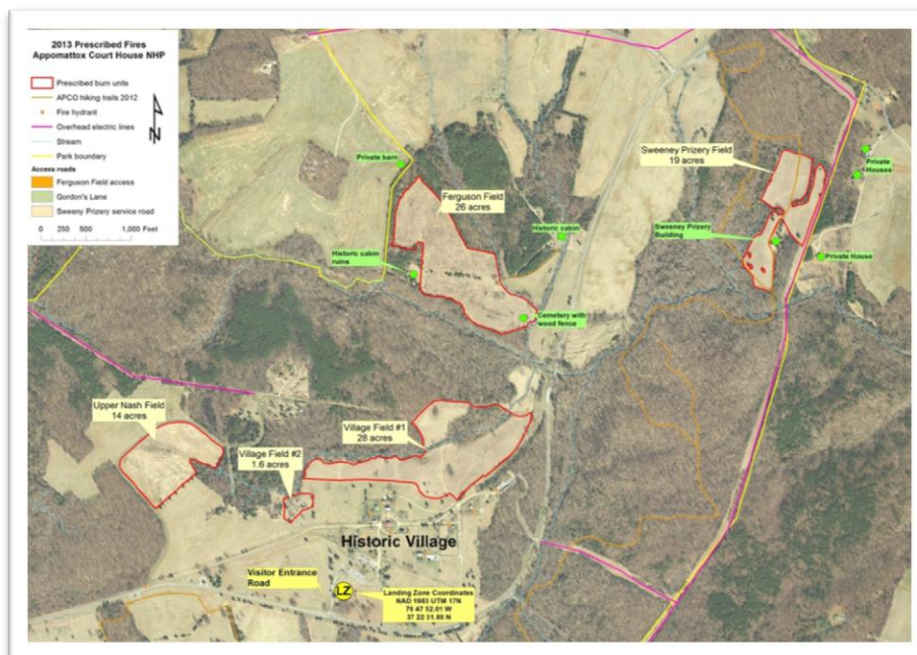
Lifeform/Nativity	2003 n=2	2010 n=3	2011 n=3	2013 n=3	2003 SE	2010 SE	2011 se	2013 se
Forb/Herb_Native	28	19	18	33	2	7	3	3
Forb/Herb_Non_Native	74	74	92	101	27	13	16	11
Graminoid_Native	116	101	91	129	26	13	2	12
Graminoid_Non_Native	7	2	1	9	5	0.3	0.1	0.3
Shrub_Native	42	33	37	27	15	2.4	3	3
Shrub_Non_Native	2	0.3	0	0.3	2	0.3	0	0.2
Tree_Native	1	3.6	3.6	4	1	3.6	2	3
Tree_Non_Native	0	0	0	0	0	0	0	0
Vine_Native	1	0	0	0	1	0	0	0
Vine_Non_Native	0	0	0	0	0	0	0	0

Appomattox Courthouse (APCO) 2013 Fire Effects Monitoring Annual Report

Appomattox Court House National Historical Park (APCO) consists of approximately 1,743 acres in the piedmont of south-central Virginia, and is located approximately three miles northeast of the town of Appomattox.

In September of 2013 a prescribed burn operation was implemented to treat five grassland units: Ferguson Field, Village Field #1, Village Field #2, Upper Nash Field, and Sweeney Prizery Field. Most of the grassland areas of the park have been managed in some way over the years as part of the park's desire to maintain the rural character of the landscape. The Ferguson Field, Village Field #1, and Sweeney Prizery fields have all been managed as mature grassland units, with planting of warm-season grass species taking place after the application of selective herbicides to remove non-native graminoids such as tall fescue. Herbicide was applied to the Upper Nash Field in 2011, but it was not seeded with native warm season grasses following the treatment. Village Field #2 is a small woodland unit that was mechanically thinned prior to this operation. All units were treated except for Village Field #2, which was not burned because of a lack of time. Ferguson field had a total of 8 grassland FMH plots installed in 2008 and burned in 2010. This was the only other prescribed burn at APCO. A total of 84 acres were burned on September 17 - 18, 2013.

APCO prescribed fire map. September 17 – 18, 2013.



No new data analysis occurred this year with the exception of the burn day fire effects monitoring.

With the onset of smaller travel budgets and increasing workloads the monitoring interval will be modified to every three years. This will continue to provide the necessary data to evaluate whether management goals and objectives are being met and whether undesired effects are occurring. Monitoring may occur in 2014 depending on time and budgetary constraints. Currently the only grassland plots at APCO are at Ferguson Field and there are no plans to install additional grassland plots.

Description

Most of the grassland areas in the park have been managed in one form or another for years. Currently, approximately 400 acres of grasslands are managed for cool-season grasses (primarily fescues) for hay production (~200 acres) and for pasture for cattle grazing (~ 200 acres) through the Historic Property Leasing Program. Fifty-four acres (Sweeney Prizery Field and Village Back Field) are managed as native, warm-season grasses for hay production through the same program. Forty-two acres (Ferguson Field and Upper Nash Field) are managed as a mature grassland community.

Ferguson Field is managed as a mature grassland community. The vegetation of the Ferguson Field is characterized by a mosaic of native and non-native grasses, native forbs, native woody shrubs and pioneer trees, and non-native forbs and shrubs. Vegetation cover is dominated by graminoids, including the native perennials *Andropogon virginicus*, *Tridens flavus*, *Sorghastrum nutans*, *Panicum virgatum* and *Andropogon gerardii*. Non-native perennial grasses are primarily of the genus *Festuca*. Forbs, shrubs, and trees include *Solidago* species, *Symphoricarpos orbiculatus*, *Rubus* species, *Rhus* species, and *Juniperus virginiana*. Non-native species include *Rosa multiflora* and *Centaurea maculosa*. Vegetation height varied at the time of the burn, with tall graminoids and patches of sumac reaching 2 to 2.5 meters.

Ferguson field was a pasture utilized for cattle grazing until 2001. The field was treated with a selective herbicide in 2002 to reduce non-native perennial grasses and replanted with a mixture of Native Warm Season Grasses (NWSGs) including *Sorghastrum nutans*, *Panicum virgatum* and *Andropogon gerardii*. The field was first burned in the spring of 2009. A few weeks following the initial prescribed fire, the Mid Atlantic Exotic Plant Management Team re-treated the newly re sprouting cool season meadow fescue (*Schedonorus pratensis*). This combination of burning and follow up spraying was notably successful at reducing the coverage of this non-native grass.

The Upper Nash Field is similar to Ferguson Field in that it is characterized by a diverse mosaic of grasses and forbs, but the cover of native warm season grasses is lower (this field was not seeded following herbicide application). The maximum height of vegetation in most of the field was 1.5 meters, with some patches of native grasses reaching approximately 2.5 meters. Village Field #1 and the Sweeney Prizery Field are characterized by a dense growth of planted *Andropogon gerardii* reaching 2.5 meters in height, with extensive areas superficially appearing to be monotypic. Other graminoid species, both native and non-native, make up relatively small components of the floral community. Forb and shrub cover is very low. A small number of mature trees are in the fields, with the surrounding vegetation mowed in order to protect them from fire.

The smallest unit, Village Field #2, contains a diverse assortment of grasses, forbs, shrubs, and trees, both native and exotic. This area had recently contained numerous stems of *Juniperus virginiana*, but they were mechanically thinned prior to the prescribed burn. Mature trees are scattered throughout the unit, creating a woodland environment with a grass, forb, and shrub understory not exceeding 1.5 meters in height. This unit was not burned in this operation.

Goals and Objective

Goals

The primary goal is to maintain the historic scene of **April 9, 1865** that the park commemorates, while creating a diverse grassland habitat. This is being accomplished by mechanically removing the trees, herbicide treatment of exotic vegetation, bushhogging, and through the use of prescribed fire.

Burn Objectives

- >90% consumption of fine fuels as measured immediately post burn.
- < 5% mineral soil exposure prior to green up as measured immediately post burn.

Village Field 1

Village Field 1 is an important component of the cultural landscape viewshed. A high percentage of grass must be maintained to create an appearance of active farmland. Cutting the field for hay may continue to be used in conjunction with fire as a management tool.

Objectives include:

- Decrease woody species to <5% as measured after three treatments.
- Maintain non-native grasses and forbs to <25% as measured after three treatments.
- Maintain native forbs to <15% as measured after three treatments.
- Maintain native grasses to >80% after three treatments.



Backing fire in Village Field 1 at beginning of burning operations. *Photo S. Paull*

Village Field 2

Views of the battlefield are maintained through the savanna-like field.

Objectives include:

- Decrease woody species to <25% as measured after three treatments.
- Decrease non-native grasses and forbs <25% as measured after three treatments.
- Maintain native grasses and forbs to >75% after three treatments.

Upper Nash Field

Management objectives are similar to Ferguson field.

Objectives include:

- Decrease woody species to <25% as measured after three treatments.
- Decrease non-native grasses and forbs <25% as measured after three treatments.
- Maintain native grasses and forbs to >75% after three treatments.



Firing operations in middle of Upper Nash Field, with good smoke lift typical of this burn. *Photo S. Paull*

Sweeney Prizery Field

Management objectives are similar to Village field 1.

Objectives include:

- Decrease woody species to <5% as measured after three treatments.
- Maintain non-native grasses and forbs to <25% as measured after three treatments.
- Maintain native forbs to <15% as measured after three treatments.
- Maintain native grasses to >80% after three treatments.



Head fire at Sweeney Field, south field. *Photo S. Paull*

Ferguson Field

The Ferguson field is managed to provide habitat for the field sparrow and northern bob-white as well as to maintain the cultural landscape. To provide habitat, a greater percentage of native woody species and forbs will be allowed.

Objectives include:

- Decrease woody species to <25% of total cover, as measured after three treatments.
- Decrease non-native grasses and forbs <25% as measured after three treatments.
- Maintain cover of native grasses and forbs is >75% after three treatments.



Two flaming fronts coming together in southern section of Ferguson Field. Head fire at Sweeney Field, south field. *Photo S. Paull*

Initial Qualitative Assessment of Results

(excerpt from 2013 APCO Monitoring Report 09/27/13 – Steve Paull FEMO(t))

Fire carried through a majority of the area contained within the operational units, but some moist low-lying areas did not carry fire well. Fire carried more readily and with more complete consumption through areas with higher cover of native warm season grasses. Fire severity appeared to be lower in regions that were dominated by forbs. Overall, variations in topography, vegetation type, and fire type (e.g., backing versus head) combined to create a mosaic of fire effects and severity. The impact of low intensity backing fire on small woody plants such as red cedar saplings appears to have been minimal; however, it is difficult to assess the effects on woody vegetation immediately following fire because mortality is often delayed. Future monitoring will gauge project success by evaluating whether or not project-specific objectives were achieved.



Missy Forder FIRB(t) ignites Sweeny Prizery Field September 18, 2013.
Photo S. Paull.

Richmond National Battlefield Park (RICH) 2013 Fire Effects Monitoring Annual Report

On September 18, 2013, resources were assembled to implement the first growing season prescribed fire at the Richmond National Battlefield Park Malvern Hill unit. The goal of the burn was to restore and maintain a historic view shed, as seen on July 1, 1862. Seventeen acres of grasslands were treated.

A second day of burning was scheduled on September 19th at the Cold Harbor unit with the objective of continued restoration of a heavily forested area back to a more open “park-like” landscape, as witnessed during the battle in 1862. Despite preparations, weather conditions were not suitable for adequate smoke dispersal on the second day. In efforts to still achieve the objective of an open viewshed, resource managers and fire personnel treated several acres of brush with chainsaws and brush cutters, improving the historic scene for visitors and preparing the area for future treatment with prescribed fire.

No new data analysis occurred this year with the exception of the burn day fire effects monitoring. Cold Harbor and Malvern Hill are scheduled for prescribed fire in the spring of 2014.

Future Plans

The Cold Harbor oak-pine unit will be monitored in 2014 following the spring prescribed fire. 2010 data analysis indicate the achievement of all but one objective. Recent data analysis indicates that both of these projects have moved from the restoration phase to the maintenance stage. With the onset of smaller travel budgets and increasing workloads the monitoring interval will be modified to every three to five years. This will continue to provide the necessary data to evaluate whether management goals and objectives are being met and whether undesired effects are occurring.

Park Information

Richmond National Battlefield Park is located 110 miles south of Washington, D.C., in and near the city of Richmond, Virginia. The park manages approximately 1200 acres in 13 individual units spread over a 132-square mile area. Established as part of the National Park System in 1936, the park protects Civil War battle sites where in 1862 and 1864-65 the Union Army attempted to take the city of Richmond, the capital of the Confederacy, and to destroy the Army of Northern Virginia.

Malvern Hill Unit Overview

The Malvern Hill consists of approximately 1,040 acres of agricultural crop fields, mixed oak and hardwood-conifer woodlands, hedgerows, mown grass fields, lawn, and an interpretive facility. The field burn unit is partially surrounded by blacktop road and is fuel model 1 and 3. The area consists of warm season native grasses, cool season exotic grasses, and patchy shrub species to a height of 1- 3 meters. Prescribed fire is being used to reduce brushy fuels to open up the historic scene, maintain vistas, reduce invasive non-native species and promote the growth of native warm season grasses, so that park maintenance will no longer need to use time, equipment, and fuel to maintain these open fields, so that park visitors can get a feeling for the battlefield as it was during the Civil War, and to create grassland habitats suitable for a diversity of birds, herps and small mammals.

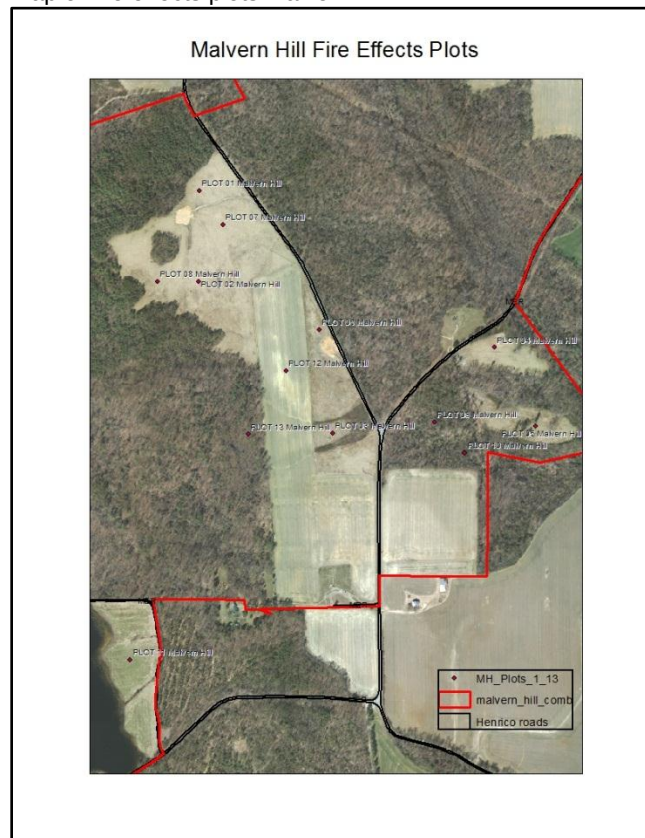
The Mid-South historically contained vast acreages of native grassland and savannas with scattered trees and shrub cover, which was maintained by fire. Through the years, these have been replaced with non-native grasses such as meadow fescue (*Schedonorus pratensis*). Agriculture, trees and suburban development have also replaced open fields with Native Warm Season Grasses (NWSGs). Native warm season grasses provide critical habitat for numerous songbirds and wildlife species. These native grasslands are the most endangered ecosystems in

the Mid-South and as a result of their loss numerous wildlife and grassland bird species have experienced steep, long term declines.

The unit contains several invasive species of concern including Johnson grass (*Sorghum halepense*), Chinese bush clover (*Lespedeza cuneata*) and Japanese Honeysuckle (*Lonicera japonica*). These exotics are actively being treated with herbicide. Dense patches of meadow fescue (*Schedonorus pratensis*), an exotic cool season grass, are also being sprayed. This grass forms a dense carpet and prevents the establishment of desired native warm season grasses. Common native grasses include Broomsedge (*Andropogon virginicus*), purpletop (*Tridens flavus*), little bluestem (*Schizachyrium scoparium*) and Indian grass (*Sorghastrum nutans*). The shrub layer is dominated by winged sumac (*Rhus copallinum*) and blackberry (*Rubus* spp.). Common native forbs include ragweed (*Ambrosia artemisiifolia*) and gypsyweed (*Veronica officinalis*).

The crew began monitoring the Malvern Hill grassland unit in 2005. Currently, there are 13 FMH brush monitoring plots located in a complex of seven fields. In 2008 it was decided to analyze the fields in two separate groups relating to their management history. The first group, referred to as the cool season grass fields were planted with meadow fescue (*Schedonorus pratensis*) prior to the establishment of the current natural resource program. An objective for these fields is to remove the carpet of fescue and allow the NWSGs to re-establish. These fields include 29 acre North, Parsonage North and South and the 12 acre South field (not planted with fescue). The warm season grass fields have been planted with NWSGs and include Parsonage West and the Crewes Channel field. The objective for this group of fields is to maintain the planted NWSGs (Figure 1). In the future the 12 acre South field will be lumped with the warm season grass fields or they may be analyzed together.

Map of fire effects plots Malvern Hill.



Goals and Objective – Malvern Hill

Goal

The primary goal is to restore and maintain the historic scene of July 1, 1862 and perpetuate native grassland species. This will be accomplished through mechanically removing trees, herbicide treatment of exotic vegetation, bushhogging, and the use of prescribed fire.

Burn Objectives

- >90% consumption of fine fuels as measured immediately post burn.
- < 5% mineral soil exposure prior to green up as measured immediately post burn.

Monitoring Objectives

- Percent cover of woody species < 25% as measured after four treatments.
- Percent cover of non-natives grasses and forbs < 25% as measured after four treatments.
 - ♦ Resource Management staff measures from NRCA:
 - proportion of plot cover in "non-natives"
 - number of species per plot of "non-natives"
 - proportion of total species "non-natives"
- Percent cover of "meadow specialists" native grasses and forbs >75% as measured after four treatments.
 - ♦ Resource Management staff measures from NRCA:
 - proportion of plot cover in "meadow specialists"
 - number of species per plot of "meadow specialists"
 - proportion of total species in "meadow specialists"



Malvern Hill summer prescribed burn September 2013.



Malvern Hill summer prescribed burn September 2013.

Cold Harbor Overview

Cold Harbor Unit is predominately composed of a Coastal Plain Oak Heath Forest, with a Coastal Plain Acidic Seepage Swamp community bisecting the unit and running along Bloody Run Creek. Historically, Bloody Run Creek looked much like it does now, with deciduous trees in the overstory and thick underbrush, spreading up the hill and eventually mixing with the pine community on the uplands. The majority of the forest is 70-80 years in age and in fair health. During the Civil War most of the ridge areas were open farmland, and the slopes and streams were covered by woods; however, many of these fields have since been allowed to become mixed hardwood and coniferous forests. The understory vegetation along the drainage is an acidic seepage swamp community characterized by an extremely dense and brushy shrub layer.

The community that runs along the creek has an overstory dominated by blackgum and American holly, with an understory of sweet pepperbush, wild azalea and blueberry. The oak heath forest community is dominated by loblolly pine and black oak, white oak, northern red oak and American holly. The understory of these communities consists of saplings of tree species that dominate the overstory, with the addition of hickory, sassafras and blueberry. The herbaceous layer is sparse and dominated by muscadine, Virginia creeper and Japanese honeysuckle (*Lonicera japonica*).

This burn unit comprises an area of approximately 30 acres, which is in the central portion of the Cold Harbor Unit and is surrounded by a blacktop road Anderson and Wright Drive. The unit was first burned in 1997 before the establishment of monitoring plots. FMH forest plots were installed in 2003, and have been treated in 2004, 2005 and 2009. Plot design is consistent with the specifications for forest plots found in the NPS Fire Monitoring Handbook. Mechanical (lopping and chain sawing) and chemical treatments have also taken place in the unit. A tropical storm impacted the area in 2005, falling numerous large trees.

Cold Harbor Fire Effects Plots



Map of Cold Harbor fire effects plots.

Goals and Objectives - Cold Harbor

Burn Objectives – as measured during and immediately postburn

- 75%-100% of overall area will be burned as measured immediately post burn.
- Limit flame height to be not more than 6 feet on average as measured during the burn.
- Scorch height to be not more than 50% – 60% of overstory tree height as measured immediately post burn.
- < 10% mineral soil exposure prior to green up as measured immediately post burn.
- Preserve an acceptable duff layer of .5 inch as measured immediately post burn.

Long Term Goals and Objectives

Goal - Maintain the historic scene much as it was July 1, 1862.

Objectives

- >50% Reduction in pole size (2.5-15cm) tree density after four burns.
- Increase native grasses by >75% after four burns.
- Maintain an open forested stand as it appeared at the time of the battle as measured within one year post burn.

Goal - Reduce the potential for a catastrophic wildfire in the wildland urban interface through fuel reduction projects adjacent to park boundaries and structures.

Objective

- Reduce 1,10 and 100 hour fuels by 50% within one year postburn.

Delaware Water Gap National Recreation Area (DEWA) 2013 Effects Monitoring Annual Report

Summary

Delaware Water Gap uses prescribed fire to aid in achieving the open space goals and objectives mandated in the park's General Management Plan and Resource Management Plan. The park conducts prescribed fire operations in consultation with resource management staff in select fields each spring. The park is currently in discussion to incorporate summer burning as a method to reduce encroaching woody species. The fire effects crew has plots located in two representative fields.

No new monitoring data was collected or data analysis occurred this year with the exception of the burn day fire effects monitoring.

Burn day fire and weather data was collected on site. Plots may be re-read in 2014 depending on fire frequency/timing and need. With the onset of smaller travel budgets and increasing workloads, the monitoring interval has been modified to every three to five years. This will continue to provide the necessary data to evaluate if management goals and objectives are being met and whether undesired effects are occurring. The plots were last treated in the spring of 2012.

Park Overview

Delaware Water Gap National Recreation Area is the largest natural area in the entire National Park System between Virginia and Maine and one of the largest protected natural areas in the metropolitan corridor extending from Washington, D.C., to Boston, Massachusetts. The recreation area encompasses 67,000 acres of mountain ridge, forest, and floodplain on both sides of the Delaware River in the states of New Jersey and Pennsylvania. Forty miles of the Middle Delaware River are within the park unit. The park is the tenth most visited area in the National Park System with almost 5 million recreational visits each year.

The mission of the park is to provide outdoor recreation opportunities while conserving the natural, cultural and scenic resources of the recreation area. The park has a significant number of threatened species including 49 plant, 9 fish, 13 mammals, 7 reptiles and 10 amphibians. Agriculture, forested areas and suburban development have replaced open fields with Native Warm Season Grasses (NWSGs). Native grasslands with scattered trees and shrub cover, maintained by fire, have also been replaced with non-native grasses such as smooth brome (*Bromus inermis*) and Kentucky bluegrass (*Poa pratensis*). Native warm season grass fields provide critical habitat for numerous songbirds and wildlife species. Resource management staff has identified the use of prescribed fire as a viable management technique to aid in achieving the open space goals and objectives listed in the park's General Management Plan and Resource Management Plan. An open space prescribed fire plan was completed in 2007 which describes many units that can be treated with prescribed fire.

Goal

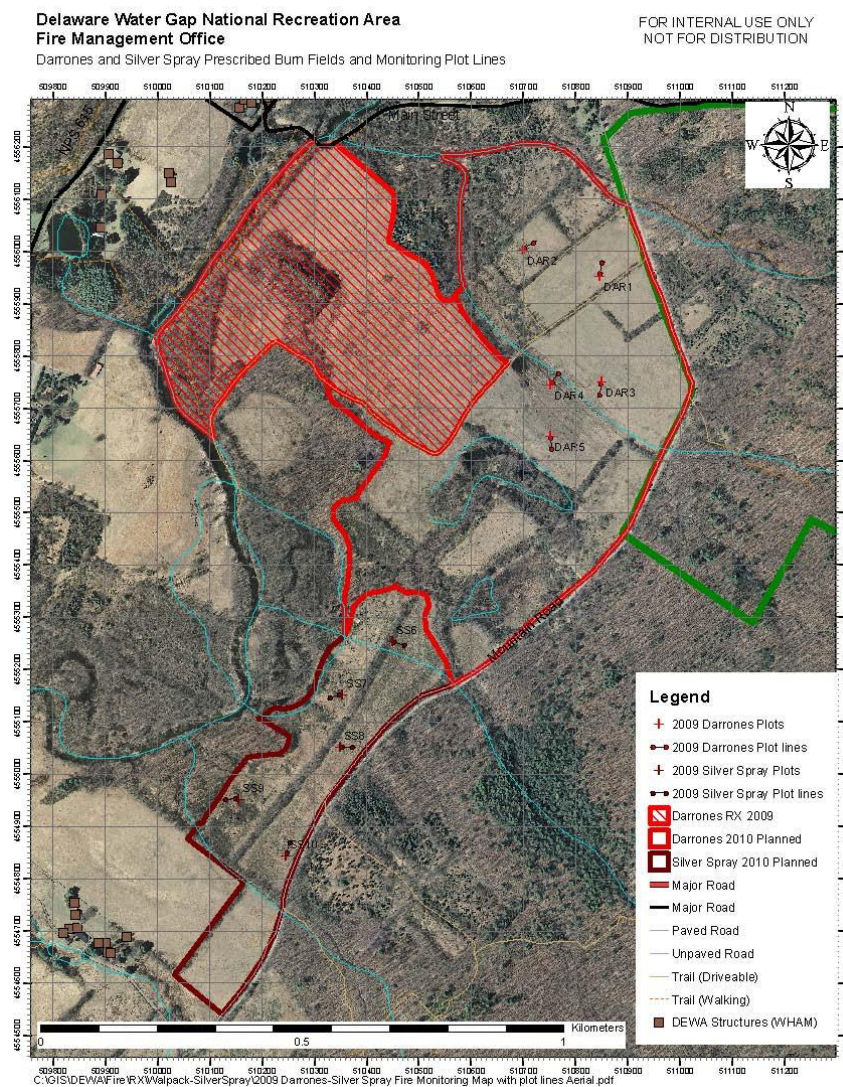
The overall objectives of these burns are to perpetuate the native species, perpetuate the open space character of the landscape, maintain wildlife habitat, control invasive exotic species, maintain fire dependent ecosystems, and reduce hazard fuel concentrations by disrupting fuel continuity.

Objectives

- Reduce 1-hour, dead and down fuels by $\geq 75\%$ as determined immediately post burn.
- Percent cover of native grasses and herbs $>75\%$ as measured after four treatments.
- Percent cover of woody species $< 25\%$ as measured after four treatments.
- Percent cover of non-natives grasses and forbs $< 25\%$ as measured after four treatments.



DEWA Open Space Grass land plots



Fredericksburg and Spotsylvania National Military Park (FRSP) 2013 Fire Effects Monitoring Annual Report

No prescribed burning took place at Fredericksburg and Spotsylvania Courthouse during 2013. Three forest FMH plots were installed during the summer of 2013 in a xeric oak monitoring type. Two forested units are slated for prescribed fire in the fall of 2014.

The grassland units have moved from the restoration phase to the maintenance stage. With the onset of smaller budgets and increasing workloads the monitoring level and interval will be modified to every *three to five* years. This will continue to provide the necessary data to evaluate whether management goals and objectives are being met and whether undesired effects are occurring.

No new monitoring data was collected or data analysis occurred this year with the exception of the burn day fire effects monitoring. This area is scheduled to have a prescribed fire in the spring of 2014.

With the onset of smaller travel budgets and increasing workloads the monitoring interval will be modified to every three years. This will continue to provide the necessary data to evaluate whether management goals and objectives are being met and whether undesired effects are occurring. Monitoring may occur in 2014 depending on time and budgetary constraints.

2008 – 2011 data analysis indicted that dormant season burning was ineffective at reducing cover of woody species. Prescribed fire timing was altered to include summer growing season burns when woody plants are actively growing and peak plant carbohydrate levels are above ground making them more susceptible to stress.

In September of 2012, Crescent, Middle, Native Grass and McCoull fields were treated with prescribed fire. These four fields have not been bush-hogged since the summer of 2010. Data collection and analysis will occur after multiple treatments.

Park Overview

Fredericksburg and Spotsylvania National Military Park is located approximately 50 miles south of Washington, D.C. The park is spread out over a 145-square mile area in the city of Fredericksburg, Virginia, at the junction of Interstate 95 and State Route 3, and in Caroline, Orange, Spotsylvania, and Stafford Counties. It is comprised of four separate Civil War battlefields: Fredericksburg, Spotsylvania Court House, Chancellorsville, and Wilderness, and four related sites: Salem Church, Chatham Manor, Jackson Shrine, and the Fredericksburg National Cemetery.

On four separate occasions, the main eastern armies of the United States and the Confederate States fought major battles in and around Fredericksburg, Virginia. The woods and fields of the battles are the primary resources of the park: federal lands encompass 1,200 ac of open fields, 6,000 ac of forest, 540 ac of wetlands, and 102 mi of boundary. In addition, the park has significant terrain features, historic roads and traces, structures, house sites, ruins, cemeteries, monuments, markers, and historic objects. A number of historic structures dating from the mid-19th century add to the park's significance, including more than 43 mi of earthworks built by the soldiers, Salem Church, the house where Stonewall Jackson died, Ellwood, Chatham Manor, and several other structures that were landmarks on the historic fields.

The Spotsy Fields Monitoring unit consists of open fields and earthworks. Open fields in Spotsylvania Court House Battlefield are considered cultural meadows. Cultural Meadow includes all mowed or maintained fields in the park, and are managed to maintain the open fields characteristic of Civil War battlefields. These meadows have a mix of native and exotic grasses and forbs with scattered shrubs. Dense stands of cool season grasses such as meadow fescue (*Schedonorus pratensis*) and orchard grass (*Dactylis glomerata*) typically occur.

Common vegetation encountered in fire monitoring plots include; native grasses and sedges such as, beaked panic grass (*Panicum anceps*), poverty oatgrass (*Danthonia spicata*), rosette grass (*Dichanthelium dichotomum*), broomsedge (*Andropogon virginicus*), little bluestem (*Schizachyrium scoparium*), Indian grass (*Sorghastrum nutans*) and sedges (*Carex spp.*). Shrubs include blackberry (*Rubus spp.*) and winged sumac (*Rhus copallinum*) and herbaceous plants include trailing bush clover (*Lespedeza procumbens*) yarrow (*Achillea millefolium*) and cinquefolia (*Potentilla spp.*) Tree seedlings include blackjack oak (*Quercus marilandica*), sweet-gum (*Liquidambar styraciflua*) and locust (*Robinia pseudoacacia*). Additionally, there are a few exotic species of concern found in the fields. Some of which include, but are not limited to, Japanese Honeysuckle (*Lonicera japonica*), colonial bent grass (*Agrostis capillaris*), sweet vernal grass (*Anthoxanthum odoratum*), cat's ear (*Hypochaeris radicata*) and red sorrel (*Rumex acetosella*).

The Northeast Region Fire Effects Monitoring Crew began monitoring fire effects at the park in 2004. Currently there are 14 FMH brush transect monitoring plots in a complex of seven fields for a total of 125 acres in size. Upton Field 11.8 ac, McCoull House Field 19.3 ac, Harrison House Field 29.7 ac, Crescent Field 5.3 ac, Native Grass Field 4.8 ac, Middle Field 7.2 ac, Landram House Field 46.4 ac.

Fredericksburg and Spotsylvania National Military Park Fire Effects Monitoring Plots 1 - 14



Goals and Objectives

Goal

Open fields would preserve the historic scene as it appeared at the time of the battle while providing critical habitat for birds and small mammals. Native warm season grasses would dominate the vegetation cover while non-native cool season grass cover would be minimal.

Burn Objectives

- Provide for personnel safety.
- 90% - 100% of overall area to be burned as measured immediately post burn
- Limit mineral soil exposure to no more than 5% until greenup as measured immediately post burn.

Monitoring Objectives

- Maintain woody species < 25% as measured after four treatments.
- Percent cover on non-native grasses and forbs <25% as measured after four treatments.
- Percent cover of native grasses <75% as measured after four treatments.

Growing season burn FRSP September, 2012.



Middle Field Flame lengths 1-3 feet. *Photo H. Dammeyer*



Middle Field Occasional torching of tall shrubs, 4-8' FL. *Photo H. Dammeyer*



East part of field McCoull House Field pre and post burn. *Photo H. Dammeyer*

Excerpt from FRSP monitoring reports – 9/11/12 and 9/14/12 H. Dammeyer (FEMO)

Burn coverage was nearly complete throughout the units (estimated >98%) due to sufficient litter accumulation and continuity of grass cover. In Crescent and Middle fields, woody vegetation had full consumption of leaves up to ~3 ft in height, leaving much of the vegetation taller than that only scorched. The higher density of grass in the native grass field lead to more uniform consumption of woody plants with nearly all leaves being consumed.

Conducting a late growing season burn, such as this one, should significantly damage or top kill woody vegetation when most of the plants carbohydrate stores are above ground. This should help to reduce the plants ability to resprout as compared to spring burning when the plants are dormant and have their reserves stored below ground. Late summer burns conducted over successive years will deplete carbohydrate reserves and eventually kill woody vegetation. Future monitoring will need to be conducted to gauge project success by evaluating whether or not project-specific objectives were achieved.

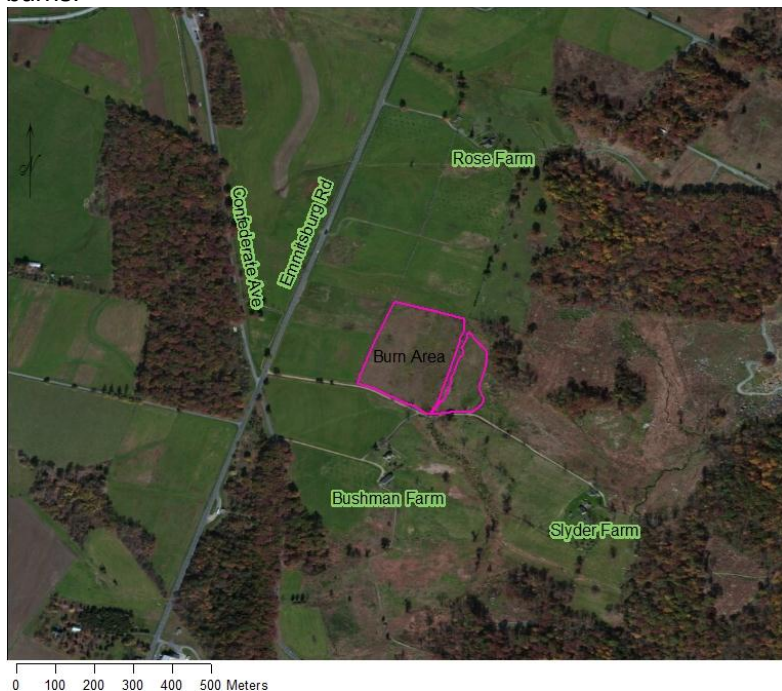
Gettysburg National Military Park 2013 Fire Effects Annual Report

Gettysburg National Military Park implemented its first ever research prescribed fire in the fall of 2014. Limited fire effects' monitoring was undertaken by the GETT Resource staff prior to the prescribed fire. Fire effects staff participated in the development of objectives and burn day monitoring. Fire ecology staff will help develop a Fire Management plan in the spring of 2014 to include the use of prescribed fire. The EA for the FMP has been developed and circulated internally but will need to go out for public comment. Fire effects staff expects to install a few newly developed rapid assessment grass plots this summer before prescribed fires planned for the fall of 2014. **Only preburn data exists, there was no data analysis completed in 2013.**

Excerpt FEMO report Arnie Peterson (FEMO-T) October 30, 2013

Gettysburg National Military Park (GETT) consists of approximately 6,000 acres in southern central Pennsylvania and partially surrounds the town of Gettysburg. The location of this prescribed burn unit is approximately 2 miles south of town, and approximately 0.1 mile east of a major through road. The burn unit is an historic agricultural field that is currently not in crops and has been managed as an open field by mowing. The park's objective for this area is to maintain the historic open field as it existed during the battle of Gettysburg 150 years ago. In the absence of treatment, woody species quickly re-establish as the field reverts to forest. The objectives of this prescribed burn are to test whether prescribed fire can be used to control woody species, and to conduct a first ever prescribed burn at GETT. This prescribed burn is a pilot study and the results of this burn will be used for a revision of the park's Fire Management Plan.

An historic stone wall bisects the treatment area into an east unit of 2.8 acres and a west unit of 9.5 acres. In order to protect the stone wall from possible detrimental effects of fire, control lines were established to either side and the two portions of the burn unit were treated as two separate, sequential burns.



Surrounding area of prescribed burn.

Previously the burn unit was a field of native grasses with woody species controlled by mowing on an approximate yearly basis. During the four years of planning for this prescribed burn mowing was discontinued and some of the woody species are now over 2 meters tall. In addition, the non-native plant honeysuckle has invaded a large portion of the unit.

Fire Behavior Observations

The general pattern of firing was to ignite along the burn area perimeter producing a backing fire that strengthened the perimeter with an area of black (all ignition was by drip torch). The main fire was ignited by drip torch strips across the prescribed burn area (approximately 20-30 feet apart). Strips were east-west across the burn unit and began along the north edge of the burn unit with each next successive strip to the south. This produced a slow backing fire to the south of each strip and a head fire from a strip towards the previous strip.

The main carrier of the fire was grass. The fire tended to go out when it hit a patch of dense honeysuckle. Drip torch lines through honeysuckle created small spots or lines that burned only until the drip torch fuel was consumed. Burning or scorching of woody species appeared to be dependent on the intensity/height of adjacent burning grass.

The fire burned quickly in the east unit (i.e. short residence time) and very shortly after the entire east unit had burned, there were no visible flames and negligible smoke. Whereas in the west unit, there were small patches of fire and smoke on the edges of honeysuckle, and possibly around patches of woody species, for about an hour after the west unit was burned.

Initial Qualitative Assessment of Results

While the fire activity was similar in the two halves of the burn area, there were some apparent differences, possibly due both to the patches of woody species and patches of honeysuckle in the west unit, as well as to slightly drier fuels later in the day when the west unit was burned. (Note that the east unit was ignited immediately after the relative humidity dropped low enough for the burn to be in prescription.)

Fire severity for the whole burn area was "light". Grass burned throughout the unit, however woody species were burned/scorched to the height of the adjacent grass fire (i.e. woody species burned in the fire, but did not carry the fire). While in the days following the burn many of the leaves of cedars turned brown and wilted, it is unknown what the final mortality will be. A final assessment of woody species mortality will not be available until monitoring next spring.

In the east unit (without patches of honeysuckle) approximately 80%-95% of the unit was burned (range in percent burned reflects the different opinions of the two FEMO's). Underlying the upper burned grass was a ground layer of unburned grass about 1 inch high or less (the shorter grass was still green which may have contributed to it's not being completely consumed). In addition, throughout the east unit many of the taller grass stems did not burn.

In the west unit, fire appeared to burn more intensely in the grass than it did in the east unit, and following the fire the amount of ground layer unburned grass under the burned grass appeared to be much less. Also, there were fewer tall unburned stems of grass. The fire carried through the grass and consumed thickets of blackberry canes and multiflora rose, but was extinguished when it reached a patch of dense honeysuckle. The map of unburned area (see figure 2) is also a map of honeysuckle. Approximately one third of the west unit appeared to be unburned. Thus fire had little to no effect on honey suckle or woody species within the honeysuckle patches.



Head fire in tall grass, east unit. Photo NPS Arnie Peterson (FEMO-T).



Post fire burned area, east unit. Note general thorough consumption of fine fuels except for scattered unburned grass stems. Photo NPS Arnie Peterson (FEMO-T).



Firing in west unit. Note shorter flame lengths on backing fire (right side of black) and longer flame lengths on head fire (left side of black). Photo NPS Arnie Peterson (FEMO-T).



Smoke rising from west unit. Photo NPS Arnie Peterson (FEMO-T).

Catoctin Mountain Park National Capitol Region 2013 Annual Report

The fire effects crew has made three trips to Catoctin Mountain Park in the last two years. The initial meeting was a presentation to park staff about fire effects monitoring and to discuss planned projects. The crew went to the park this year to install new developed “rapid assessment” grass plots. **Only preburn data exists, there was no data analysis completed in 2013.**

Grasslands

In August of 2013, the FEM crew visited CATO to do some “rapid assessment” grass plots on their Braestrup property. The property, which was purchased by the park two years ago, includes a structure (home of former resident) and ten small fields averaging one acre in size. The plant community in the fields is dominated by cool season grasses. Invasive exotics are abundant on the field edges. Some species, such as *Microstegium vimineum* and *Rosa multiflora*, also have significant cover within the fields. Native graminoids include *Schizachyrium scoparium*, *Dichanthelium* sp., and *Panicum* sp. Overall combined cover of these native species is very low (<5%). Park staff would like to decrease woody growth, decrease exotic cover, and increase native warm season grass cover.

They are planning a prescribed burn for spring 2014. The current burn plan calls for ten separate burn units, one for each field. This approach is being used because there is a concern that fire will not carry through the crude stone walls between the fields. The walls are broad, low, and covered with vegetation, primarily exotic shrubs and mature native trees. Standard FMH grassland plots were not installed due to concerns about the ability to maintain them in the future with declining budgets. The FEM crew used a new rapid assessment protocol to collect data in eight of the ten fields. The protocol takes less time to perform than a standard FMH grassland transect, and can be done easily by two people. This protocol is described in detail in a separate document (*in development 2013-2014*).

Pine-Oak Forest Plots

In September of 2012, the FEM crew visited CATO to install two FMH forest plots. There are two proposed burn units, one at Chimney Rock (3.7 acres) and one at Wolf Rock (5.2 acres). These initial burns are to serve as a “proof of concept” (i.e., to show park management that Rx is safe), hence the small size of the units. Additional burn units of larger size may be proposed in the future if all goes well with these pilot burns. It should be noted that the park’s flora has been impacted severely by an overabundance of white-tailed deer, resulting in a depauperate shrub and herb layer. Park management approved the culling of deer a few years ago; more than 600 animals have been removed over the last 3 years. The SHEN FEM crew installed a single 50m x 20m forest plot in each burn unit. Site selection was complicated by the very small burn areas, proximity of popular trails, and exposed bedrock. The rebar posts were not painted because of concerns about vandalism.

FMH Plot 1 – Chimney Rock

Oak-pine forest with canopy dominated by QUEPRI. Pine abundance relatively low, predominantly PINRIG with only a couple PINPUN stems. Very few trees in small size classes, presumably due to intense deer browsing. Shrub layer ericaceous with moderate cover. Herbs not observed at plot installation. According to the CATO veg map, this plot is a combination of two community types: Chestnut Oak / Mtn Laurel Forest (CEGL006299), Pine-Oak / Heath Woodland (CEGL004996).

FMH Plot 2 – Wolf Rock

Oak-pine forest, mostly QUEPRI, with other oak species and PINRIG as minor canopy components. The understory is open with patchy ericaceous cover. Herb cover negligible. According to the CATO veg map, this plot is a combination of two community types: Dry Chestnut Oak – Northern Red Oak / Heath Forest (CEGL008523), Pine-Oak / Heath Woodland (CEGL004996).

New River Gorge National Recreation Area 2013 Monitoring Report

Fire Ecology personnel did not make any trips to NERI in 2013. Staff took numerous trips in 2012 for meetings, reconnaissance and plot installation. The park had planned to implement two small xeric oak forest research burns in 2012; however the required consultation with the FWS regarding a federally listed bat species was not completed in time. The park plans to implement the two forest prescribed fires in addition to a few small grassland burns in the spring of 2014. Fire ecology staff provided newly developed rapid assessment grassland monitoring protocols to natural resource staff but did not participate in the installation.

Only preburn data exists, there was no data analysis completed in 2013.

Xeric Oak Communities

The Grandview site is mesic with mixed hardwoods and a few conifers (PINSTR, TSUCAN). Understory and herb layers are very sparse throughout due to intense deer browsing. The Backus site contains mesic and dry-mesic habitats. The randomly selected plot locations here are located in moderately sloped dry-mesic areas with good oak representation. Understory and herb layers are sparse-to-moderate at the plot locations. Deer browse not as conspicuous here. The dominant vegetation type at both sites is Oak-Hickory (CEGL007267). There are small areas of Oak-Ericad (CEGL006271) at both sites.

Grandview Site: Trees comprised of Carya, Magnolia (cucumber tree), Acer, Quercus, Nyssa, Oxydendrum, shrub layer very sparse, primarily VACPAL and SMIROT, herb layer very sparse.

Backus Site: Moderate slope, dry-mesic, evidence of past fire (scars on uphill side of some canopy trees). Canopy: Quercus (chestnut, black, white, scarlet), Sassafras, Carya, Oxydendrum, subcanopy: Oxydendrum, Acer, Carya, Cornus, shrubs include lots of Sassafras, ACERUB, CASDEN, Carya, deciduous rhodo (flame azalea?). Herb layer is sparse. Observed Dichanthelium, DIOSPP, and LYSQUA.

Open Fields

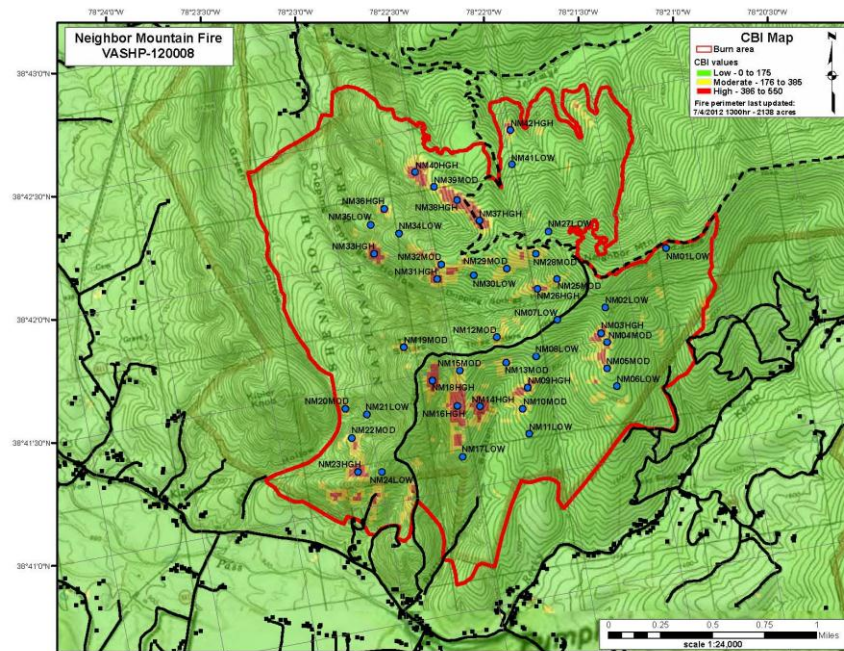
The park is considering using fire to maintain the architectural landscape. Prescribed burning is tentatively planned for the spring or summer of 2014. The rapid assessment protocol implemented at Catoctin Mountain Park in 2013 was sent to the park natural resource specialist.

Shenandoah National Park 2013 CBI Monitoring

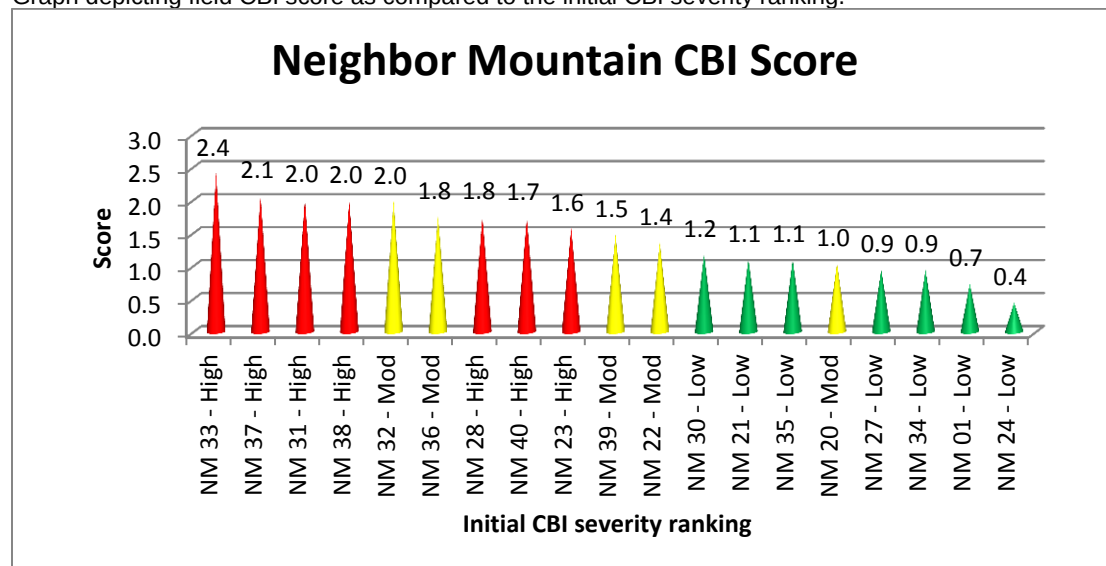
Nineteen CBI plots were read in the 2012 Neighbor Mountain fire as part of the annual collaboration with Southern Appalachian and Barrens to Bayous fire effects monitoring crews. This fire was driven by low live fuel moistures, high KBDI, high temperatures and low RH.

Initial breakpoints determined from CBI work done in the Southeast J. Picotte

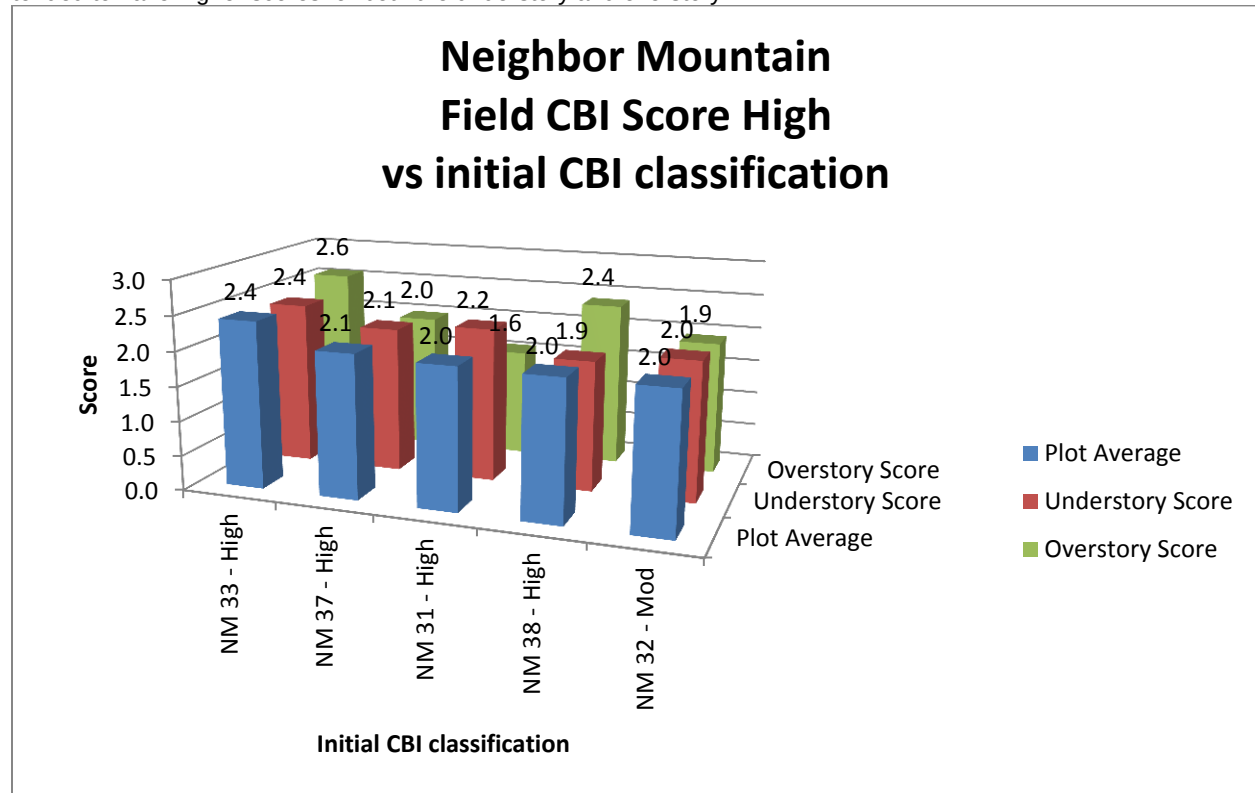
- Low: 70-130 (Average: 100)
- Medium 220-320 (Average: 270)
- High: 450-550 (Average: 500)



Graph depicting field CBI score as compared to the initial CBI severity ranking.



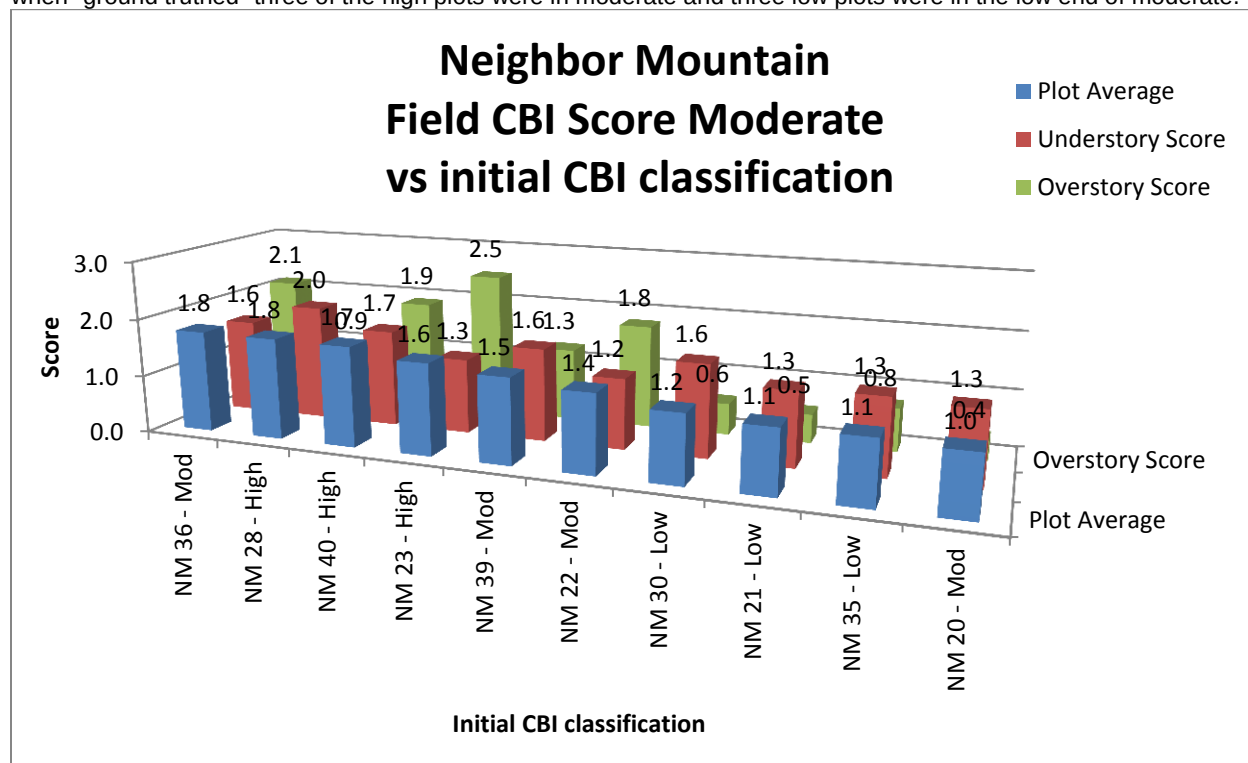
Graph depicting high plot average score, US Score, OS Score as compared with the initial classification. Plots tended to have higher scores for both the understory and overstory.



Steve Paull examines severity of NM33.



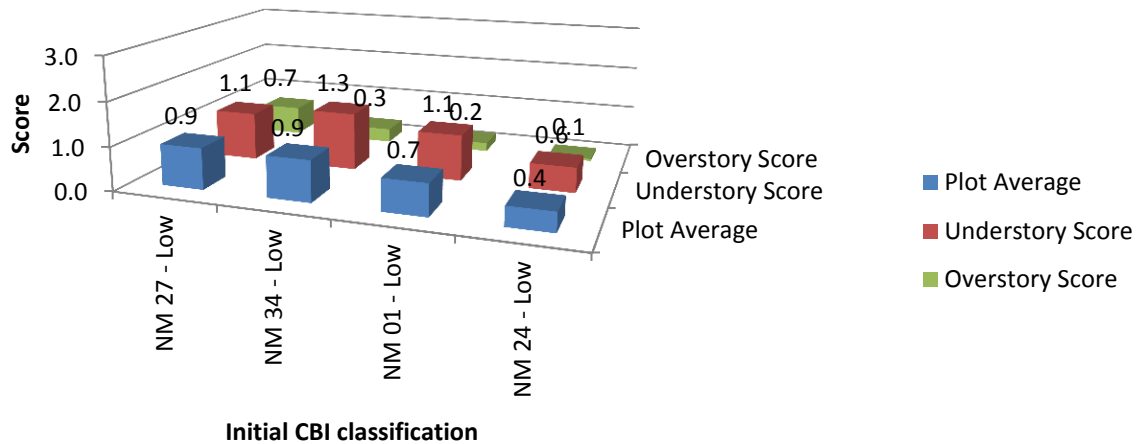
Graph depicting moderate plot average score, US score, OS score as compared to the initial classification. Note that when "ground truthed" three of the high plots were in moderate and three low plots were in the low end of moderate.



Neighbor Mountain plot 23. Note the high overstory mortality with the resprouting in the understory.



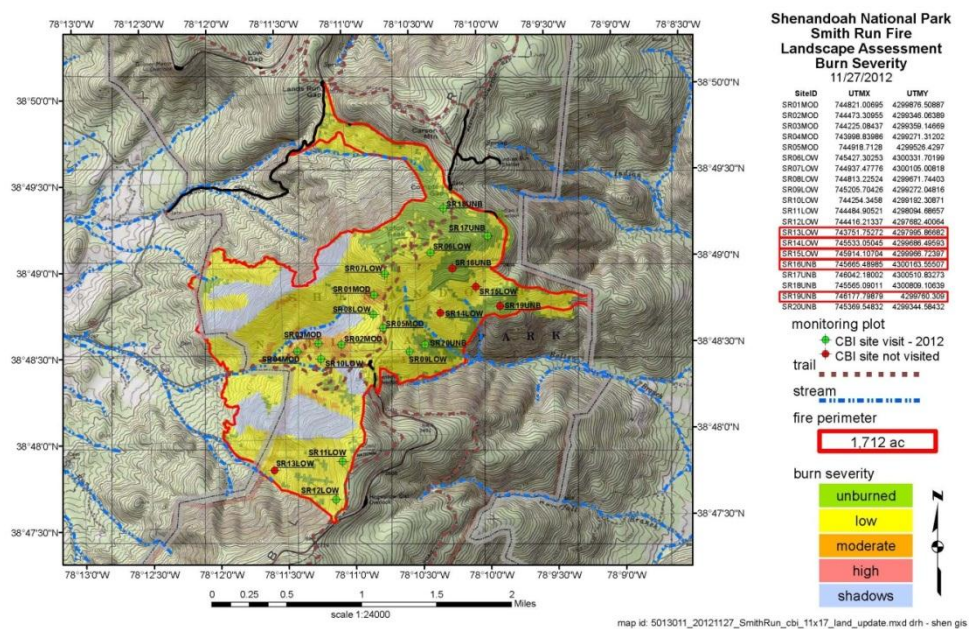
Neighbor Mountain Field CBI Score Low vs initial CBI classification



Neighbor Mountain plot 34, low severity. Note no impacts to the overstory and minimal to the understory.



Fifteen CBI plots were visited in 2012 following the February 2011 Smith Run fire. The fire was a highly wind driven event with mainly low to moderate effects. Five plots were revisited in 2013 as part of a pending lawsuit.



Smith Run Fire Plot SR2 and SR04 moderate. Note the overstory mortality and the re-sprouting understory.

