



**National Park Service
Northeast Region
Mountains-to-the-Sea
Fire Ecology Annual Report
Calendar Year 2008**

Summary

The Northeast Region Fire Effects Monitoring Crew measured 46 FMH plots with 23 new plot installs at four National Parks units. Fire Management also conducted five prescribed burns, including a 300 acre Table Mountain Pine regeneration burn. This prescribed fire was the largest in recent history and helped lay the ground work for a stronger relationship between Fire Management and Natural Resources at Shenandoah. Additionally Fire Management and Natural Resources collaboratively developed a draft Resource Advisor plan. This proved to be timely as Shenandoah has been recently selected as a test unit for the revised direction for the Interagency Strategy for the Implementation of the Federal Wildland Fire Management Policy. In early 2009, the park has begun laying the groundwork for the development of desired future conditions. We hope to see significant progress made by next calendar year.

Shenandoah underwent a Fire Management Program review in February with positive feedback for the Fire Ecology and Monitoring Program. Other major accomplishments include the Fire Ecologist, KellyAnn Gorman, teaching portions of Rx-310 and S-130/190 and leading the development of the Fire Ecology and Monitoring Scorecard. Lead Monitor, Missy Forder, taught portions of S-130/190, S-133 and completed the Fredericksburg and Spotsylvania Monitoring Plan. She also participated in a LANDFIRE fuel calibration workshop for Zone 61, a Fire Learning Network workshop and presented results to managers at the Northeast Region Fire Management meeting in Ocean City, MD.

At the end of the fiscal year Fire Ecologist, KellyAnn Gorman, moved on to an exciting new career opportunity as the Fire Management Officer for the Fish and Wildlife Service at the Blackwater Wildlife Refuge in Maryland. Her expertise and wide berth of experience will certainly be missed.

Table 1. Fire Effects Plot Workload 2008.

Park	Monitoring Unit	Type of Plot (FMH, photo point, other)	Pre-burn	Imm. Post	Post-burn	Total Plots
Acadia NP	Carriage Road Vistas	FMH Forest Plots (mod.)	0	0	0	8
Antietam NBP	Prye House Vista	non-FMH brush transect	0	0	0	1
	Snavelly Ford Woods	non-FMH forest transect	0	0	0	6
	West Woods	non-FMH forest transect	0	0	0	5
	Sherrick Farm Woods	FMH Forest plot	0	0	0	1
Appomattox Courthouse NBP	Mixed Grassland	FMH Brush plot	*8	0	0	8
Assateague Island NS	<i>Phragmites australis</i>	FMH Brush plot	0	0	0	0
Fredericksburg and Spotsylvania NMP	Mixed Grassland	FMH Brush plot	*10	0	4	14
Richmond NBP	Cold Harbor	photo points	0	0	4	4
		FMH Forest plot	0	0	0	2
	Malvern Hill	FMH Brush plots	*5	0	5	10
Saratoga NHP	Mixed Grassland	FMH Brush plots	0	0	14	21
Shenandoah NP	Big Meadows (assist)	SNP transects	0	0	0	40
	Fultz Run	CBI	-	0	0	20
	Gray Birch	FMH forest plots	0	0	0	10
	Lewis Mountain	CBI	-	0	0	16
	Rocky Top	CBI	-	0	0	19
	Sawmill	Brown's lines	0	0	0	10
	Shenandoah Complex	CBI	-	0	0	11
	Shenandoah NP	LTEM (assist -2 plots burn in Rx)	-	-	2	2
Total			*23	0	29	208

* indicates new installations

Table 2. Fire Ecology Staffing 2008.

	Starting Date	Ending Date	# of Pay Periods	Training and Development
KellyAnn Gorman	01/01/08	10/03/07	21	Fire refresher, A-110, S-110, D-110, Dispatch Recorder, S-200, B-3, UTV training, TX TNC Rx Assignment.
Missy Forder	02/03/08	01/01/08	23	FFI software training, Fire refresher, Completed Squad Boss taskbook, S-212, B-3, LANDFIRE, Fire Learning Network, UTV training, Lost Person Behavior (SAR).
Matthew Mueller	05/10/2008	09/27/2008	10	Fire Refresher, S-212, FEMO taskbook, SAR training
Sheah Mucci	05/10/2008	09/27/2008	10	Fire Refresher, S-212, FEMO taskbook, SAR training
Matthew Smith	06/08/2008	09/27/2008	8	Fire Refresher, SAR training

Table 3. Management Objectives and Monitoring Results 2008.

Results are shown using 80% Confidence Intervals of the mean. Mean are shown in the brackets. Figures and pictures can be found in Appendix 1.

Park	Monitoring Unit	Management Objective (80% C.I.)	Monitoring Results	Objectives Achieved
Richmond National Battlefield Park	Malvern Hill Mixed Grassland	20% reduction of woody cover after four burns Figure 1.	Increase Preburn - % cover 16.4 (±11.8) Year 3 - % cover 26.6 (±22.5) (n=5, 1-3 fires)	No # treatments not achieved. Added 5 more plots in 2008
		Reduce relative percent cover of non-native grasses by 30% after four burns Figure 2.	No change Preburn - % cover 73.66 (±46.7) 3 Treatments 78.66 (±29.9) (n=3, 3 fires)	No Added 5 more plots in 2008
		Increase relative percent cover of native grasses by 30% after four burns. Figure 3.	Increase Preburn- % cover 9.3 (±12) 3 Treatments 16 (±6.5) (n=3, 3 fires)	No Added 5 more plots in 2008
	Cold Harbor Hardwood/Pine Forest	Decrease pole size trees by 50% after four burns. Figure 4.	Decrease Pole size trees from 46 to 13 after two burns. (n=2, 2 fires)	YES Plan to add additional plots in 2009
		Decrease shrubs by 50% after four burns. Figure 5.	Increase Shrubs increased from 3035 to 9551 (stems/acre) (n=1, 2 fires)	No Plan to add additional plots in 2009
		Maintain an open forested stand as it appeared at the time of the battle. See Photo points (pg. 14)	Initially the vista was visually more open after the 1 st and 2 nd treatment. In the two years post fire it has re-sprouted back vigorously. In late 2008, mechanical treatments were used to cut some of the small saplings in preparation for a 2009 Spring burn.	Initially Yes see Photo points

Park	Monitoring Unit	Management Objective (80% C.I.)	Monitoring Results	Objectives Achieved
Fredericksburg and Spotsylvania National Historical Park	Spotsylvania Mixed Grassland	Decrease percent cover of woody vegetation by >20% after four burns. Figure 6.	Decrease Preburn % Cover 89.5(±60) 4 Treatments 68(±6.1). (n=2, 4 burns)	YES Added 10 more plots in 2008.
		Decrease percent cover of exotic forbs and grasses by >20% after four burns. Figure 7.	No Change After looking at only 2 plots the exotic cover is already so low, this objective may need to be changed. (n=2, 4 burns)	NO Added 10 more plots in 2008.
		Increase relative cover of native grasses by >20% after four burns. Figure 8.	No Change Preburn % relative cover 75 (±35) 4 Treatments 66(±18). (n=2, 4 burns)	NO Added 10 more plots in 2008.
		Maintain > 75% relative cover native grasses. Figure 9.	84.25(±10) (n=4, 4 burns) After increasing our sample size to n=14 our % cover = 76.21(±7)	YES
Saratoga National Historical Park	Mixed Grassland	Increase relative cover of native grasses and herbs by 20%. Figure 10.	Preburn % relative cover grasses 58.16(±15.15) and forbs 45.5(±20.6) Current 44.28 (±10.83) and forbs 53.57 (±12.9) (n=6,14, 1-3 burns)	NO
		Decrease relative cover of non-native herbs by 20%. Figure 11.	Preburn % relative cover non-native herbaceous 46.16(±14.2) Current 44.57 (±13.01)	NO
		Woody species are maintained at a density > 25,000 stems/acre. Figure 12.	Woody stems/acre average =53,973 stems/acre [-10,859% (-53,973%) - 127,071%]	NO

Park	Monitoring Unit	Management Objective (80% C.I.)	Monitoring Results	Objectives Achieved
Appomattox Court House National Historical Park	Ferguson Field Mixed Grassland	Increase relative cover of native grasses by 30%-50% within 5 years post-burn.	N/A	Pre burn data only. 8 new plots in 2008.
		Decrease relative cover of nonnative species by 25%-45% within 5 years post burn.	N/A	Pre burn data only. 8 new plots in 2008.
		Reduce relative percent cover of woody vegetation by 50%-75% within 5 years post burn.	N/A	Pre burn data only. 8 new plots in 2008.

Table 4. Fire Ecologist Accomplishments and Area of Focus. KellyAnn Gorman

Category	% Time	Accomplishments/Focus Areas
Planning	14%	EAs, FONSI's, PCFs and other NEPA, burn plans
Presentations	7%	Park staff, teach classes.
NPS meetings task groups	5%	FESC meeting and conference calls, Fire Ecology and Monitoring Program scorecard.
Interagency Work	5%	FPA, Fire Learning Network
Fire Assignments	24%	Prescribed fire - 8%; initial attack & on-park wildfire -16%.
Research	8%	General fire ecology work, such as: monitoring plans, treatment recommendations to managers
Data entry	0%	Monitors completed all data entry
Data Analysis	0%	
Supervision & Administration	20%	Hiring, supervision, travel, payroll, etc.
Training & Development	9%	Fire refresher, A-110, S-110, D110, S-200, B-3, UTV training, TNC Texas Rx assignment
Miscellaneous	8%	Includes JHA development, SAR and all-hazard assignments

Table 5. Lead Fire Monitor Accomplishments and Area of Focus. Missy Forder

Category	% Time	Notes
FMH plots	19%	Includes installs and postburn measurements
Other plot work	< 1%	2 LTEMs plot in Blackrock burn unit.
Fire Assignments	16%	FFT1, FEMO South One Fire, VA and FS - 12%; IA & on-park wildfire - 4%.
Prescribed Fire	8%	Prescribed fire, FEMO, Fire Monitoring Reports, ArcGIS Maps
Data Entry	6%	Completed entry of 100% of data collected in 2008;
Data conversion/management	5%	Clean up species lists
Data Analysis	4%	
Supervision/Admin	20%	Includes travel prep, ordering supplies, timekeeping, employee orientation, trip reports, crew leading, errands
Training & Development	13%	FFI software training, Fire refresher, S-212, B-3, LANDFIRE, Fire Learning Network, UTV training, Lost Person Behavior (SAR), PEPC.
Miscellaneous	3%	SAR's
Presentations & Reports	5%	Presentation to NER FMO's, FRSP and RICH Monitoring Plans, reports, Blackrock Rx article.

Table 6. Fire Effects Crew Accomplishments and Area of Focus.

Category	% Time	Notes
FMH plots	30%	Includes installs and postburn measurements
Other plot work	6%	LTEM plots in the Blackrock burn unit, fuel samples
Fire Assignments	23%	South One Fire, Cove Creek Fire, Peters Ridge Fire- all in VA.
Data Entry	17%	All data entered into FFI. All species lists have been cleaned up.
Administration	5%	Travel, timesheets, etc
Training	13%	Heartsaver First Aid, Search and Rescue, mandatory gov't training, plant ID, fire refresher, etc.
Miscellaneous	6%	Includes time spent assisting other park crews

Appendix 1.

Data Analysis Graphs and Discussion

Figure 1. Richmond National Battlefield Park- Malvern Hill.

Management Objective: 20% reduction of woody cover after four burns.

Current Results: Increase in percent cover of woody vegetation (shrubs/trees) after 3 burns. Preburn % cover 16.4 (± 11.8), Year 3 % cover 26.6 (± 22.5).

Discussion: Large increase in winged sumac (*Rhus copallinum*) in one plot after treatments may have led to and increase in mean percent cover. Plots may need to be analyzed separately due to different treatment years. Added 5 additional plots in 2008 to increase n=10.

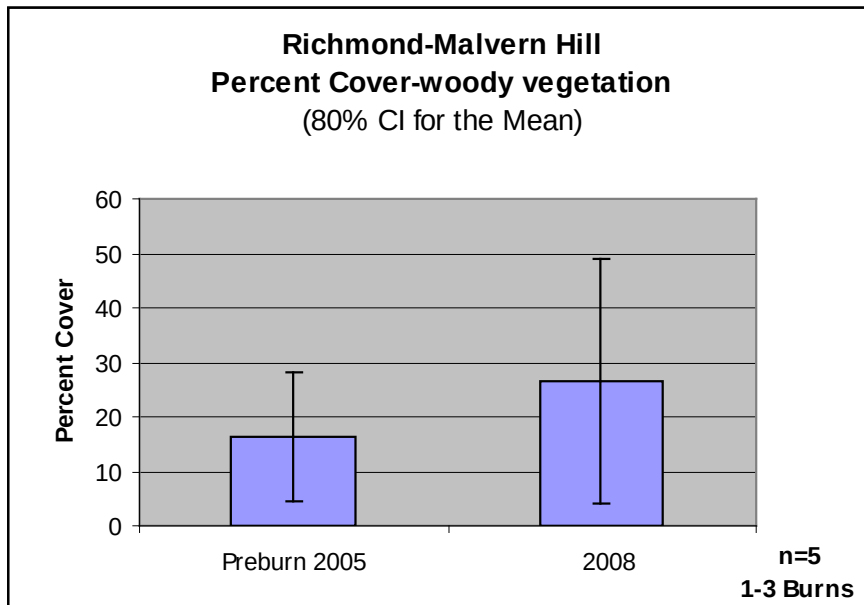


Figure 2. Richmond Malvern Hill.

Management Objective: Reduce relative percent cover of non-native grasses by 30% after four burns.

Current Results: No changes in relative percent cover of non-native vegetation.

Preburn - % cover 73.66 (± 46.7) After 3 Burns 78.66 (± 29.9)

Discussion: After 3 treatments there has been no change in the relative percent cover of non-native grasses. This field was planted in the non-native grass (*Lolium pratense*) after it was converted from livestock grazing. Drastic measures may be needed to remove this exotic grass, such as broadcast herbicide application and re-planting of native grasses (i.e. nuke and start over). Added 5 additional plots in 2008 to increase n=10.

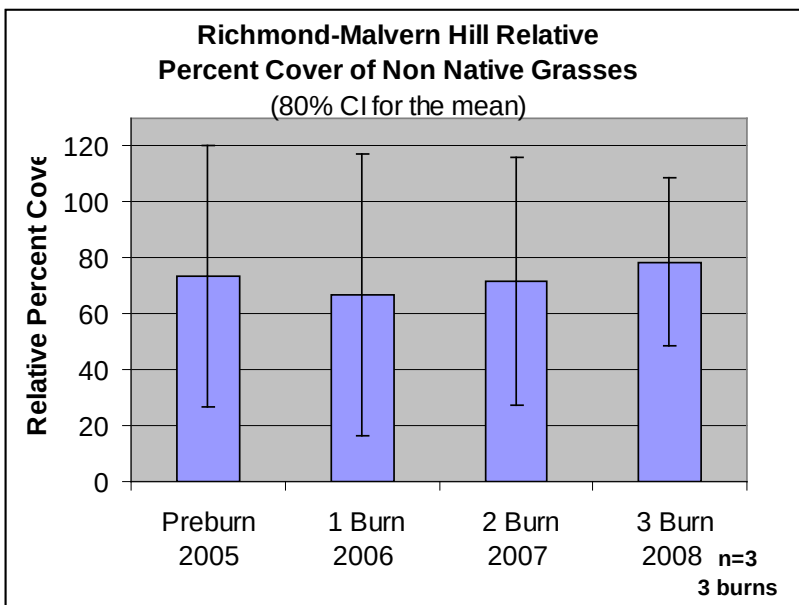


Figure 3. Richmond Malvern Hill.

Management Objective: Increase relative percent cover of native grasses by 30% after four burns.

Current Results: Slight increase in relative percent cover Preburn- % cover 9.3 (± 12), After 3 Treatments 16 (± 6.5)

Discussion: After three treatments there has been no change in relative cover of native grasses. As stated above this is likely because the field was planted in an exotic grass and there is nowhere for native grasses to establish. One strategy may be to burn later in the spring when the cool season red fescue (*Lolium pratense*) has greened up. This may result in a larger mortality for the cool season grasses and an opening for the native warm season grasses later in the summer to establish. Added 5 additional plots in 2008 to increase n=10.

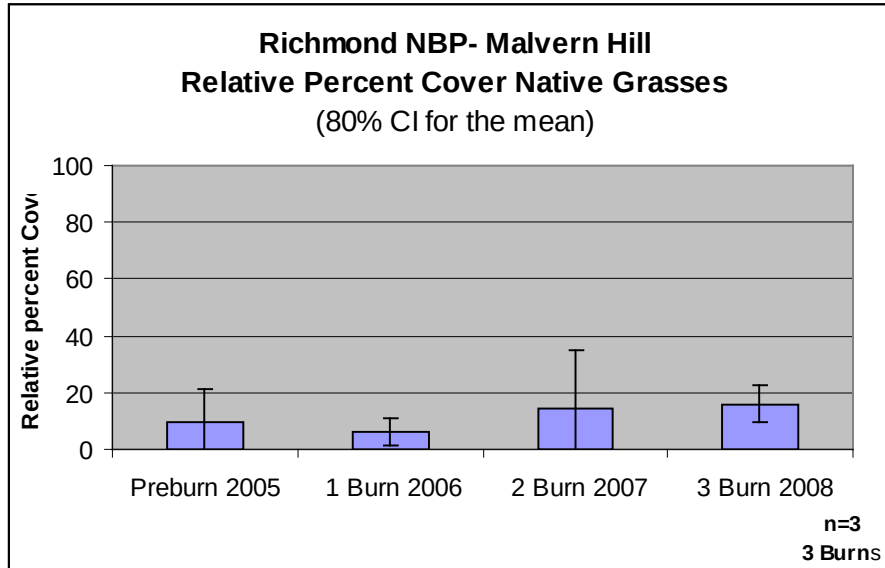


Figure 4. Richmond Cold Harbor.

Management Objective: Decrease pole size trees by 50% after four burns.

Current Results: Decrease in the number of pole size trees from 46 trees to 13 trees after two treatments.

Discussion: We did see a large decrease in pole size trees, particularly (*Pinus taeda*). However, since the last burn in 2005 they have begun to sprout back. As a result this fall, mechanical cutting was done on some of the smaller re-sprouts. The unit will be burned again this fall. This summer an additional plot or two will be installed as our current sample size is 2.

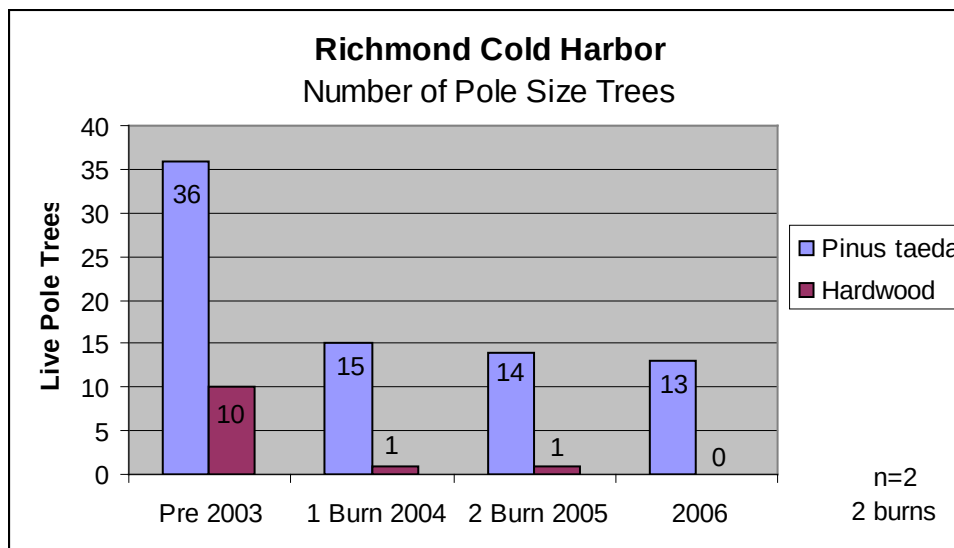


Figure 5. Richmond Cold Harbor

Management Objective: Decrease shrubs by 50% after four burns.

Current Results: Large increase in shrub density after two burns.

Discussion: The shrub layer is re-sprouting back vigorously after a decrease in the pole sized trees. The overstory trees are relatively sparse and with the reduction in the pole size trees more light is reaching the floor which may have led to an increase in the shrub layer. We will increase our sample size in 2009.

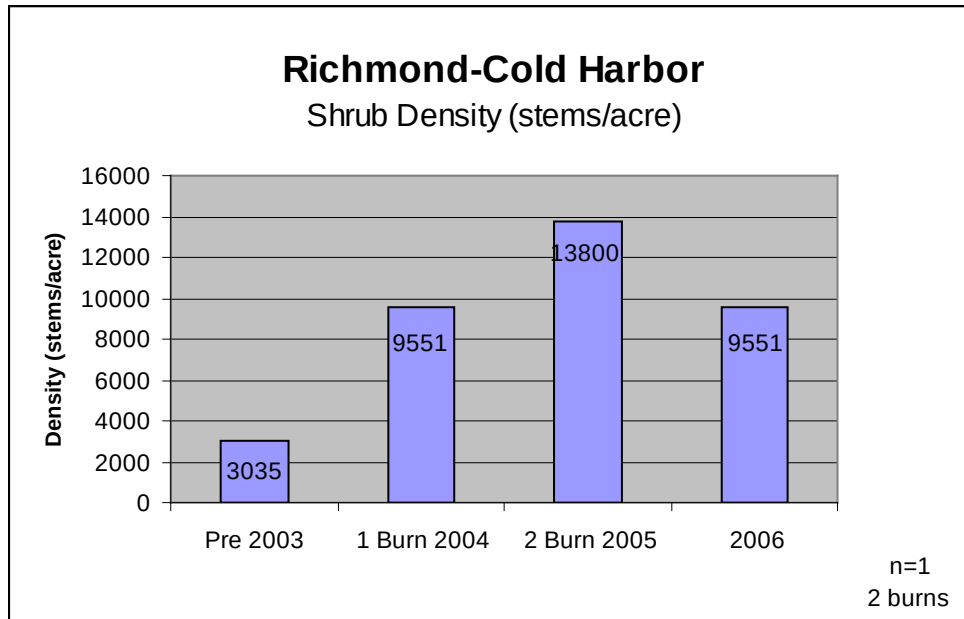


Figure 6. Fredericksburg and Spotsylvania NMP.

Management Objective: Decrease percent cover of woody vegetation by >20% after four burns.

Current Results: Preburn % Cover 89.5(±60), after 4 burns 68(±6.1).

Discussion: We were successful at reducing woody vegetation after four burns. The greatest success came after a combination summer burn and mow in 2004. Recent studies have found it effective to conduct a burn and and mow treatment during the growing season when plant carbohydrate reserves are low. We would like to try this technique on a few more transects. Woody shrub/tree removal is a often a goal for battlefield parks when managing fields.

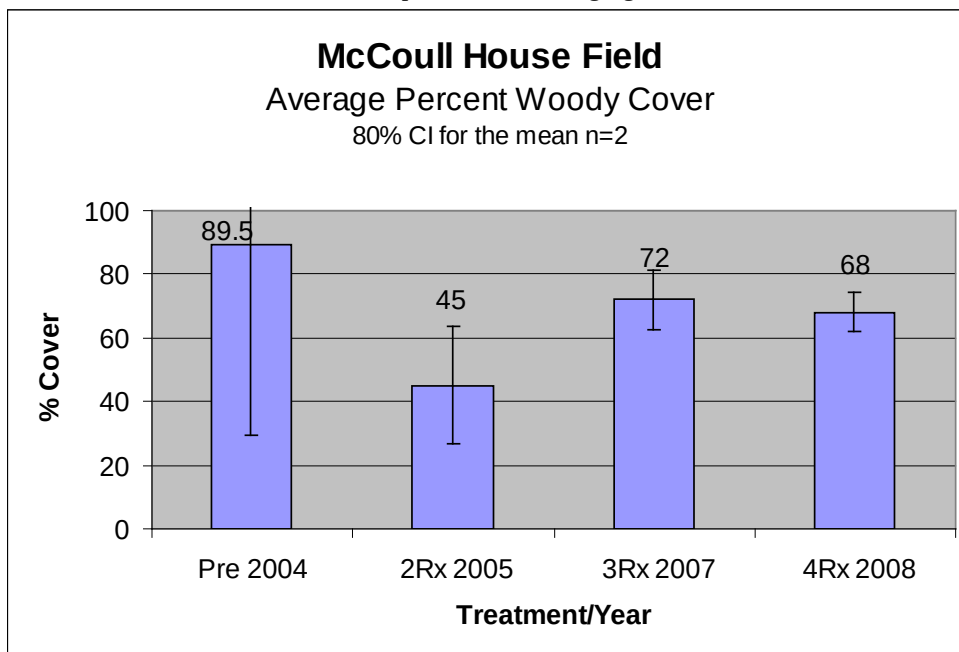


Figure 7. Fredericksburg and Spotsylvania NMP.

Management Objective: Decrease percent cover of exotic forbs and grasses by >20% after four burns.

Current Result: Exotic grass and forb cover already really low.

Discussion: We found that exotic grass and forb cover is less than 20% and will probably change this objective to maintain <20% exotic forb and grass cover. In 2008 we added 10 more plots to increase n=14.

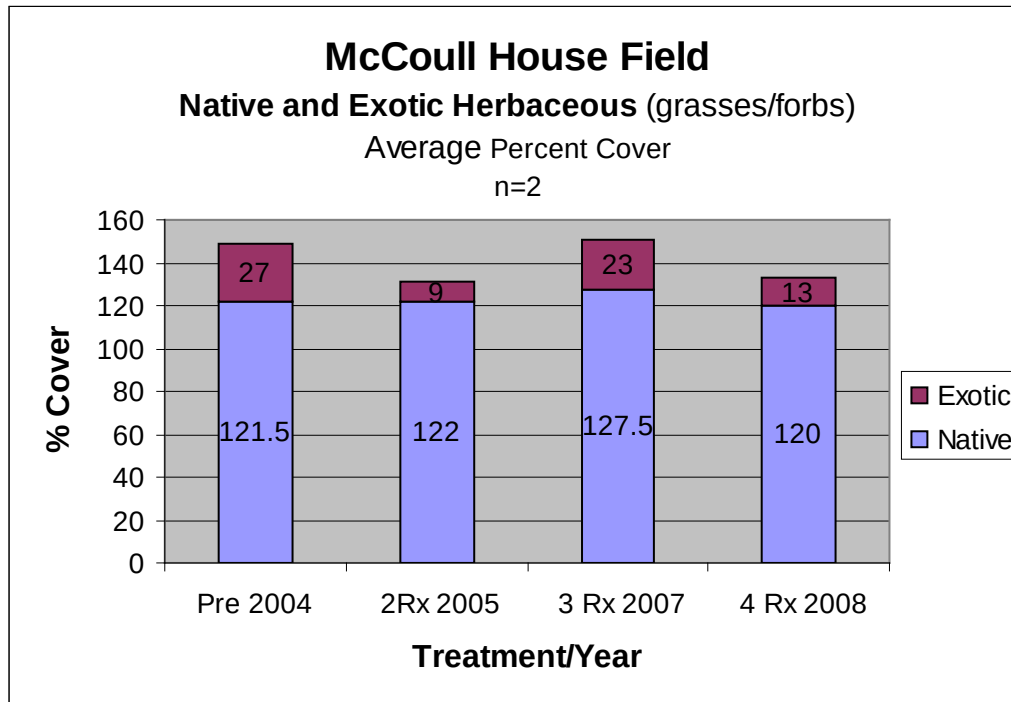


Figure 8. Fredericksburg and Spotsylvania NMP.

Management Objective: Increase relative cover of native grasses by >20% after four burns.

Current Results: Preburn % relative cover 75 (± 35) 4 Treatments 66(± 18) (n=2, 4 burns).

Discussion: We have found that the relative cover of native grasses to be high 65-85%. We will probably eliminate this objective and replace it with maintaining $\geq 75\%$ cover in native grasses (see Figure 9).

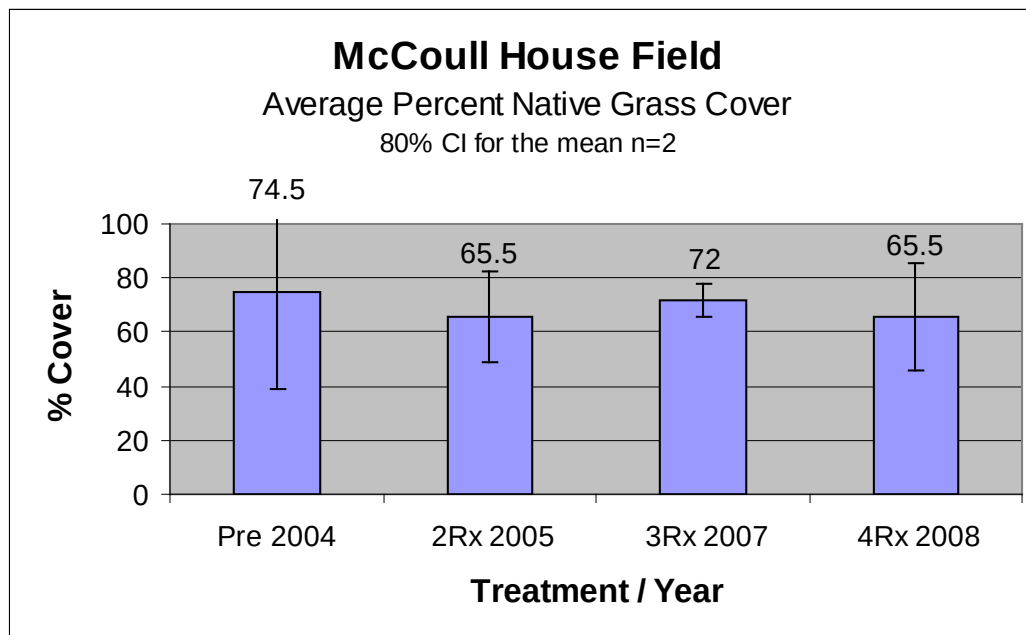


Figure 9. Fredericksburg and Spotsylvania NMP.

Management Objective: Maintain > 75% relative cover native grasses.

Current Results: Current native grass cover 84.25(±10) (n=4, 4 burns)

Discussion: After increasing our sample size to n=14 our % cover = 76.21(±7). So, you could say we have been successful, but it appears that in our pre-burn data we were already in the ballpark.

Relative percent cover of native grasses with sample size n=4 and n=14.

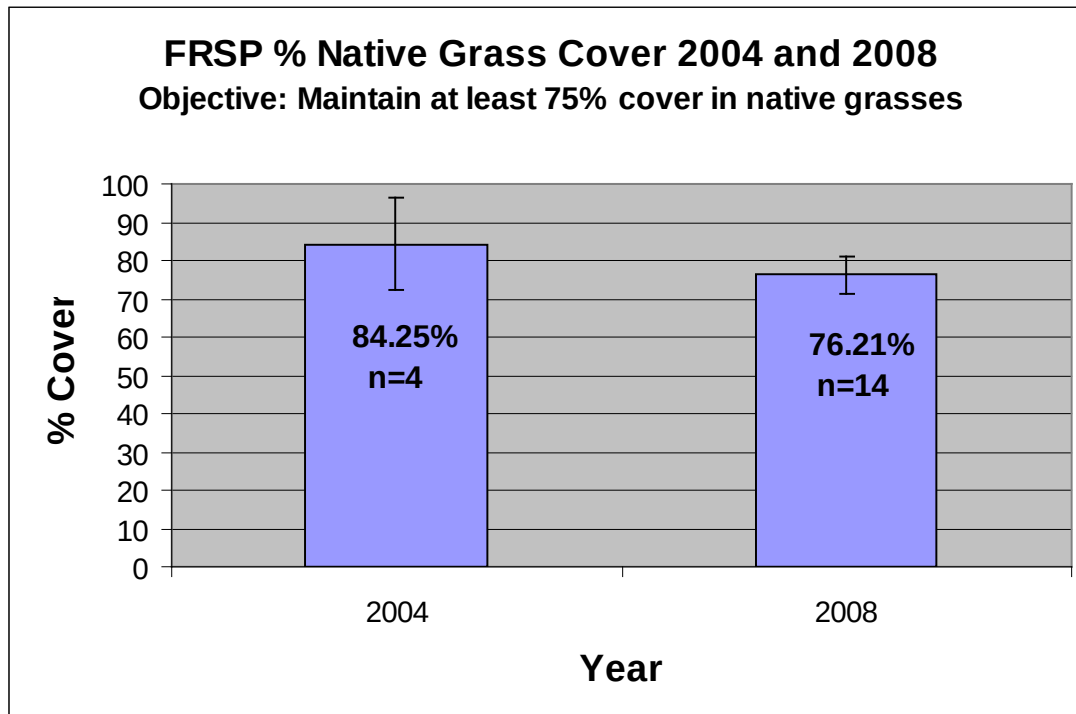


Figure 10. Saratoga National Historical Park

Management Objective: Increase relative cover of native grasses and herbs by 20%.

Current status: Preburn % relative cover grasses 58.16(±15.15) and forbs 45.5(±20.6)
Current 44.28 (±10.83) and forbs 53.57 (±12.9) (n=6,14, 1-3 burns)

Discussion: Burns are rotated through different fields each spring. More work needs to be done in deciphering treatments for each plot.

Relative percent cover of native grasses and forbs after 1-3 burns.

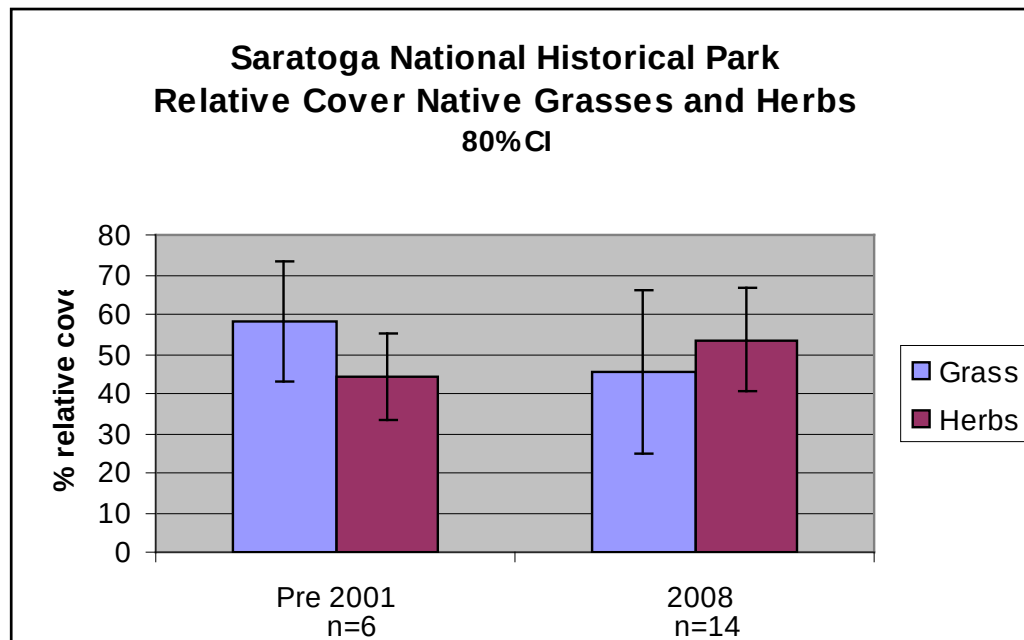


Figure 11. Saratoga National Historical Park

Management Objective: Decrease relative cover of non-native herbs by 20%.

Current results: Preburn % relative cover non-native herbaceous 46.16($\pm$ 14.2). Current 44.57 ($\pm$ 13.01).

Discussion: Relative cover of non-native herbaceous vegetation is unchanged. This objective may be changed to Specify the exotic forb knapweed (*Centaurea* spp.) which is becoming a problem in the fields. Treatment History needs to be more clearly identified to improve data analysis.

Relative percent cover of exotic herbaceous vegetation after 1-3 burns.

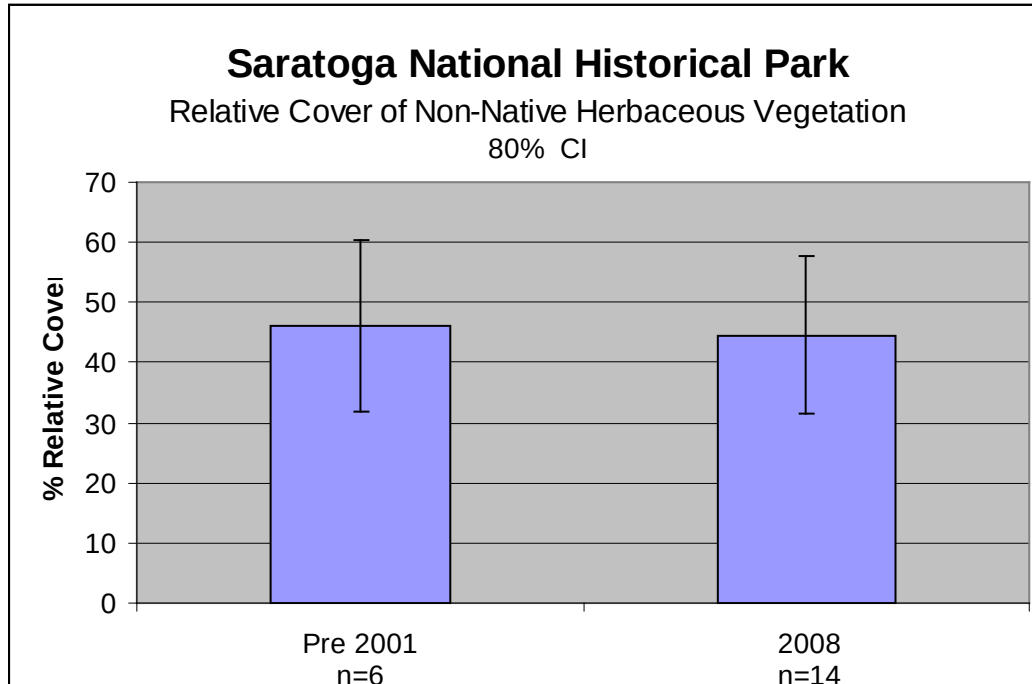
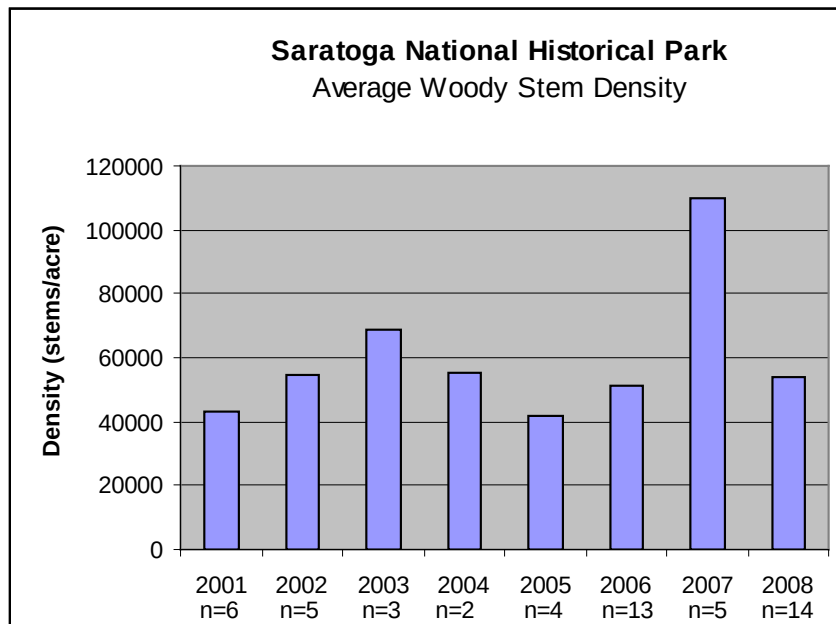


Figure 12. Saratoga National Historical Park

Management Objective: Woody species are maintained at a density > 25,000 stems/acre.

Current results: Woody stems/acre average =53,973 stems/acre [-10,859% (-53,973%) -127,071%]

Discussion: We are not having much success with woody shrub reduction. We are experimenting with cutting and then burning in the summer in two plots to compare with spring burning. Woody stem density varies greatly by fields and transects may need to be further broken down by mow frequency or slope.



Richmond-Cold Harbor Unit -Photo Points



Richmond –Cold Harbor Unit
Burned- Spring 2005
Photo- Summer 2005
1 Burn



Richmond –Cold Harbor Unit
Burned- Spring 2006
Photo- Summer 2006
2 Burns



Richmond –Cold Harbor Unit
Last Burn 2 years prior
Photo- Summer 2008
4 Year after initial burn

***Mechanical treatment** -cutting saplings and small trees occurred after photo was taken in preparation for 2009 Spring burn.

Appendix 2.

Blackrock Monitoring Report

Shenandoah National Park Monitoring Report
Blackrock Prescribed Fire Project
Wednesday, May 7, 2008

Monitoring Report Part 2
September 3-4, 2008

Introduction. The Blackrock prescribed burn project is a 282 acre unit located in the South District. The boundaries are the Appalachian Trail and old Blackrock Fire Road on the northwest and the Skyline Drive from mile 84.9 to 87.1 on the south and east. The vegetation is Montane Oak - Hickory Forest and Low-Elevation Chestnut Oak Forest with pockets of Pine - Oak / Heath Woodland. Fuels are best represented by Fuel Model 9: Timber Litter, with pockets of Fuel Model 5: Brush (Anderson 1982). Blackrock Hut, two long-term monitoring plots, and an area of cultural resource concern are found within the unit (Gorman, Blackrock 2008 Monitoring Report Part 1, May 2008).

Purpose. The purpose of the project is to see how mixed hardwood forest that has been heavily impacted by gypsy moth caterpillar defoliation reacts to prescribed fire, in the hopes of promoting germination and recruitment of oak, especially chestnut oak, and table mountain pine. In order to improve conditions for regeneration, the intent is to burn on the hot end of the prescription in order to kill, or at least top-kill, the majority of understory shrubs and pole-size trees and some overstory trees to open the canopy and increase penetration of sunlight; remove the most of the litter layer and in spots some of the duff layer, so that the tiny seeds of table mountain pine can reach mineral soil; and generate enough heat to open the closed cones of table mountain pine. Several treatments may be necessary to reach these goals (Gorman, Blackrock 2008 Monitoring Report Part 1, May 2008).

Preliminary Fire Effects Assessment - May 23, 2008. Overall the unit shows a good mosaic of burn severity. Some areas, such as the north aspects at the north end of the unit, experienced a very light burn and provide refugia for wildlife. Portions of interior mid-slopes burned very hot and even torched in a few pine stands, which is desirable for renewing table mountain pine stands. Other areas of hot fire behavior in pockets along the AT should result in overstory tree mortality and oak regeneration and recruitment (Gorman, Blackrock 2008 Monitoring Report Part 1, May 2008).

Secondary Fire Effects Assessment - September 3, 2008. A more detailed secondary assessment was conducted at the end of the first full growing season to evaluate mortality rate in the overstory and shrub layers, evaluate the fuels, and to search for new infestations of non-native species.

Post-Fire Vegetation. Fire opportunistic plants observed throughout the burn unit include fireweed (*Erechtites hieracifolia*), pokeweed (*Phytolacca americana*), black gum (*Nyssa sylvatica*) and sassafras (*Sassafras albidum*). These plants commonly establish quickly post fire. The bank along Skyline Drive was blanketed with common ragweed (*Ambrosia artemisiifolia*), a plant that thrives with disturbance.

Canopy and Shrub Mortality. The largest reduction in the canopy appears to be in the pine stands where there was an accumulation of dead and down material. These areas include the eastern lower portion of the burn unit from Skyline Drive approximately three quarters up the slope and on the western side of the burn midslope (see Figure 1, cross-hatched areas). The ridge that runs along the top of the unit to around one quarter of the way down on both sides has the least amount of overstory mortality.

The hardwoods, including red oak (*Quercus rubra*) and chestnut oak (*Quercus prinus*), are re-sprouting from the base. Shrub species including mountain laurel (*Kalmia latifolia*), blueberry (*Vaccinium palidum*), and huckleberry (*Gaylussacia brachycera*) have been top killed and are re-sprouting. Most of the larger pines,

including table mountain (*Pinus pungens*) and pitch pine (*P. rigida*), were not killed. A few pockets of pine, particularly midslope on the west side, experienced torching.

Fuels. Using visual estimations, one-hour, ten-hour and some of 100-hour fuels were consumed over most of the project area. The 1000-hour fuels were reduced approximately 20 - 30%. Nearly 100% of the litter layer was consumed and the duff was reduced by 20 - 50%.

Nonnative Survey. The main species of concern is the highly invasive mile-a-minute (*Polygonal perfoliatum*). This vine invades open disturbed areas rapidly and grows over other plants. It reduces the ability of native plants to photosynthesize and may lead to their death. It is most often spread over long distances by birds. An existing population of mile-a-minute has been identified a few miles south of the burn unit along Skyline Drive.

Two teams of two surveyors began at the south end of the burn unit, near milepost 87, closest to the existing mile-a-minute population. One team walked the Appalachian Trail / holding line to the Blackrock parking area at the north end of the unit. The other team started walking Skyline drive towards milepost 86 and then headed into the burn unit, walking the ridge to the Blackrock parking area. Both teams then walked south along Skyline Drive to milepost 87. There was no mile-a-minute found in the burn unit during the survey.

The most common exotic species seen was tree of heaven (*Ailanthus altissima*). Most of the trees were seen on the trail down to the Blackrock Hut and at the north end of the unit along Skyline Drive. One larger population was seen inside the burn unit approximately 55 meters south of LTEM 3L472 (Figure 1, waypoint AILALT).

Oriental bittersweet (*Celastrus orbiculatus*) was also seen near the Appalachian Hut. One population was noted along the trail going down to the Hut. It is approximately 10 meters radius in size and climbing 5 meters into the canopy. A second population is directly in front of the hut and 3 x 3 meters in size (Figure 1, waypoint CELORB).

Japanese stiltgrass (*Microstegium vimineum*) was seen at the north end of the unit near the Blackrock parking area. It is on both sides of the trail and approximately 1 acre in size (Figure 1, waypoint MICVIM).

Black bindweed (*Polygonum convolvulus*) was noted to be extremely prevalent in the burn unit. This annual plant reproduces by seeds which may remain dormant for several years until a disturbance. It can spread quickly and cover bare ground was observed climbing over the fireweed and poke weed (Figure 1, waypoint POLCON).

Other common nonnative species noted along Skyline Drive in the mow zone include Asiatic dayflower (*Commelina communis*), quickweed (*Galinsoga ciliata*) and lady's thumb (*Polygonum persicaria*) (Figure 1, waypoints COMCOM, GALCIL, and POLPER respectively).

LTEM site visit. On September 4, the fire effects crew accompanied the vegetation management team to read two Long Term Ecological Monitoring plots (LTEMs) located within the project area. The first site, 3L472, is located in northern most portion of the burn atop a small ridge (Figure 1). It is primarily an oak hardwood overstory with a sparse shrub layers. There was very limited mortality observed in this plot (Figure 2). The second site is located in the southwestern portion of the burn about a quarter of the way up the slope (Figure 1). The vegetation in this plot is a mix of oaks and pines. Two table mountain pines are inside the plot and several more are located in the immediate vicinity. Pitch pine is also intermixed throughout the site. The mountain laurel in this site was top killed, along with some of the smaller trees (<15 cm dbh); however, both were re-sprouting at the base (Figure 3).

Discussion. In a 2003 paper on the effects of ice storms, southern pine beetle infestation, and fire on table mountain pine forests of southwestern Virginia, the authors conclude that disturbances and the infrequent

occurrence of fire will lead to the elimination of table mountain pine stands. Without fire table mountain pine will become restricted to extremely xeric sites where hardwoods cannot compete. In the absence of natural ignitions, the existence of table mountain pine will be dependent upon the implementation of prescribed burns. Stands that have been disturbed by events such as ice storms and southern pine beetle infestations and have existing large canopy openings would particularly benefit from prescribed fire as to allow for the establishment of pine seedlings post-fire (Lafon and Kutac 2003).

The Blackrock prescribed fire has met our objective of improving the conditions for pine regeneration. The fire effects indicate a large portion of the burn was a medium intensity burn. Torching of trees and brush along with short uphill runs with observed flame lengths of 6 to 8 feet (see Part 1 of this monitoring report) resulted in small pockets of high-severity burn. In these pockets, many of the overstory trees and the majority of pole sized trees and understory shrubs were top-killed, most of the litter layer was removed, and the duff layer was reduced. All visible table mountain pine cones have opened.

The Blackrock prescribed fire appears to have met all of the visible seedling regeneration requirements. Recent studies have shown that fires of all intensities will result in table mountain pine regeneration (Waldrop et al. 2006). However, it is desirable to kill the hardwood overstory and shrub layer to allow for light penetration. Moreover, current research indicates that duff depth is not as critical of a factor as once believed (Welch and Waldrop 2001). What remains to be seen is the ability of the table mountain pine seedlings to out-compete the prolific sprouts of the hardwoods and mountain laurel. In the Blackrock burn unit, table mountain pine stands are intermixed with hardwoods. Currently, the competitive ability of table mountain pine is unknown (Welch and Waldrop 2001). Additional low- to moderate-severity disturbances, fire or mechanical, may be needed to restore table mountain pine stands (Brose et al. 2002). Further monitoring in the burn area, will be needed to assess the recruitment and establishment of table mountain pine seedlings. A monitoring protocol will be designed this winter.

Survey Team Members.

Melissa Forder, Lead Fire Effects Monitor, Shenandoah National Park
Matt Smith, Fire Effects Monitor, Shenandoah National Park.
Matt Mueller, Fire Effects Monitor, Shenandoah National Park.
Sheah Mucci, Fire Effects Monitor, Shenandoah National Park.
Wendy Hochstedler, Vegetation Management Crew, Shenandoah National Park
Steve Paul, Vegetation Management Crew, Shenandoah National Park

Preparer - Missy Forder, Lead Fire Effects Monitor, Shenandoah National Park, 9/18/08.

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Figure 1. Map of the Blackrock prescribed burn unit showing pine-dominated vegetation and locations of nonnative plant infestations. The small pine trees indicate pockets of table mountain pine and pitch pine. These areas were delineated by comparing a GPS track log generated during a ground survey with the 2005 working version of the park vegetation map.

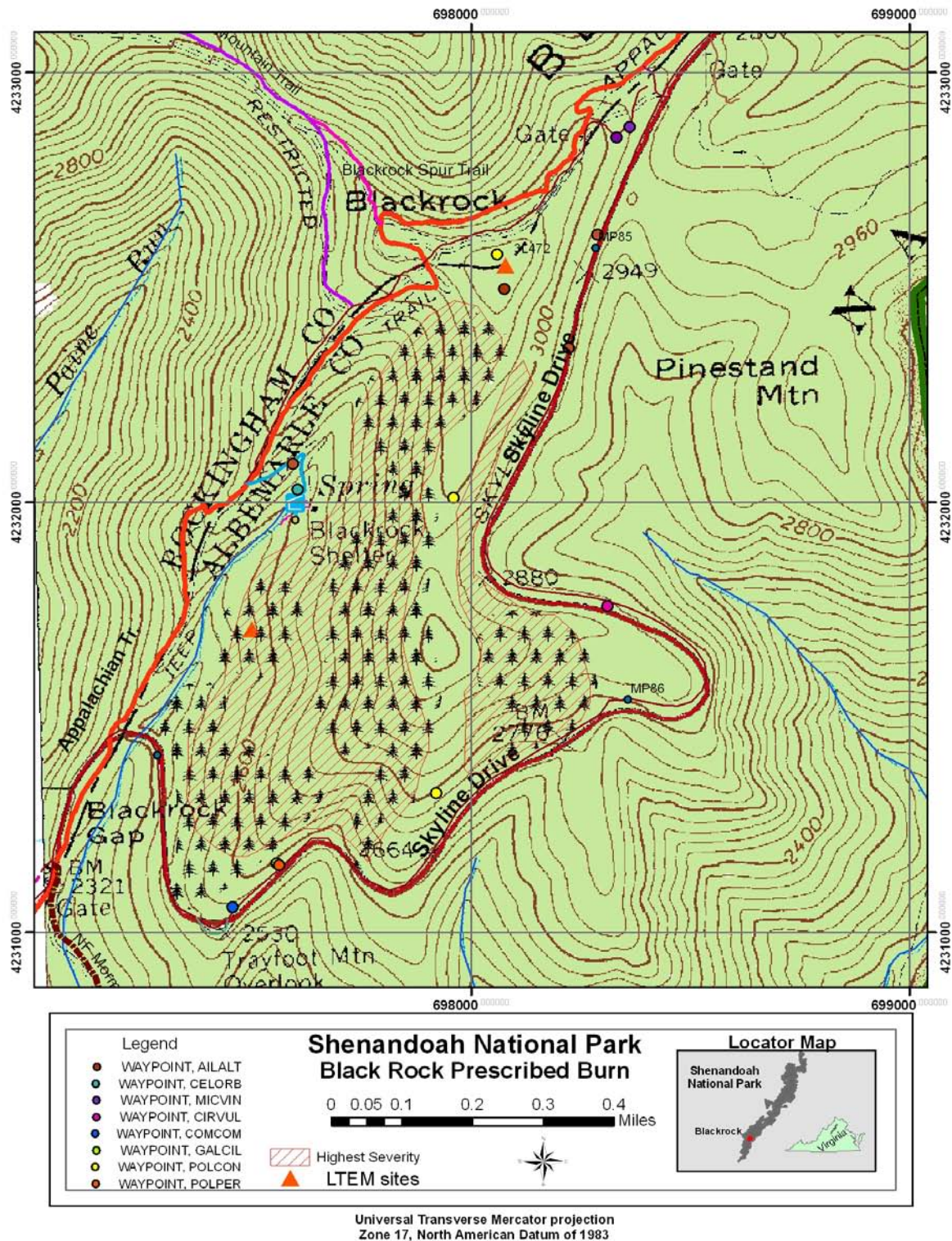


Figure 2. LTEM site 3L472 - Blackrock prescribed burn unit, September 4, 2008.



Figure 3. LTEM site 3L119 - Blackrock prescribed burn unit, September 4, 2008.





**National Park Service
Fire Ecology Annual Report
Cape Cod National Seashore
Calendar Year 2008**

Cape Cod National Seashore had four monitoring projects/efforts in 2008:

- 1) Broom Crowberry / Marconi Site wildfire urban interface fuels reduction
- 2) Broom Crowberry / Fire Cache Construction
- 3) Lombard/Paradise Hollow Research Area
- 4) Heathland Monitoring / Marconi Site Heathland restoration

Broom Crowberry / Marconi Site wildfire urban interface fuels reduction (13.0 Acres)

As a component of on-going fuels reduction projects around the CACO HQ and Maintenance areas there should be an expected increase in the population and cover of the state listed broom crowberry (*Corema conradii*). Colonization of burn pile footprints by crowberry is expected. Plots were established to quantify the timing and amount of crowberry recruitment.

Broom Crowberry / Fire Cache Construction

Cape Cod National Seashore's began construction of a new fire cache in 2008 (the cache project was approved in 1993 however not funded). Prior to construction 40 Broom Crowberry plants required transplanting and a five year monitoring effort was started to meet Massachusetts Natural Heritage and Endangered Species Program stipulations for take.

Lombard / Paradise Hollow Research Area

The Cape Cod National Seashore and the University of Massachusetts / Amherst under direction of CACO FMO David W. Crary, Jr. and Professor William A. Patterson III successfully completed the twenty-second (23rd) year of annual monitoring on research plots established in 1986 to explore the long-term effects of burning and mowing on coastal oak-pine forests.

A generalized description of the Lombard Paradise Hollow 23 year Rx burn project may be viewed at:
<http://www.umass.edu/nebarrensfuels/>

Heathland Monitoring / Marconi Site Heathland restoration (10.5 Acres)

Cape Cod National Seashore is clearing 35 acres of invasive scrub oak and pitch pine forest from previously open heathland in the former Camp Wellfleet Marconi area. Live and dead forest fuels are being cut and piled for winter pile burning. Project began in 2008 and will continue through 2011.

Table 1. Fire Effects Plot Workload Cape Cod National Seashore 2008

Park	Monitoring Unit	Type of Plot (FMH, photo point, other)	Pre-burn	Immed. Post	Postburn (1-20 yrs)	Total Plots
CACO	Marconi WUI Broom Crowberry monitoring	Photo, distance to nearest <i>Corema</i> plant	NO	Yes	Yes	40
CACO	Fire Cache <i>Corema</i> transplanting	Photo, cover, vegetation health	Yes	N/A	Annually for five years	40
CACO	Lombard Paradise Hollow (Truro, MA)	Forest mow/burn research 0.1 acre plots	Yes	Yes	Yes (1 – 20 year)	54
CACO	Marconi Heathland Monitoring	Photo, <i>releve'</i> , point intercept	Yes	No	Yes	22

Table 2. Fire Ecology Staffing Cape Cod National Seashore 2008

Monitor	Starting Date	Ending Date	# of Pay Periods	Training and Development
SHEN Monitor Kadrin Getman	April 08	May 08	2.0	SHEN monitor
Fire Techs	2008	August 08	3.5	280 hours by fire techs assisting with sampling, plot corridor maintenance and plot burning/mowing.
UMass staff	2008	August 08	1.0 pp	80 hours of UMass support sampling
CACO Engine Supervisor	2008	n/a	0.5 pp	Supervision
CACO FMO	2008	n/a	1.0 pp	RXB2, project oversight

Table 3. Management Objectives and Monitoring Results 2008

Monitoring Unit	Management Objective	Monitoring Results	Objective Achieved?
Marconi WUI Broom Crowberry monitoring	Determine extent and time for colonization of burn pile footprints by <i>Corema</i>	Distance and direction to nearest <i>Corema</i> population, burn pile footprint area, and burn pile center data was recorded.	Yes
Fire Cache <i>Corema</i> transplanting	Measure long term cover and health of 40 <i>Corema</i> plants prior to transplanting	Area (size) and relative health (poor, fair, good) were recorded	Yes

Monitoring Unit	Management Objective	Monitoring Results	Objective Achieved?
Lombard Paradise Hollow	Research, vegetation	Collected data included: live and dead pre- and post-treatment fuel loading by size class and % cover and height class estimations of under- and over- story vegetation.	YES
	Research, burning	Day of burn information collected: RH, foliar moisture content, 1- 100 hr downed woody fuel moisture, wind speed and direction (each minute) and fire ROS	YES
Heathland Monitoring / Marconi Site Heathland restoration	Establish pre-treatment baseline data for 35 area heathland restoration in the Marconi area	Photo points, point intercept and <i>releve'</i> data were recorded	Yes





Sampling and fire behavior
Monitoring at Lombard /
Paradise Hollow burn plots
July 2008



Fire cache broom crowberry
transplanting August 2008



Heathland photo point March 2008



Marconi Burn Pile
Monitoring 2008



**National Park Service
Delaware Water Gap National Recreation Area
Mid-Atlantic Fire Management Area
Fire Ecology Annual Report
Calendar Year 2008**

Summary

The Delaware Water Gap NRA planned to conduct two prescribed burns this year. The Snyder (53 acres) and Loch Lomond (38 acres) prescribed burns were conducted successfully on April 18 and April 23, 2008 respectively. The 91 acres burned represent a 52% increase over planned prescribed burn acres. Along with employees from DEWA, personnel from INDE, UPDE, STEA, STLI, the US Fish and Wildlife Service and The Nature Conservancy assisted. Both burns were conducted to maintain the native warm season grasses, perpetuate the scenic vistas, and disrupt fuel continuity. The burns also helped the park meet its open space management objectives as directed by the park's General Management Plan. DEWA continued with its hazardous fuel reduction projects thinning 43 acres along the park boundary, maintaining 34 miles of fire roads (equivalent to 54 acres – a 93% increase above planned fire road acres), and reducing hazardous fuel around park structures for 5 acres.

Gateway National Recreation Area cleared 11 miles of fire roads, equivalent to 16 acres, using GATE maintenance staff only.

None of the other parks within the Mid-Atlantic Fire Management Area planned to conduct any prescribed burns, monitoring, or fuels treatment.

Fire Ecology Staffing 2008

The park has no fire ecology staff

Fire Ecologist Accomplishments/Focus Area

As the park has no fire ecologist, all accomplishments were completed by the FMO and the Fire Operations/Prescribed Fire and Fuels Technician. The percent time is a percent of time associated with prescribed fire and fuels treatment projects and not of time associated with total workload. Prescribed fire and fuels treatment projects account for 50% of the total workload.

Table 1. Management Objectives and Monitoring Results 2008

Monitoring Unit	Management Objective (Restoration)	Monitoring Results	Objective Achieved?
Loch Lomond 2008	Reduce 1-hr fuels $\geq 75\%$ Reduce 10-hr fuels $\geq 75\%$ if present Maintain native grass cover (1-year post burn) Maintain native herbaceous cover (1-year post burn) Reduce shrub and brush cover $\geq 10\%$ (1-year post burn) Overstory mortality $> 10\%$ (all species, 1-year post burn) Overstory mortality $> 10\%$ (pine/cedar species, 1-year post burn)	100% $\geq 75\%$ TBD TBD TBD TBD TBD	YES YES
Loch Lomond 2007 RX	Maintain native grass cover (1-year post burn) Maintain native herbaceous cover (1-year post burn) $> 10\%$ overstory mortality for all fuels > 1 -hour (1-year post burn)	Maintained Maintained $> 10\%$	YES YES YES
Snyder 2008	Reduce 1-hr fuels $\geq 75\%$ Reduce 10-hr fuels $\geq 75\%$ if present Maintain native grass cover (1-year post burn) Maintain native herbaceous cover (1-year post burn) Reduce shrub and brush cover $\geq 10\%$ (1-year post burn) Overstory mortality $> 10\%$ (all species, 1-year post burn) Overstory mortality $> 10\%$ (pine/cedar species, 1-year post burn)	100% None present TBD TBD TBD TBD TBD	YES
Snyder 2007	Maintain native grass cover (1-year post burn) Maintain native herbaceous cover (1-year post burn) $> 10\%$ overstory mortality for all fuels > 1 -hour (1-year post burn) if present	Maintained Maintained $> 10\%$	YES YES YES

Table 2. Fire Ecologist Accomplishments/Focus Areas

Category	Percent Time	Accomplishments/Focus Areas
General Planning	84%	Planning 2009 RX fires Open Space Prescribed Fire Plan Completed RX Post Burn Reports for Snyder and Loch Lomond RX fires
Monitoring Plans	0%	
Presentations	1%	Contacting park neighbors regarding Dingmans Boundary Hazard Fuel Reduction Project Media interviews
NPS Meetings/ Task Groups	1%	FMO attended three PA RX Fire Council Meetings
Interagency Work	0%	
Fire Assignments and Fuels Projects	12%	COTR for Dingmans Boundary Hazard Fuel Reduction Project Snyder RX Loch Lomond RX Fire road and structure clearing
Research	0%	
Monitoring Field Work	1%	Qualitative monitoring of 2007 and 2008 RX burn sites Qualitative monitoring of boundary work completed in previous years
Data Entry	1%	Entering information into NFPORS
Data Management and Conversion	0%	
Data Analysis	0%	
Supervision/Admin	0%	
Training & Professional Development	0%	
Miscellaneous		

Fire Effect Crew Accomplishments

DEWA had two seasonal employees in 2008 – one paid out of suppression funding and the other from hazard fuel reduction funding. The seasonal employees spent about 75% of their working on hazard fuel reduction projects involving preparing the Loch Lomond and Snyder RX burn sites, flagging park boundary for contractors for the Dingmans Boundary Hazard Fuel Reduction Project clearing defensible space around park structures and clearing fire roads. Throughout the spring and summer, the Fire Management Office had additional support with hazard fuel projects from park volunteers and other park personnel whose primary duties were other than fire management activities.



**National Park Service
New River Gorge National River
Allegheny Fire Management Area
Fire Ecology Annual Report
Calendar Year 2008**

Summary

In the spring of 2008 the New River Gorge National River conducted a prescribed fire over most of the designated grassland area located at the Sandstone Visitor Center. The prognosis of the burn seems to be positive in the suppression of undesirable species and favoring of native grasses and forbs. The data suggests that a program of prescribed fire will be beneficial as an annual or biannual treatment of this site. The landscape as a whole (after four years of maintenance and prescribed fire) looks better and is healthier than ever before.