Resource Advisor Report &

Burned Area Emergency Response (BAER) Plan

Rocky Mtn Fire 2016

UNIT: National Park Service, Shenandoah National Park, VA
DATE: April 16, 2016 INCIDENT NUMBER: VA-SHP-160006



Submitted by:

5/6/16
Date

Superintendent, Shenandoah National Park

Approved by:

5/11/16
Date

Regional Director, Northeast Region

BURNED AREA EMERGENCY RESPONSE PLAN REVIEW AND APPROVAL

Project Leader approval that the Burned Area Emergency Response Plan meets approved land management plan management objectives.

	5/6/16

Jim Schaberl — Chief, Natural and Cultural Resources Division, Shenandoah National Park — Date

Regional Fire Management Officer concurrence that the plan fits the technical definition for use of Emergency Stabilization (ES) and Burned Area Rehabilitation (BAR) funding.

	5/10/16

Mark Musitano — Fire Management Officer, Northeast Region, National Park Service — Date

Park Superintendent concurrence on the submission to the Northeast Regional Office.

(Acting)	5/9/16

for Jim Northup — Park Superintendent, Shenandoah National Park — Date

Emergency Stabilization (ES) and Burned Area Rehabilitation (BAR) Funding Approval (check one box below)

☑ Approved

☐ Disapproved

	5/11/16

FS: Michael Caldwell — Regional Director, Northeast Region, National Park Service — Date

TABLE OF CONTENTS

- BURNED AREA EMERGENCY RESPONSE PLAN REVIEW AND APPROVAL
- SHENANDOAH NATIONAL PARK MANAGEMENT
- FIRE OVERVIEW
- SUPPRESSION PHASE REHABILITATION ACTIONS
- SUMMARY OF RESOURCE ADVISOR (READ) ACTIVITIES
- RESOURCE IMPACTS AND PLANNED ACTIONS
- PROPOSED WILDFIRE REHABILITATION TREATMENTS
- ROCKY MTN FIRE 2016 – BAER – TREATMENT SPECIFICATIONS
  - REPAIR FIRE DAMAGE TO TRAILS
  - REPAIR BOUNDARY MARKING
  - TREATMENT OF EASTERN HEMLOCK
  - CONTROL OF NON-NATIVE SPECIES
  - BAER PLANNING/OVERHEAD
- RESOURCE ADVISORS AND PLAN CONTRIBUTORS
- APPENDIX A-1. FIRE PROGRESSION MAP
- APPENDIX A-2. PREPARED FIRELINES (OWNERSHIP)
- APPENDIX A-3. PREPARED FIRELINES (BURNED & UNBURNED)
- APPENDIX A-4. VEGETATION MAP
- APPENDIX A-5. VEGETATION FIRE TOLERANCE MAP
- APPENDIX A-6. RELATIVE PROBABILITY OF ESTABLISHMENT OF NEW INVASIVES
- APPENDIX A-7. RELATIVE PROBABILITY OF INVASIVE PLANT PRESENCE
- APPENDIX A-8. PRELIMINARY BURN SEVERITY MAP
- APPENDIX B. READ REPAIR & REHABILITATION PUNCH LIST
- APPENDIX C. PRELIMINARY REHABILITATION GUIDELINES FOR WILDERNESS TRAILS
- APPENDIX D. READ LESSONS LEARNED
- APPENDIX E. READ ICS-214s
- APPENDIX F. SIGNED DELEGATION OF AUTHORITY
- APPENDIX G. READ PHOTOS
  - FIRE BEHAVIOR
  - SUPPRESSION IMPACTS
  - REPAIR / REHABILITATION
  - READs IN ACTION
  - TRAILS
  - BOUNDARY
  - CULTURAL RESOURCES
  - FLORA
  - MISCELLANEOUS

SHENANDOAH NATIONAL PARK MANAGEMENT

In May, 1926 an act (44 Stat.616) was passed providing for the establishment of Shenandoah National Park (SHEN). On July 3, 1936, President Franklin D. Roosevelt dedicated Shenandoah National Park "to the present and future generations of America for the recreation and re-creation which we shall find here." On October 2, 1968, Congress designated The Appalachian Trail, which runs the entire length of the park, as a National Scenic Trail. On October 20, 1976, an act was passed designating the Shenandoah Wilderness. Through these Acts and others, Shenandoah National Park has developed its goals to:

- Protect, maintain, and restore as appropriate the ecological integrity of this portion of the Blue Ridge/Central Appalachian biome.
- Protect, restore as appropriate, maintain in good condition, and manage in their cultural context, the significant cultural resources and associated values.
- Preserve in partnership with surrounding communities the scenic and rural character of the Shenandoah Valley and the Piedmont.

Park resource management issues are many and varied but one of the largest and widespread threats to park ecological integrity is invasive non-native plants. More than 360 species of non-native plants have been identified and some species are especially aggressive and harm native plant communities. Little invasive plant inventory or management has taken place in the fire area, but a few established populations within/near the fire boundaries were noted during suppression activities.

FIRE OVERVIEW

The Rocky Mtn Fire 2016 was first reported on 4/16/2016 at 1315 hours in designated Wilderness along the Rocky Mount Trail several miles from the nearest trailhead. When firefighters first arrived on scene, the fire was approximately 70 acres in size, growing quickly, and burning too intensely for direct attack. Firefighters instead focused on evacuating hikers and backpackers, and ordered additional firefighters and equipment to the scene. The Park Superintendent authorized the use of chainsaws, leaf blowers, and helicopters on a limited basis in the designated Wilderness to aid in suppression.

The fire quickly exceeded Park fire and cooperating resource capabilities. In addition, the neighboring George Washington Jefferson National Forest discovered two fires which further depleted resources. Additional resources were not readily available because of coincidental fires in the state and throughout the region. On 4/17/2016, following the initial engagement, Park management decided to manage the fire for multiple objectives including safety, cost, and natural resource benefit as supported by the Park's Fire Management Plan. The fire was managed as a Type 3 organization and fire managers ordered a Type 2 Incident Management Team (IMT) on 4/17/2016. On 4/18/2016, managers again evaluated relative risk with changing fire behavior and weather, concerns from the Virginia Department of Forestry and neighboring counties regarding impacts to private lands, messaging to the public, and smoke concerns. The need for a Type 1 IMT was evident given the rapidly developing and expanding incident with concerns about the fire escaping the park on to private lands. The Southern Area Red Type 1 IMT arrived on 4/18/2016. Unified command was established between Shenandoah National Park and the Virginia Department of Forestry. Command transitioned to the Type 1 IMT on 4/20/2016.

The fire burned in a vegetation type dominated by oak and pine, with heath species such as mountain laurel, blueberry, and huckleberry occupying the understory. For a majority (63%) of the burned area, there are no records of prior fire in the Park's recorded fire history, which extends back to the 1920s. Previous fires that burned the remaining 37% occurred between 1934 and 2003. Steep terrain, historically low fuel moisture levels, and extreme fire behavior necessitated defining a Maximum Management Area (MMA) for the fire. The MMA included keeping the fire west of Skyline Drive, east of the Park's western boundary, south of Beldor Hollow/Gap Run, and north of Madison Run (see Figure 1 below). The course of action to keep the fire within the MMA and the boundary of the Park reflects the direction and guidance of the Park General Management Plan, Fire Management Plan, and the Backcountry and Wilderness Management Plan.

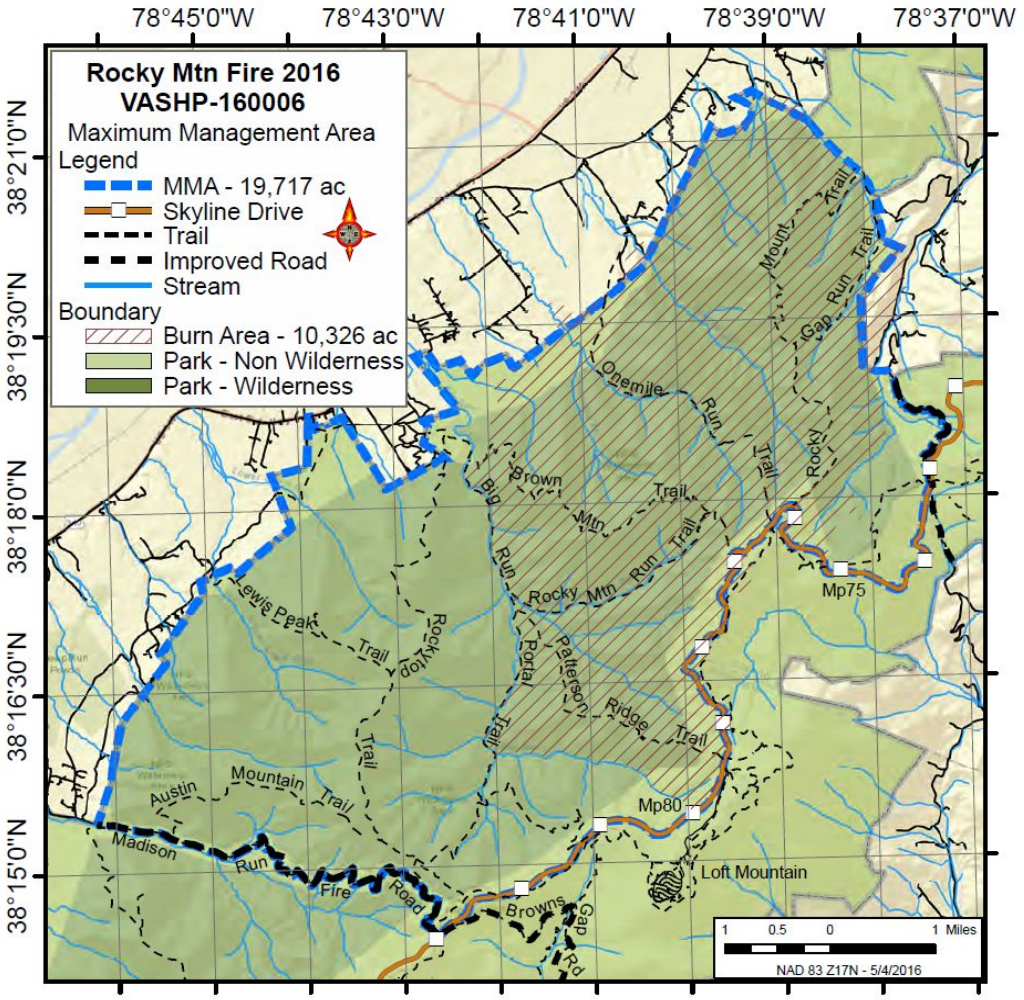


Figure 1. Maximum Management Area (MMA) and burned area.

Containment lines were created or enhanced to meet MMA objectives. Hand-dug firelines and bulldozer lines were created within Park boundaries. Approximately 5 miles of hand line and 3 miles of dozer line were constructed within the Park. A burnout using aerial ignition occurred on 4/24/2016. These suppression actions, combined with weather conditions less conducive to fire spread and precipitation on 4/25/2016 and 4/26/2016, enabled firefighters to effectively halt the spread of the fire. A fire progression map is included in Appendix A-1. Firelines and the Wilderness boundary are shown on the map in Appendix A-2.

Rehabilitation of suppression efforts began on 4/26/2016 and focused on clearing affected trails and repairing dozer and hand firelines. The fire transitioned to a Type 4 organization on 4/30/2016 and was declared 100% contained on 4/31/2016. The fire was declared controlled on 5/3/2016 at 1700.

Table 1. Acres burned by ownership.

Ownership	Wilderness	Non- Wilderness	Total Acres
NPS	8,729	1,301	10,030
Private	0	296	296
Total Acres			**10,326**

Table 2. Summary of fire suppression treatments (see Appendix A-2 for map).

Impact type	NPS (non-Wilderness)	NPS (Wilderness)	Private	Length (miles)
Cold Trail	2.07	0.57	0	2.64
Dozer Line	3.03	0	3.44	6.48
Hand Line	3.83	1.35	2.89	8.07
Improved Road	17.47	0.27	4.41	22.15
Natural Barrier	0.74	5.58	0	6.33
Total	27.15	7.77	10.75	45.66

Table 3. Miles of burned and unburned fireline (see Appendix A-3 for map).

Impact type	NPS (non-Wilderness)	NPS (Wilderness)	Private	Length (miles)
Burned	12.52	6.58	5.68	24.78
Unburned	14.63	1.19	5.06	20.88
Total	27.15	7.77	10.75	45.66

SUPPRESSION PHASE REHABILITATION ACTIONS

During the final stages prior to fire containment, several efforts for suppression rehabilitation occurred. Saw crews removed downed trees from trails within the fire perimeter, including the Appalachian Trail, and felled fire-weakened hazard tree threats. Saw crews also mitigated visual evidence of saw work in the Wilderness to include flush cutting stumps, angling cuts, and dispersing cut debris. Hand crews and a tracked mini-excavator stabilized bulldozer and hand lines by leveling berms and installing water bars. The state of Virginia rehabilitated dozer lines created on private lands.

SUMMARY OF RESOURCE ADVISOR (READ) ACTIVITIES

Resource Advisor support at the start of the incident was provided by Alan Williams (NPS-SHEN) and Steve Paull (NPS-SHEN), with Alan serving as Lead READ. Additional READs were enlisted as the fire grew and the complexity of the incident increased. The additional READs were Bob Dellinger (NPS-BITH), Kate Sullivan (NPS-CACO), Chris Ziegler (NPS-SHEN), and Howard Morrison (NPS-SHEN), with Chris and Howard serving on an intermittent basis.

Primary READ tasks were as follows:

- First day of READ involvement:
  - Gathered READ supplies, such as flagging and weed wash materials
  - Updated GPS units and/or mobile devices with READ and incident maps
- During suppression period:
  - Served as primary representatives of SHEN NCR; interacted with other members of NCR staff to determine areas of concern and develop mitigation strategies
  - Made Operations aware of READ concerns, and made sure that READ messages were getting to the divisions
  - Scouted control line locations, making sure that impacts to resources were minimized
  - Documented issues that would need to be addressed during the repair/rehab phase
  - Provided guidance regarding dozer and hand line locations and specifications
  - Provided guidance regarding hazard tree removal
  - Provided guidance regarding weed suppression
  - Provided guidance regarding burnout operations
  - Provided holding support in emergency situations
  - Provided FEMO support as needed (weather observations)
  - Collected GPS data for incident GISS
  - Collected photo documentation
- After active suppression period:
  - Assessed impacts of fire and suppression activities on resources, such as trails, signs, streams, cultural resources, monitoring plots, rare plant populations, and hemlock populations
  - Established repair/rehab specifications for trails and control lines
  - Created repair/rehab punch list and tracked progress
  - Accompanied work crews to ensure conformance to specs
  - Collected photo documentation
  - Generated READ/BAER report

Several appendices at the end of this document provide additional details related to READ activities, observations, and directives:

- Appendix B is a list of post-suppression repair and rehabilitation tasks to be performed by suppression personnel.
- Appendix C provides guidance on felling and bucking of trees in Park Wilderness.
- Appendix D enumerates issues that were discussed during the READ After Action Review (AAR).
- Appendix E contains READ activity logs (ICS 214s).
- Appendix F contains the Delegation of Authority for this incident.
- Appendix G contains a selection of photographs taken by READs during the incident.

RESOURCE IMPACTS AND PLANNED ACTIONS



Streams and Waterways: Shenandoah National Park contains over 70 mountain streams. Big Run, the Park's largest watershed, is located on the fire's southern perimeter. It is known for its native brook trout population and superior water quality, and is one of the Park's most popular fishing streams. Big Run is a Tier III waterway according to the Clean Water Act and is designated as "Outstanding National Resource Waters" for EPA and "Exceptional State Waters" for Virginia because of pristine water quality. The Exceptional State Water designation maintains high water quality in select Virginia streams. Acidification and shade loss are an ongoing concern for high quality brook trout habitat statewide. The stream drainage was identified as a potential holding line during early stages of the fire. Incident requirements were developed to minimize fire intensity and severity to riparian areas in and around the Big Run drainage. Hand and aerial firing operations occurred off Big Run on 4/24/2016 to contain the fire. Ignition operations were conducting with the intent of minimizing potential resource impacts in the Big Run riparian corridor and included tactics such as backing fire ignition and limiting scraping/digging during mop-up. Portable pumps placed in the stream had fine mesh screens installed on the intake valves to prevent harming fish fry. This greatly reduced potential resource impacts to the waterway.



Boundary Survey Markers: Approximately 2.4 miles of new dozer line was constructed immediately adjacent to (0.81 miles) or inside the park boundary (1.63 miles). There was the potential for boundary marker monuments to be uprooted or damaged during line construction. READs accompanied the dozers and scouted lines along the boundary to mitigate potential resource damage. All boundary survey markers were accounted for and no new damage was observed.

Approximately 6 miles of Park boundary was impacted by suppression activities or fire. In some areas, placards were damaged and/or paint-blazed trees were either top-killed or charred to a height above the blazing. With BAER/BAR funding support, staff will survey the impacted boundary and replace damaged placards and re-blaze trees as necessary. Clear boundary marking is required in order to prevent accidental poaching of resources and impacts from recreational ATV use.

Vegetation Resources: The burn area is dominated by fire-adapted xeric forest communities (see Appendix A-4 for a vegetation map and Appendix A-5 for a fire tolerance map). A majority of the burned area is classified as Central Appalachian Dry Chestnut Oak Forest, a vegetation type that is very tolerant of fire and can be expected to regenerate vigorously post-burn. Other fire-adapted communities within the burned area include pine-oak heath woodland, mixed oak heath forest, and acidic oak-hickory forest. Mesic vegetation communities along Hawksbill Creek on the northeastern perimeter of the burn are less tolerant of fire. Fire in this area was patchy and burned with lower intensity, presumably because of higher soil moisture, so the impact on plant communities was less severe.

The fire burned through several rare plant communities. Three populations of the state-rare paper birch (*Betula papyrifera*) were impacted. This species is fire-sensitive, but is also dependent upon periodic fire or other disturbance for regeneration, so the long-term impacts are not clear. Three populations of state-rare bristly sarsaparilla (*Aralia hipida*) are located within the burned area. This species generally responds favorably to fire, as its persistence appears to be strongly dependent on fire or other disturbances. Several populations of Bradley's

spleenwort (*Asplenium bradleyi*) are located on Brown Mountain. This small fern grows in moist crevices on rock and is probably very sensitive to fire. All rare plant populations within the burned area will be assessed during the growing season following the fire.

Eastern hemlock (*Tsuga canadensis*) stands occur in four drainages that were affected by the fire: Gap Run, Twomile Run, Onemile Run, and Big Run. These trees are protected/managed remnants of 95% of park stands lost to the invasive hemlock woolly adelgid (*Adelges tsugae*). Park Natural Resources personnel have been treating these populations with systemic pesticides in order to prevent their extirpation from these drainages. Post-burn stand surveys found that fire burned through the entirety of the Twomile and Onemile populations. The Gap Run population was partially burned, and the majority of the Big Run population was protected by fire control lines. In those areas that were burned, small hemlock trees appeared to suffer most, often with needle scorch of 100%. Larger trees fared better because scorch percentages were much lower. Hemlock roots are highly susceptible to fire because they are near the soil surface; however, burn depth appeared to be relatively low in most areas, so root damage may be minimal. The fate of these trees, already under drought stress prior to the incident, is unknown. The Park is requesting BAER/BAR funding support for a 3-year monitoring and rehabilitation program for the impacted hemlock populations in the Gap Run, Twomile Run, and Onemile Run drainages.



Hemlock trees along Onemile Run

Exotic Plants: Most of the fire occurred in weed-resistant dry oak-heath forest; however, invasive plants are a concern in some of the mesic areas on the fire perimeter, such as Gap Run and the Hawksbill Creek watershed. Of particular concern is wavyleaf basketgrass (*Oplismenus undulatifolius*), an especially invasive grass that is known to exist in the park just north of the fire. With BAER/BAR funding support, park personnel will perform post-burn monitoring along Gap Run and the firelines in the Hawksbill Creek drainage to make sure that wavyleaf basketgrass has not been spread to these areas. Invasive oriental bittersweet (*Celastrus orbiculatus*) is a known problem in the upper Hawksbill Creek drainage at Pinefield Gap. Personnel will monitor this location and treat the bittersweet with herbicide, if necessary, in order to encourage the regeneration of native vegetation.

Additional monitoring will be necessary along Skyline Drive and Beldor Fire Road for tree-of-heaven (*Ailanthus altimissima*) and princesstree (*Paulownia tomentosa*). These invasive tree species are present along road margins and may seed into areas that have been disturbed by fire and suppression activities. Based on previous disturbances at SHEN with similar conditions, forested areas that were subject to high burn severity (i.e., girdling of canopy trees) are particularly susceptible to invasion by these species.

Two probability maps related to exotic plants are included in the appendices. Appendix A-6 contains a map illustrating the relative probability of establishment of new invasives, based on where they have been found in the past and various predictors such as geology, distance from roads, trails, streams, development and the boundary. Appendix A-7 contains a map of relative probability of established weeds, based on existing vegetation datasets and other predictors.

Archaeological/Cultural Resources: Several recorded sites were present in the burn area prior to the fire. All sites within the fire perimeter were classified as sites to avoid during suppression as opposed to sites to protect. Fire did not appear to damage any archaeological or cultural resources. Sites adjacent to control lines were identified, flagged and avoided during line construction. Sites included an old homestead, a cemetery, and scattered lithic sites.

Infrastructure: The fire threatened several structures, including Doyles River Cabin, Ivy Creek Shelter, Pinefield Hut, Loft Mountain Wayside, and the Loft Mountain wastewater treatment plant. Actions taken to protect structures during suppression included thinning preparation along firelines and burnout. No structure wrapping occurred. No structures were damaged by the fire.

The following roads were impacted by the fire: Skyline Drive (milepost 73 to 83), Madison Run Fire Road, and Beldor Hollow Fire Road. All three roads were closed for at least a portion of the time that suppression efforts were underway. While there were no direct suppression impacts on Skyline Drive itself, some signs were damaged along the roadway. Vegetation on the north margin of Madison Run Fire Road was cut and chipped in the event that the fire reached the road. Limited snag removal took place at the upper end of Beldor Fire Road. Vegetation and leaf letter were cleared around power poles located in the power line swath that intersects Beldor Fire Road.





Recreation Resources: The fire burned a total of 10,030 acres of the Park, including 8,729 acres of federally designated Wilderness. This area represents 5% of the Park's overall area, and 11% of its Wilderness. A total of 23.4 miles of the Park's trail network was impacted by the fire, including three quarters of a mile of the Appalachian Trail. Other trails that are partially or entirely within the burned area include Gap Run Trail, Rocky Mount Trail, Onemile Run Trail, Brown Mountain Trail, Rocky Mountain Run Trail, Big Run Portal Trail and Patterson Ridge Trail.

Temporary closures were established on the Appalachian Trail and those trails that were within or near the fire during the suppression effort. During the closures, the Park instituted a shuttle system to transport Appalachian Trail hikers around the impacted area. As part of the final suppression efforts, fire crews assessed and removed fallen and fire-weakened hazard trees so that the trails could be re-opened as soon as the fire was officially contained (see Appendix C for rehab guidelines). The Park is seeking BAER/BAR funding for several sections of trail within the burned area that require some degree of rehabilitation. A few areas will require extensive repair, such as cribbing to stabilize degraded trail edges, but most of the damage can be addressed by more modest measures (e.g., re-blazing, tread repair, waterbars, and/or check dams). Blazing will need to be redone in areas where blazed trees were damaged or charred. Two backcountry signs were damaged by fire and need to be replaced: Onemile Run Trail at boundary (pictured at left), and Gap Run Trail at boundary.

Overnight opportunities were also impacted by the fire. Doyle River Cabin and the Pinefield Hut were both temporarily closed, as were the campsites at Loft Mountain Campground.

Soil and Watershed: Fire primarily consumed leaf litter, fine fuels, and small shrubs. Some areas of dense mountain laurel burned with greater intensity, particularly in the presence of a pine overstory, but little of the organic layer was consumed. A reconnaissance flight over the burned area did not yield any large areas of soil sterilization or scarification. In most areas, fire severity appeared to be in the low to moderate range, with fine leaf litter only scorched or incompletely consumed. While herbs, shrubs, and small trees were top-killed over large areas of the

burn, their root systems remained mostly intact. These root systems, combined with a dense organic surface layer, will reduce the likelihood of significant erosion. Accordingly, no watershed treatments are recommended.

Burn Severity: Although spring fires are common in Virginia, the extreme weather conditions that caused the rapid spread of this fire are rare. Observations made during reconnaissance flights indicate that a majority of the burned area experienced low to moderate fire severity, but areas that experienced uphill head fires exhibited high burn severity with evident overstory tree mortality, particularly in pine stands. Fire top-killed all standing vegetation in several small very severely burned areas. These areas typically had a dense understory of mountain laurel. Oak-dominated stands that experienced uphill runs burned with moderate to high severity, likely delaying leaf-out but not resulting in large scale tree mortality. However, if the dry weather pattern continues with limited precipitation, more extensive mortality is expected. Fire that backed through hardwood leaf litter resulted in a patchy mosaic burn pattern. Most shrubs and some trees are likely top-killed and will re-sprout. A Burned Area Reflectance Classification (BARC) map has been requested for the fire. This product is a satellite-derived map of post-fire vegetation condition. Burn severity mapping and monitoring will be carried out by the fire effects monitoring crew at Shenandoah National Park.

A preliminary burn severity map is included in Appendix A-8. This map is based on satellite imagery that was captured while the fire was still growing. The fire edge is shown as a narrow red band. Final severity level thresholds have not yet been defined or verified in the field, so actual severity will likely differ from what is shown. Future Landsat imagery, combined with Composite Burned Index (CBI) plots in the field, will make it possible to generate a more complete and accurate burn severity map.



Top: A wide range of burn severities observed on Brown Mountain Trail.
Bottom: Aerial photograph of Division M and Rocky Mount. View is toward the east, with fireline on existing private roads partially visible in the foreground. Black patches on south-facing slopes are indicative of higher burn severity.

PROPOSED WILDFIRE REHABILITATION TREATMENTS

The following table specifies funding requests for Emergency Stabilization (ES) and Burned Area Rehabilitation (BAR). Treatment details are provided on subsequent pages.

Treatments	Yr 1 (2016) ES[1]	Yr 2 (2017) BAR[2]	Yr 3 (2018) BAR[2]	Yr 4 (2019) BAR[2]	Yr 5 (2020) BAR[2]	Total
#1 - Trail Repair Support a park trail crew to spend 8 days assessing, cleaning and repairing water control features and under-cut tread on trails within the fire perimeter.	$16,467	$0	$0	$0	$0	**$16,467**
#2 - Boundary Marking Replace boundary placards and re-blaze trees as needed on six (6) miles of burned boundary.	$0	$2,508	$0	$0	$0	**$2,508**
#3 - Eastern Hemlock Treatment & Restoration Three-year program to monitor eastern hemlock populations, treat with pesticide as needed, and transplant seedlings to areas of high mortality.	$0	$5,920	$5,920	$5,920	$0	**$17,760**
#4 - Non-Native Invasive Plant Control and Restoration Use 2 GS-5 technicians for15 days per year (plus supplies) to assist with surveillance, treatment, and restoration efforts along the 8 miles of fireline possibly affected with invasive species.	$7,019	$7,019	$7,019	$0	$0	**$21,057**
#5 - BAER Team Support Support park staff for the preparation of the BAER plan and reports.	$946	$0	$0	$0	$0	**$946**
Totals	**$24,432**	**$15,447**	**$12,939**	**$5,920**	**$0**	**$58,738**

Total ES[1] Request		**$24,432**
Total BAR[2] Request		**$34,306**

[1]ES = Emergency Stabilization (Regional Funding Approval)

[2]BAR = Burned Area Rehabilitation (Annual DOI Competitive funding)

ROCKY MTN FIRE 2016 – BAER – TREATMENT SPECIFICATIONS

SPECIFICATION TITLE:	REPAIR FIRE DAMAGE TO TRAILS	JURISDICTIONS:	Shenandoah NP
PART E: LINE ITEM:	#1 - Repair trails inside fire perimeter (Gap Run, Rocky Mount, Onemile Run, Brown Mountain, Rocky Mountain Run, Patterson Ridge, Big Run Portal, and Appalachian Trails)	FISCAL YEAR(S) (list each year):	2016 (ES)

I. WORK TO BE DONE

A. General Description: 23.4 miles of trail were inside the perimeter of the Rocky Mtn Fire 2016. Most of the trails did not suffer excess damage due to fire but some damaged areas were identified. Three primary impacts were documented by park trails staff: 1) cribbing damage due to burned out stumps and fallen trees, 2) trail tread damage due to burned organics from the tread, 3) increased trail erosion potential where surrounding vegetation has been burned. During the end of the suppression phase of the fire, Park trails staff scouted and assessed all trails within the burned area for the amount of work required for repair.

B. Design/Construction Specifications:
Schedule trail crew work days in Summer/Fall 2016 where possible to:

i. Repair several areas of damaged cribbing in multiple locations. Rebuild with existing rocks or rocks on location.
ii. Repair areas of tread damage due to fire burning into the edge or through the duff holding the tread together. Build retaining features and/or shift trail tread with cut-and-fill using materials available in the trail corridor.
iii. Evaluate and mitigate surface water management on the trail in areas that may experience extra runoff following storm events paying special attention to areas that burned with the highest severity. Install additional check dams and water bars to manage the water and protect the trail tread.

C. Purpose of Treatment Specifications: To stabilize and prevent unacceptable degradation of the trail and immediate areas such that dangerous trail conditions could develop with use and erosion.

II. LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): **Do not include contract personnel costs here (see contractor services below).**	COST/ITEM
1 WS-04/05 @ $35.64/hr. X 80 hr X 1 FY = $2,851.20 1 WL-05/05 @ $30.16/hr. X 80 hr X 1 FY = $2,412.80 2 WG-05/05 @ $30.04/hr. X 80 hr X 1 FY = $4,806.40 4 WG-03/03 @ $18.74/hr. X 80 hr X 1 FY = $5,996.80	**$16,067.20**
TOTAL PERSONNEL SERVICE COST	**$16,067.20**
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X # Fiscal Years = Cost/Item):	COST/ITEM
2 Backcountry Signs @ $200/sign X 2 signs X 1FY = $400.00	**$400.00**
TOTAL MATERIALS AND SUPPLY COST	**$400.00**

SPECIFICATION COST SUMMARY

FISCAL YEAR	UNIT	UNIT COST	# OF UNITS	COST	FUNDING SOURCE	METHOD
2016	Miles of trail	$715.97	23	$16,467.20	ES	P
TOTAL	Miles of trail	$715.97	23	$16,467.20	ES	P

FUNDING SOURCES: ES = Emergency Stabilization **METHODS: P** = Agency Personnel Services

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	P,M
5. No cost estimate required – cost charged to Fire Suppression Account.	

P = Personnel Services **M** = Materials/Supplies **T** = Travel **C** = Contract **F** = Suppression

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report: See Appendices

SPECIFICATION TITLE:	REPAIR BOUNDARY MARKING	JURISDICTIONS:	Shenandoah NP
PART E: LINE ITEM:	#2 - Repair Park Boundary Marking	FISCAL YEAR(S) (list each year):	2017 (BAR)

I. WORK TO BE DONE

A. **General Description:**
Approximately 6 miles of the Park boundary was burned by the fire. Boundary placards were damaged in some areas, as were trees that were blazed. Damaged placards shall be replaced, and trees will be re-blazed as needed.

B. Design/Construction Specification:
A 2-person crew will walk the entirety of the burned boundary and replace placards as necessary. In areas where blazed trees are fire-killed, the crew will add blazes to living trees. Live trees on which blazes have been charred will be re-blazed.

C. Purpose of Treatment Specifications:
To clearly mark the boundary of the Park in order to prevent accidental poaching of resources and impacts from recreational ATV use.

II. LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): **Do not include contract personnel costs here (see contractor services below).**	COST/ITEM
1 WL-05/05 @ $30.16/hr. X 40 hr X 1 FY = $1206.40 1 WG-05/05 @ $30.04/hr. X 40 hr X 1 FY = $1201.60	**$2.408.00**
TOTAL PERSONNEL SERVICE COST	**$2,408.00**
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X # Fiscal Years = Cost/Item):	COST/ITEM
Paint and placards	**$100.00**
TOTAL MATERIALS AND SUPPLY COST	**$100.00**

SPECIFICATION COST SUMMARY

FISCAL YEAR	UNIT	UNIT COST	# OF UNITS	COST	FUNDING SOURCE	METHOD
2017	Miles of boundary	$418.00	6	$2,508.00	BAR	P
TOTAL	Miles of boundary	$418.00	6	$2,508.00	BAR	P

FUNDING SOURCES: BAR = Burned Area Rehabilitation **METHODS: P** = Agency Personnel Services

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	P,M
5. No cost estimate required – cost charged to Fire Suppression Account.	

P = Personnel Services **M** = Materials/Supplies **T** = Travel **C** = Contract **F** = Suppression

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report: See Appendices

SPECIFICATION TITLE:	TREATMENT OF EASTERN HEMLOCK	JURISDICTIONS:	Shenandoah NP
PART E: LINE ITEM:	#3 - Treatment and Restoration of Eastern Hemlock Populations	FISCAL YEAR(S) (list each year):	2017 (BAR), 2018 (BAR), 2019 (BAR)

I. WORK TO BE DONE

General Description: The Park has made a significant investment in the monitoring and treatment of eastern hemlock (*Tsuga canadensis*) stands that are in decline because of the exotic hemlock woolly adelgid (HWA) (*Adelges tsugae*). Three such stands were partially or completely burned by the fire at the following locations: Gap Run, Twomile Run, and Onemile Run. Fire-weakened trees will be more susceptible to mortality brought about by adelgid infestations and may require additional insecticide treatments beyond what would have occurred as part of the Park's existing HWA treatment plan. Hemlock seedlings will be planted in areas of high hemlock mortality.

Tasks:

1. **Monitor**: Impacted hemlock populations will be monitored annually for three years. The purpose of this monitoring will be to determine the degree of stand mortality, the health of surviving trees, and the severity of HWA infestation.
2. **Treatment** : Infested hemlock trees will be treated with a systemic insecticide (imidacloprid via soil injections).
3. **Restoration:** Hemlock seedlings with local genotype will be transplanted into areas of high hemlock mortality. Transplant stock will be taken from the same drainage where possible, but may be harvested in neighboring Park drainages.

Purpose of Treatment Specifications: To prevent the extirpation of eastern hemlock from drainages that were impacted by this fire.

II. LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): **Do not include contract personnel costs here (see contractor services below).**	COST/ITEM
1 GS-7 @ $34.50/hr. X 160 hr X 3 FY = $16,560.00	**$16,560.00**
TOTAL PERSONNEL SERVICE COST	**$16,560.00**
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X # Fiscal Years = Cost/Item):	COST/ITEM
Supplies: Pesticide, personal protective gear, misc. supplies @ $400 X 3 FY = $1,200.00	**$1,200.00**
TOTAL MATERIALS AND SUPPLY COST	**$1,200.00**

SPECIFICATION COST SUMMARY

FISCAL YEAR	UNIT	UNIT COST	# OF UNITS	COST	FUNDING SOURCE	METHOD
2017	Acre	$91.08	65	$5,920.00	BAR	P
2018	Acre	$91.08	65	$5,920.00	BAR	P
2019	Acre	$91.08	65	$5,920.00	BAR	P
TOTAL	Acre	$91.08	195, same 65 acres for three years	$17,760.00	BAR	P

FUNDING SOURCES: BAR = Burned Area Rehabilitation
METHODS: P = Agency Personnel Services

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	P,M
5. No cost estimate required – cost charged to Fire Suppression Account.	

P = Personnel Services **M** = Materials/Supplies **T** = Travel **C** = Contract **F** = Suppression

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report: See Appendices

SPECIFICATION TITLE:	CONTROL OF NON-NATIVE SPECIES	JURISDICTIONS:	Shenandoah NP
PART E: LINE ITEM:	#4 - Non-Native Invasive Plant Control	FISCAL YEAR(S) (list each year):	2016 (ES), 2017(BAR), 2018(BAR)

I. WORK TO BE DONE

Number and Describe Each Task:

General Description: Areas of suppression-related impacts will be surveyed and treated for new infestations. Treatments will involve approved protocols already in use at SHEN, and will include herbicide application (foliar applications) and hand pulling. Rehabilitation will occur where possible.

Tasks:

4. **Survey**: Eight miles of fireline with a 20 ft buffer will be surveyed, paying particular attention to the northeast portion of the burned area by Beldor Hollow and along the Skyline Drive and Appalachian Trail corridors.
5. **Treatment** : Treatments will involve approved protocols already in use at SHEN and will include herbicide application (foliar applications) and hand pulling.
6. **Rehabilitation**: In treated locations attempts will be made to reestablish native plants through a variety of means.

Purpose of Treatment Specifications: To prevent a rapid increase in population growth and reproduction of these disturbance-adapted weeds following the fire, and to minimize the probability of new infestations becoming established within heavily disturbed sites inside or adjacent to the burn area.

II. LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): **Do not include contract personnel costs here (see contractor services below).**	COST/ITEM
2 GS-5 @ $17.83/hr. X 180 hr X 3 FY = $19,257	**$19,257.00**
TOTAL PERSONNEL SERVICE COST	**$19,257.00**
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X # Fiscal Years = Cost/Item):	COST/ITEM
Supplies: Herbicides, personal protective gear, misc. supplies @ $600 X 3 FY = $1,800	**$1,800.00**
TOTAL MATERIALS AND SUPPLY COST	**$1,800.00**

SPECIFICATION COST SUMMARY

FISCAL YEAR	UNIT	UNIT COST	# OF UNITS	COST	FUNDING SOURCE	METHOD
2016	Mile	$877.33	8	$7,019.00	ES	P
2017	Mile	$877.33	8	$7,019.00	BAR	P
2018	Mile	$877.33	8	$7,019.00	BAR	P
TOTAL	Mile	$877.33	24, same 8 miles for three years	$21,057.00	ES / BAR	P

FUNDING SOURCES: ES = Emergency Stabilization, **BAR** = Burn Area Rehabilitation
METHODS: P = Agency Personnel Services

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	P,M
5. No cost estimate required – cost charged to Fire Suppression Account.	

P = Personnel Services **M** = Materials/Supplies **T** = Travel **C** = Contract **F** = Suppression

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report: See Appendices

SPECIFICATION TITLE:	BAER PLANNING/OVERHEAD	JURISDICTIONS:	Shenandoah NP
PART E: LINE ITEM:	#5 - BAER Team Support	FISCAL YEAR(S) (list each year):	2016 (ES)

I. WORK TO BE DONE

Number and Describe Each Task:

General Description: Team reviews incident and READ reconnaissance reports, data and maps. Develops products and components of a BAER plan and gains approval. Team includes Chief of NCR, Biotech (Exotics), and Trail Coordinator.
Tasks:

1. Gather information
2. Conduct planning meetings and consultations
3. Finalize a BAER plan containing map products, work specifications, background and narrative to justify and direct the identified response.
4. Review, edit, and verify completion and anticipated approval of the final plan.

II. LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): **Do not include contract personnel costs here (see contractor services below).**	COST/ITEM
1 GS-0408-13/04 Chief of NCR @ $57.24/hr. X 8 hr X 1 FY = $457.92	**$457.92**
1 GS-0404-07/07 Biotech (Exotics) @ $30.07/hr. X 8 hr X 1 FY = $240.56	**$240.56**
1 GS-0300-9/2 Trails Coordinator @ $30.88/hr. X 8 hr X 1 FY = $247.04	**$247.04**
TOTAL PERSONNEL SERVICE COST	**$945.52**

SPECIFICATION COST SUMMARY

FISCAL YEAR	UNIT	UNIT COST	# OF UNITS	COST	FUNDING SOURCE	METHOD
2016	Planning Team	$945.52	1	$945.52	ES	P
TOTAL	Planning Team	$945.52	1	$945.52	ES	P

FUNDING SOURCES: ES = Emergency Stabilization **METHODS: P** = Agency Personnel Services

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	
3. Estimate supported by cost guides from independent sources or other federal agencies.	
4. Estimates based upon government wage rates and material cost.	P
5. No cost estimate required – cost charged to Fire Suppression Account.	

P = Personnel Services **M** = Materials/Supplies **T** = Travel **C** = Contract **F** = Suppression

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report: See Appendices

RESOURCE ADVISORS AND PLAN CONTRIBUTORS

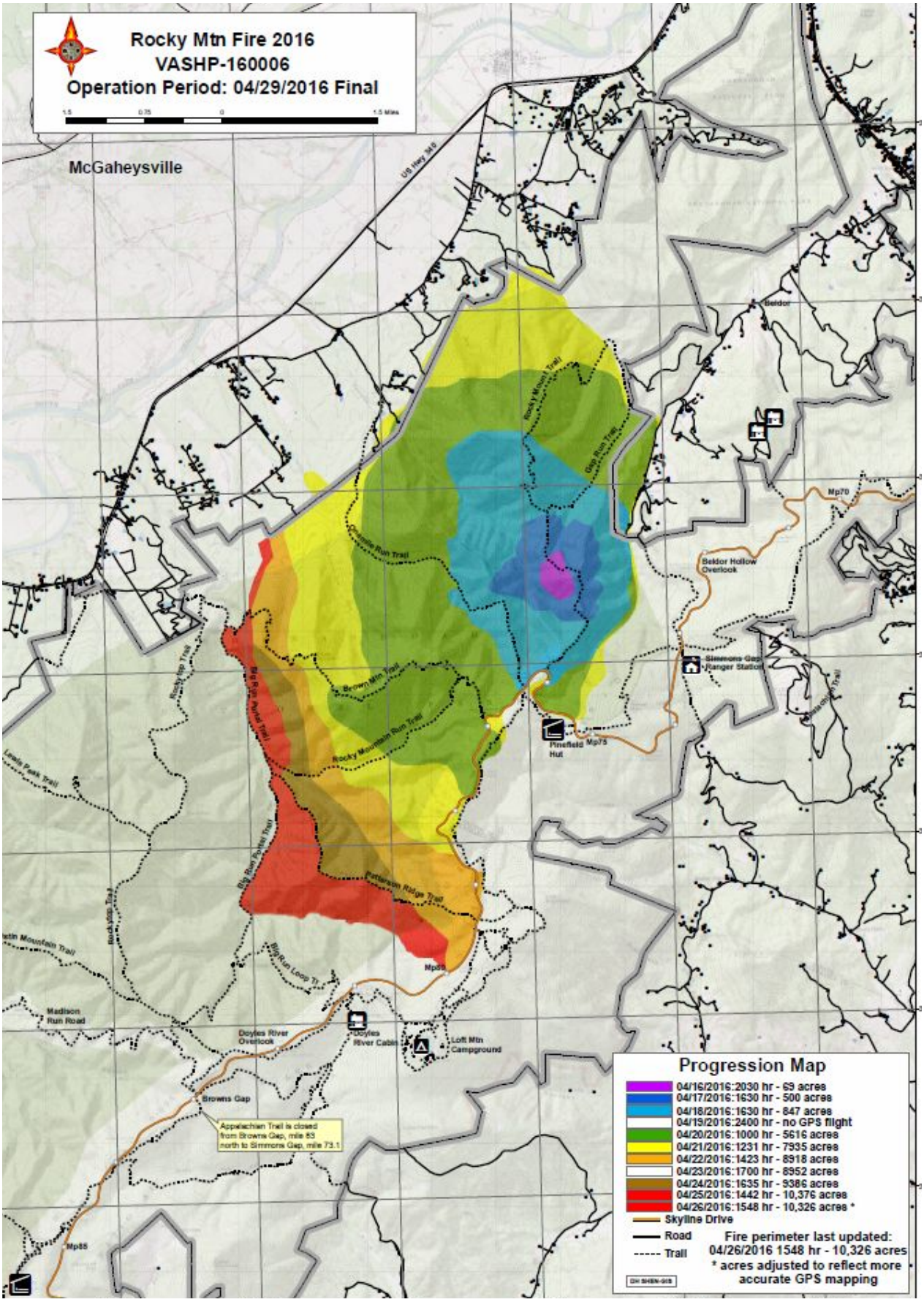
Fire Resource Advisors

Williams, Alan - Park Ecologist, Shenandoah National Park
Paull, Stephen - Rock Outcrop Management Plan Coordinator, Shenandoah National Park
Ziegler, Chris - Wilderness Backcountry and Trails Branch Chief, Shenandoah National Park
Dellinger, Bob - Lead Fire Effects Monitor, Big Thicket National Preserve
Morrison, Howard - Backcountry Ranger, Shenandoah National Park
Sullivan, Kate - Fire Technician, Cape Cod National Seashore

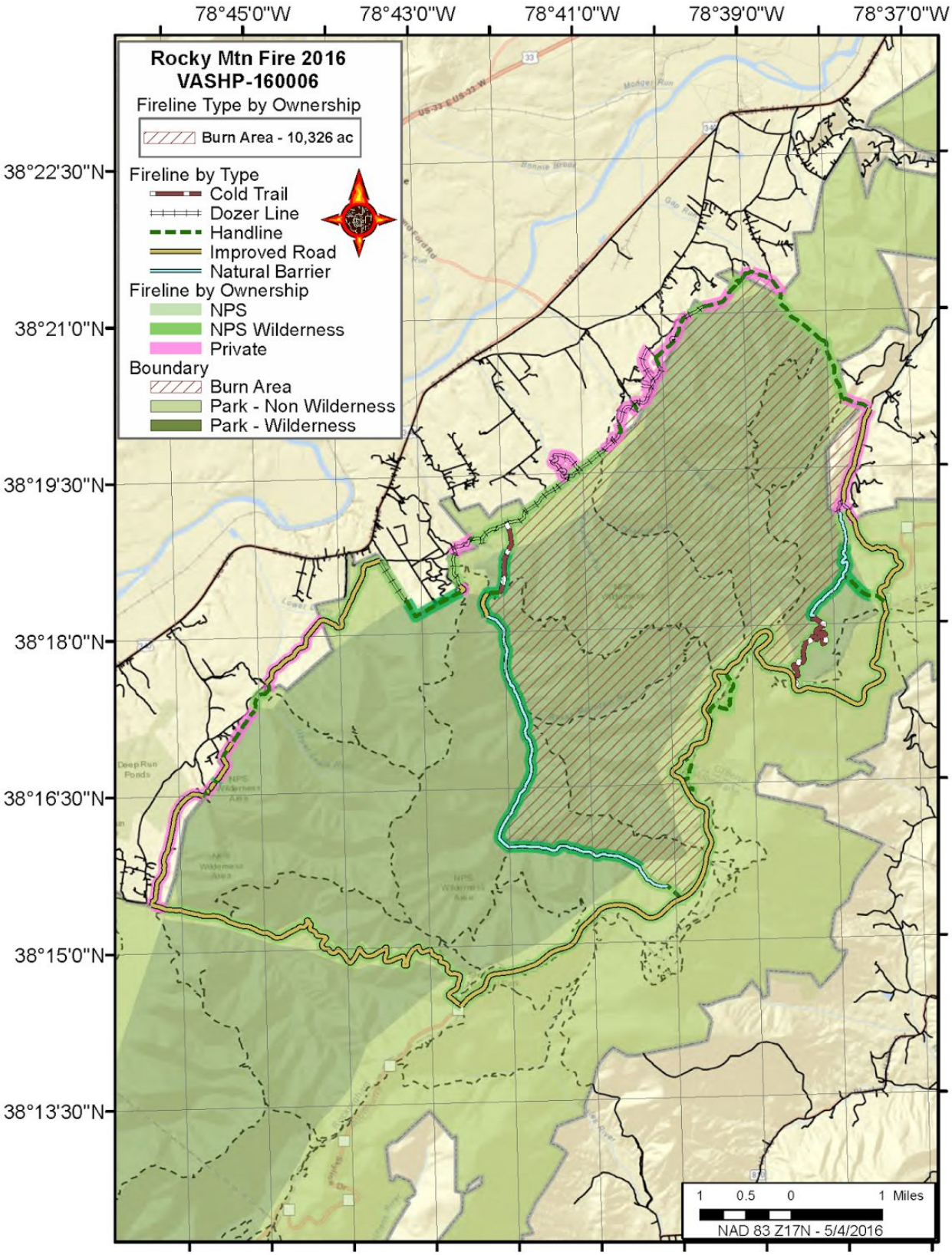
Plan Contributors

Schaberl, Jim – Natural and Cultural Resources Division Chief, Shenandoah National Park
Hurlbert, Dan – GIS Specialist, Shenandoah National Park
Cass, Wendy – Botanist, Shenandoah National Park
Hughes, Jake – Exotic Plant Specialist, Shenandoah National Park
Demarest, Dave – Biological Science Technician - Fisheries, Shenandoah National Park
Printz, Steve – Trails Work Supervisor, Shenandoah National Park
Gubler, Rolf – Biologist, Shenandoah National Park
Forder, Melissa – Deputy Regional Fire Management Officer Planning/Ecology, Southeast Region

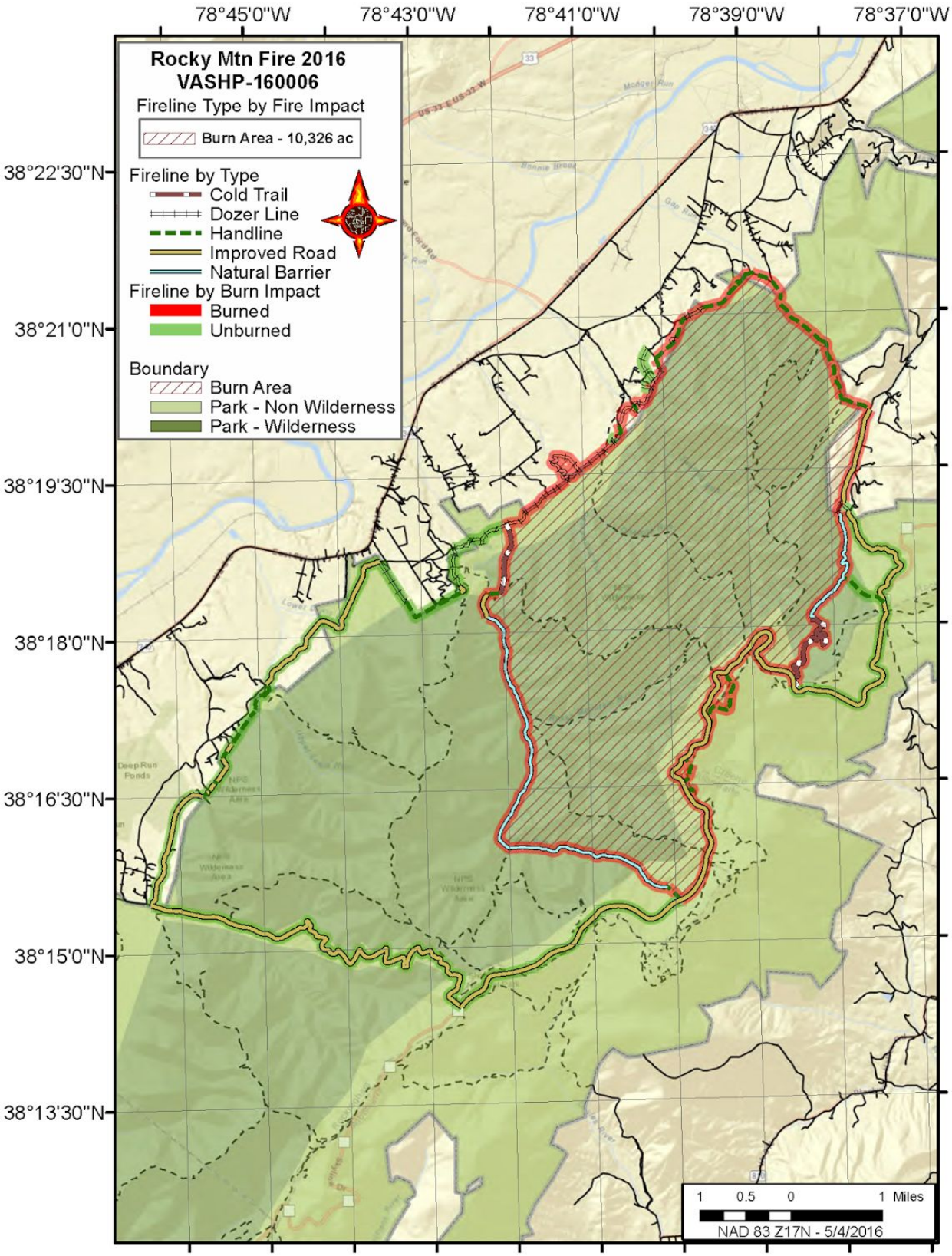
APPENDIX A-1. FIRE PROGRESSION MAP



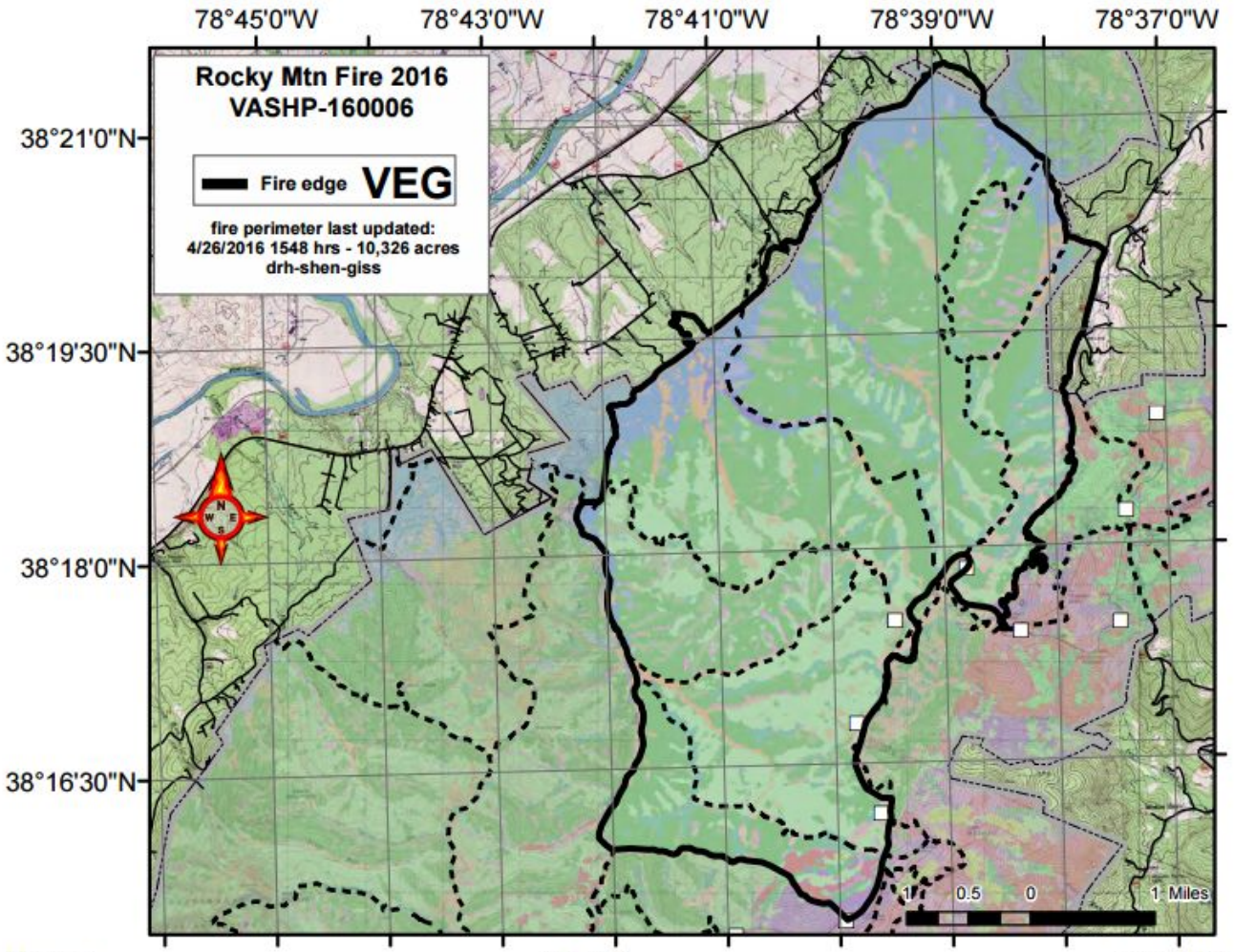
APPENDIX A-2. PREPARED FIRELINES (OWNERSHIP)



APPENDIX A-3. PREPARED FIRELINES (BURNED & UNBURNED)

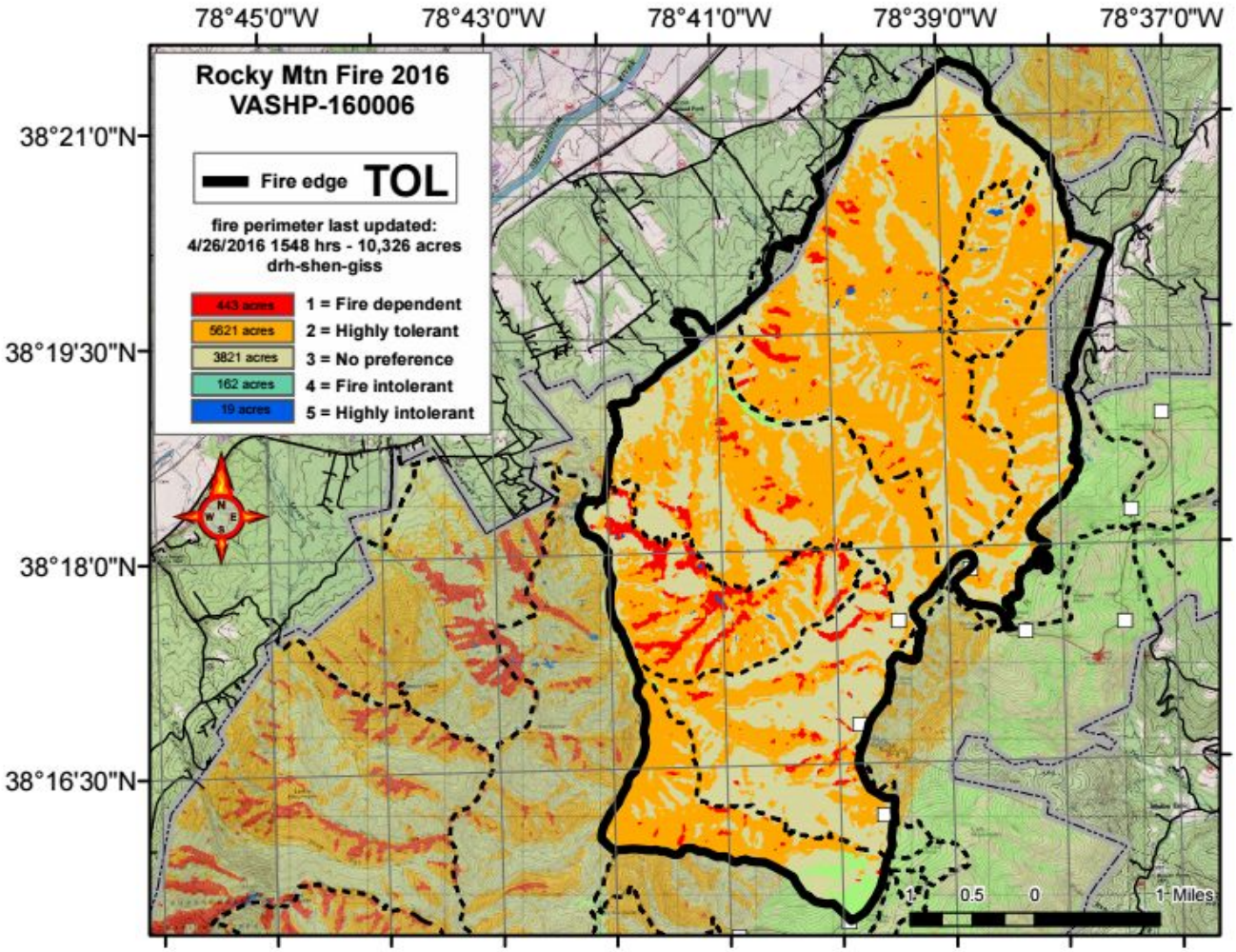


APPENDIX A-4. VEGETATION MAP



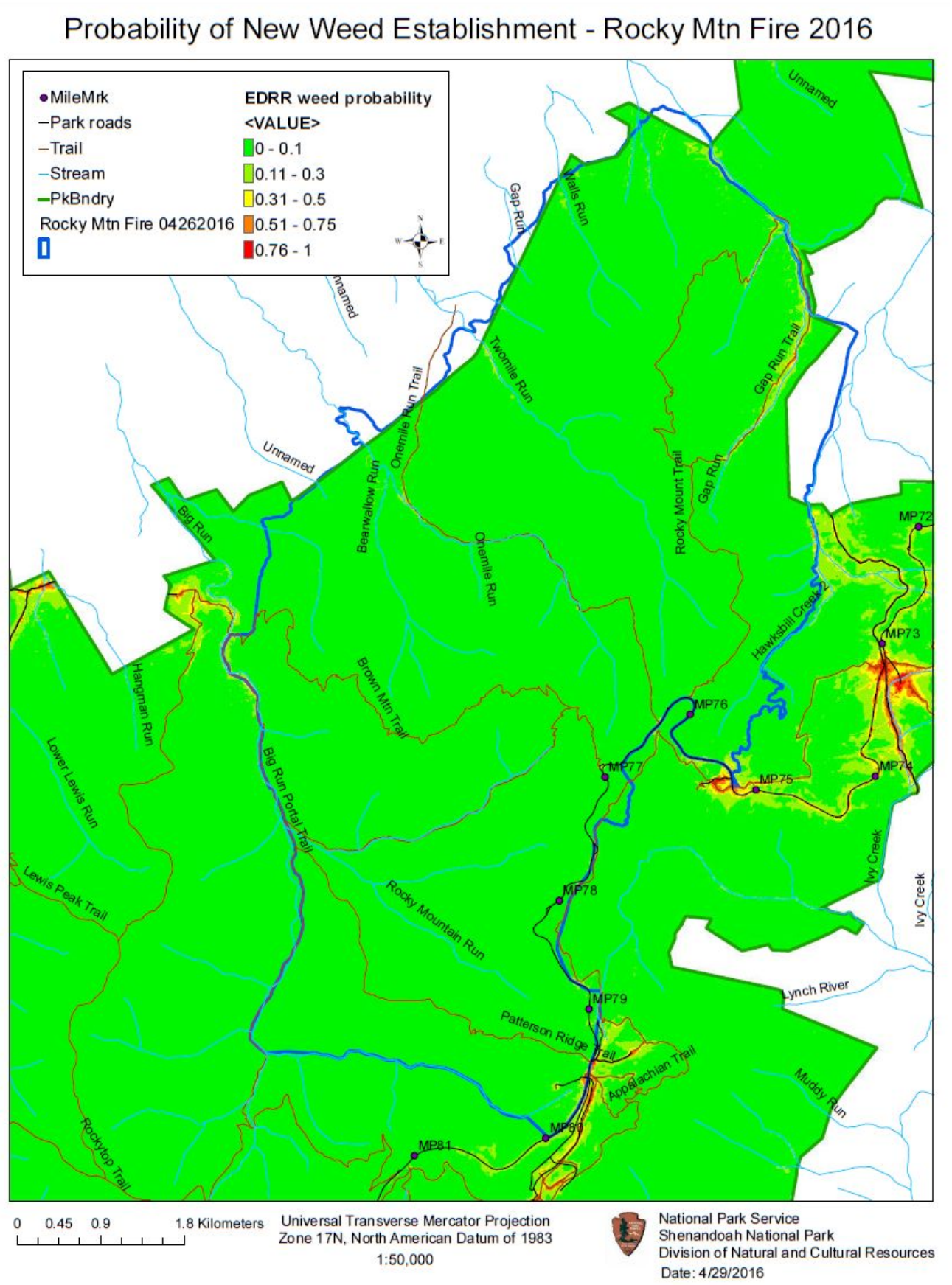
AREA_AC	VA_NAME	TOLERANCE
440.83524	Central Appalachian Pine - Oak / Heath Woodland	1=fire dependant
188.38869	Sweet Birch - Chestnut Oak Talus Woodland	3=no clear pref.
4353.14982	Central Appalachian / Northern Piedmont Chestnut Oak Forest	2=highly tolerant
96.83664	Low-Elevation Mixed Oak / Heath Forest	2=highly tolerant
2168.11242	Central Appalachian Dry-Mesic Chestnut Oak - Northern Red Oak Forest	3=no clear pref.
0.07141	Central Appalachian Northern Hardwood Forest	4=fire intolerant
0.07141	Hemlock - Northern Hardwood Forest	4=fire intolerant
45.1333	Southern Appalachian Cove Forest (Typic Montane Type)	4=fire intolerant
1.42827	Northern Blue Ridge Montane Alluvial Forest	5=highly intolerant
39.84871	Central Appalachian Acidic Cove Forest (White Pine - Hemlock - Mixed Hardwoods Type)	4=fire intolerant
18.49608	Successional Tuliptree Forest (Circumneutral Type)	4=fire intolerant
8.06972	Central Appalachian Basic Boulderfield Forest	4=fire intolerant
44.20493	Central Appalachian Rich Cove Forest	4=fire intolerant
8.35537	Central Appalachian Montane Oak - Hickory Forest (Basic Type)	4=fire intolerant
236.30711	Central Appalachian Montane Oak - Hickory Forest (Acidic Type)	3=no clear pref.
877.02861	Central Appalachian Acidic Oak - Hickory Forest	3=no clear pref.
52.5603	Central Appalachian Basic Oak - Hickory Forest (Submontane / Foothills Type)	3=no clear pref.
23.99492	Northeastern Modified Successional Forest	3=no clear pref.
0.21424	Virginia Pine Successional Forest	3=no clear pref.
814.47043	Central Appalachian Dry Chestnut Oak - Northern Red Oak / Heath Forest	2=highly tolerant
356.78161	Central Appalachian Acidic Cove Forest (Hemlock - Hardwood / Mountain-Laurel Type)	2=highly tolerant
17.63912	Central Appalachian Acidic Boulderfield	5=highly intolerant
274.58472	Catastrophically Disturbed Forest	3=no clear pref.
2.42806	Cultural Meadow	1=fire dependant

APPENDIX A-5. VEGETATION FIRE TOLERANCE MAP

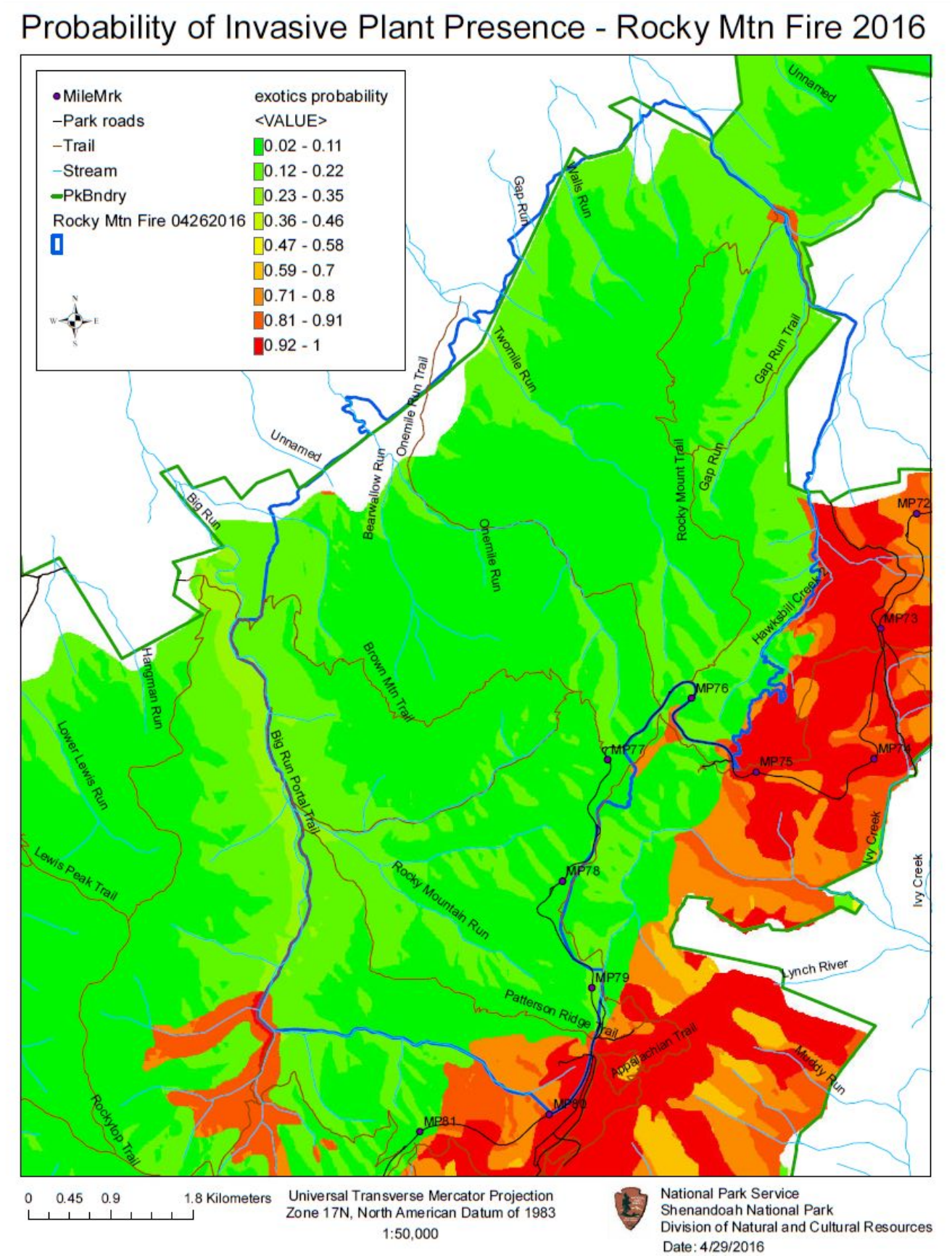


AREA_AC	VA_NAME	TOLERANCE
440.83524	Central Appalachian Pine - Oak / Heath Woodland	1=fire dependant
188.38869	Sweet Birch - Chestnut Oak Talus Woodland	3=no clear pref.
4353.14982	Central Appalachian / Northern Piedmont Chestnut Oak Forest	2=highly tolerant
96.83664	Low-Elevation Mixed Oak / Heath Forest	2=highly tolerant
2168.11242	Central Appalachian Dry-Mesic Chestnut Oak - Northern Red Oak Forest	3=no clear pref.
0.07141	Central Appalachian Northern Hardwood Forest	4=fire intolerant
0.07141	Hemlock - Northern Hardwood Forest	4=fire intolerant
45.1333	Southern Appalachian Cove Forest (Typic Montane Type)	4=fire intolerant
1.42827	Northern Blue Ridge Montane Alluvial Forest	5=highly intolerant
39.84871	Central Appalachian Acidic Cove Forest (White Pine - Hemlock - Mixed Hardwoods Type)	4=fire intolerant
18.49608	Successional Tuliptree Forest (Circumneutral Type)	4=fire intolerant
8.06972	Central Appalachian Basic Boulderfield Forest	4=fire intolerant
44.20493	Central Appalachian Rich Cove Forest	4=fire intolerant
8.35537	Central Appalachian Montane Oak - Hickory Forest (Basic Type)	4=fire intolerant
236.30711	Central Appalachian Montane Oak - Hickory Forest (Acidic Type)	3=no clear pref.
877.02861	Central Appalachian Acidic Oak - Hickory Forest	3=no clear pref.
52.5603	Central Appalachian Basic Oak - Hickory Forest (Submontane / Foothills Type)	3=no clear pref.
23.99492	Northeastern Modified Successional Forest	3=no clear pref.
0.21424	Virginia Pine Successional Forest	3=no clear pref.
814.47043	Central Appalachian Dry Chestnut Oak - Northern Red Oak / Heath Forest	2=highly tolerant
356.78161	Central Appalachian Acidic Cove Forest (Hemlock - Hardwood / Mountain-Laurel Type)	2=highly tolerant
17.63912	Central Appalachian Acidic Boulderfield	5=highly intolerant
274.58472	Catastrophically Disturbed Forest	3=no clear pref.
2.42806	Cultural Meadow	1=fire dependant

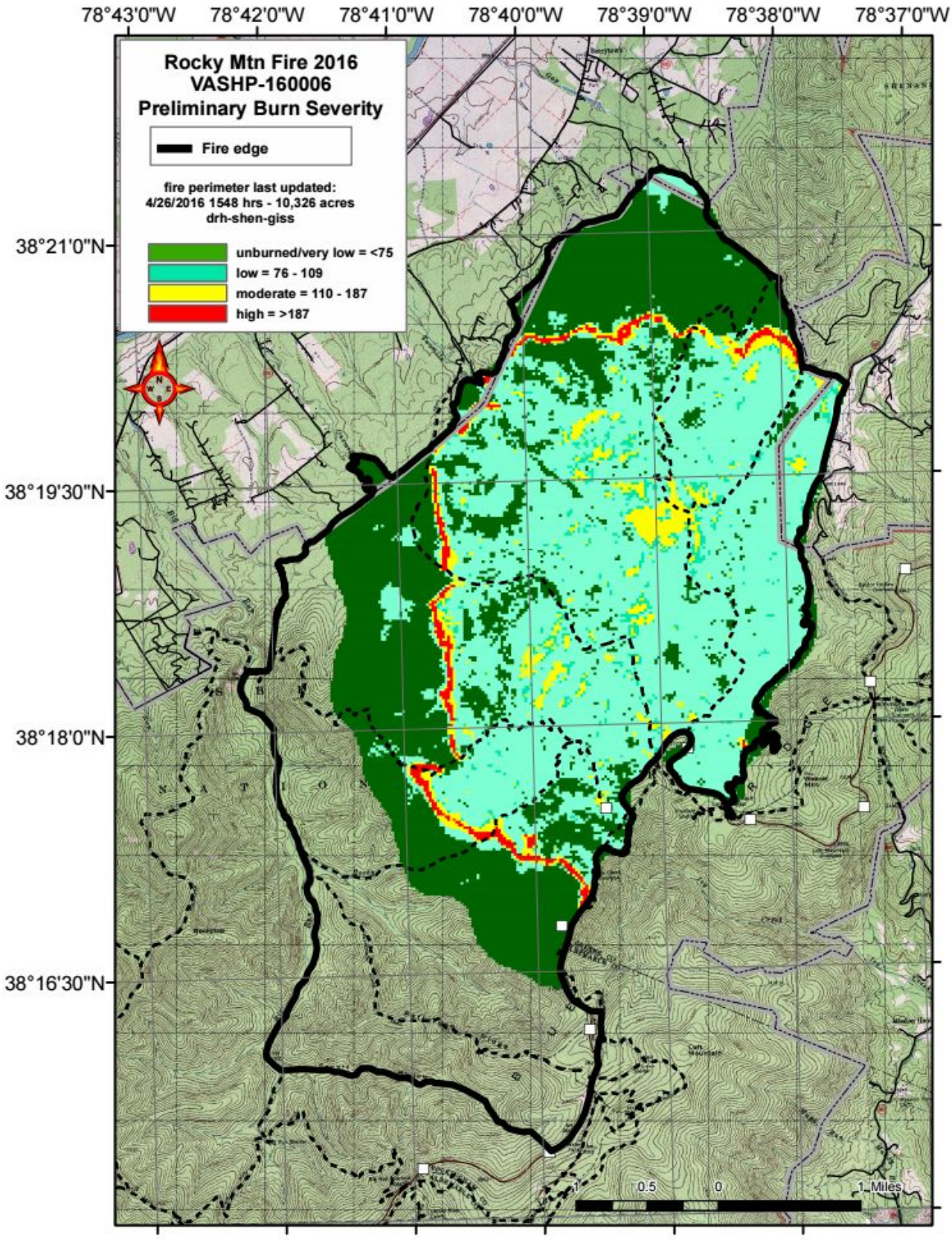
APPENDIX A-6. RELATIVE PROBABILITY OF ESTABLISHMENT OF NEW INVASIVES



APPENDIX A-7. RELATIVE PROBABILITY OF INVASIVE PLANT PRESENCE



APPENDIX A-8. PRELIMINARY BURN SEVERITY MAP



APPENDIX B. READ REPAIR & REHABILITATION PUNCH LIST

All areas:
Pull flagging and remove trash at all locations. All flagging must be removed from control lines, trails, drop points, and roads (park, private, and public). Remove drop point signage. Remove trail closure signs when appropriate.

Skyline Drive & Appalachian Trail:
Cut flagged hazard trees from AT on the slop over north of Ivy Creek Overlook and East of DP1. Flush cut stumps visible from the AT. Pull brush over handlines at AT and road intersections. Disperse piles of large rounds at the Patterson Ridge Trail trailhead. Remove logs and cut material from mowed areas and ditches along Skyline Drive (disperse into the woods). Conceal upper end of Eppert Run hand line.

Wilderness Trails:
Cut out blowdowns and hazard trees from the following trails: Rocky Mount Trail, Gap Run Trail, Onemile Run Trail, Brown Mtn Trail, Rocky Mountain Run Trail. Follow guidelines on IAP insert. Lower Brown Mtn Trail handline rehab - Brush in end of cold trail that leads to boundary dozer line and brush in (heavily) handlines that cut out trail switchbacks. Upper Brown Mtn Trail handline rehab - Brush in hand lines built across trail switchbacks.

Gap Run:
Gap Run Trail - Disperse piles of cut material into the woods; flush cut stumps visible from trail; tamp down tread marks in wet area. Gap Run handline downstream of Rocky Mt Trail - Pull cut material onto the handline to discourage future visitor use, with special attention to the concealment of the end of the control line at the Gap Run - Rocky Mt trail intersection.

Park boundary north of Big Run (formerly Div M/S):
Dozer and handline repairs:

Private property: Pull back berm and install waterbars with **dozer** or hand crew (following VADOF best practices) (3.1 miles of dozer).

NPS property: Pull back berm, cover with cut material, and install waterbars with **mini-excavator** or hand crew. Brush in ends to discourage future use. Install waterbars on east side of Walls Run and at other locations where appropriate. 2.6 miles of dozer and 0.25 miles of handline.

Do not use dozers or mini-excavators to repair handline. Be careful tracking equipment across wet drains.

Park boundary south of Big Run (formerly Div U/V):
Dozer and handline repairs:

NPS property: Pull back berm, cover with cut material, and install waterbars with **mini-excavator** or hand crew. Brush in ends to discourage future use. 1.6 miles of dozer and 0.8 miles of handline.

Do not use dozers or mini-excavators to repair handline. Be careful tracking equipment across wet drains.

Stream rehab in Park at Lower Lewis Run south of DP6

APPENDIX C. PRELIMINARY REHABILITATION GUIDELINES FOR WILDERNESS TRAILS

(Provided as an insert to the IAP during the last week)

Guidance for Activities to conduct preliminary opening and clearing of Fire impacted Trails in SHEN Wilderness

There are two trail types in wilderness:

Blue Blazed are for hikers only
Yellow Blazed is horses or hikers

1. The minimum cleared width of a wilderness trail should allow persons to walk or ride single file without leaving the treadway (blue-blazed trails about 1 foot on either side of the trail centerline; yellow-blazed trails, 1.5 feet on either side of the trail centerline)
2. Remove only those treefalls, limb debris or other obstructions which do not lie flat on the ground or which cannot easily be stepped over or walked under by a person carrying a backpack or rider on a horse. It is acceptable to leave some obstructions that can be easily traversed if it adds to the primitive setting or contributes to erosion control.
    - Areas of group deadfalls that prevent trail use may be cleared to defined widths.
    - Fell only trees that are significantly fire damaged and are in an imminent threat of falling over the trail.
    - General leaners non-fire weakened snags should not be felled unless they appear to be an imminent threat to pedestrian traffic (You should be afraid to be in its vicinity)

Saw Use Mitigation

The goal is to make it appear to future visitors that no long term human presence was left in the wilderness after fire suppression efforts.

If saws are used:

- Cut stumps to 4” above grade and angle the cut away from views from trail.
- For cuts to trees across trails, distribute rounds sparsely and perpendicular to the trail generally out of view of trail users.
- For trees across trail, “rough up” cut ends to mimic the appearance of traditional hand tool use.
- When flush cut stumps are unavoidable, cross hatch stumps to encourage rot.

APPENDIX D. READ LESSONS LEARNED

Lessons learned:

- READ staffing
  - Need more READs on large incidents, perhaps 1 per division
  - Good to have a strong cultural READ
  - More assistance on the line from SHEN NCR would be nice (i.e., more SHEN READs)
  - Would be good to have another person in a role between the READs and the park, such as a second lead READ or a second agency rep that works closely with READs
  - Would be good to have team order some FOBS so that READs are not relied on for that work
  - Do name orders for READs – be picky if possible (ask around in the area to see if there are people who would like to be notified)
  - Make sure READs have current Red Cards at the beginning of the fire season (re-up in the fall?)
- Delegation of Authority
  - Put SHEN resource guidelines in the Delegation of Authority
  - All READs should read it, understand it, and keep a copy on them
  - Consider adding to the DoA in the future: 1) use of fine mesh screen on pump intakes when drawing from Park streams, 2) biodegradable bar oil.
- Maps
  - Need a good map for field use – not the one that is in the back of the IAP or up on the wall for briefing
- Record and data keeping
  - Need a master log where all READs can enter what they did each day
  - For a big incident, it might be nice to have a "data READ" to collect information from field READs and put it all together in an organized package each day; would also work closely with GISS
  - Need to come up with a data structure for files that we put on Google drive during incident
- Setup at ICP
  - Need a real table, chairs, etc… an "office" for READs at ICP
  - Need to have a large printed READ map at ICP that we can mark up at the end of each day
- Operational / organizational considerations
  - Don't assume that DIVS has given crew leads clear guidance
  - Make sure that specs are defined for line construction, and that crews know what they are
  - There needs to be a READ message in the briefing each day
  - Should have a daily READ AAR back at ICP, understanding that some READs may not make it because they are still in the field
- SHEN NCR guidelines
  - Need to clearly define our best practices for line construction and rehab. For example, under what circumstances should trees be felled. What to fell and what not to fell is a big question. Is it more dangerous for a sawyer to fell a hazard tree, or more dangerous to leave a hazard tree standing that has a vanishingly small chance of falling on a passing hiker? This question is especially relevant when dealing with Wilderness.
  - Resource-related objectives for the incident need to be included on the IAP; generic statement about MIST is not sufficient

Things that went really well:

- Morning planning/direction was good and we were where we needed to be for the most part
- Good FOBS at the beginning to create good maps with Dan (and provided helpful info to DIVS)
- Pre-made READ maps (would be nice to get an overlay from Dan that shows control lines and DIV breaks)
- Distinct flagging color (pink w/black)
- Very good communication among READs (assisted by cell coverage on the boundary)

APPENDIX E. READ ICS-214s

ACTIVITY LOG (ICS 214)

1. Incident Name: Rocky Mt Fire	2. Operational Period: Date From: 4/17/2016 Date To: 5 /2/2016	
3. Name: Alan Williams (O-14)	4. ICS Position: READ	5. Home Agency (and Unit): NPS Shenandoah NP (VA-SHP)

6. Resources Assigned:

Name	ICS Position	Home Agency (and Unit)
Paull, Stephen	READ	Rock Outcrop Management Plan Coordinator, Shenandoah National Park
Dellinger, Bob	READ	Lead Fire Effects Monitor, Big Thicket National Preserve
Sullivan, Kate	READ	Fire Technician, Cape Cod National Seashore
Morrison, Howard	READ	Backcountry Ranger, Shenandoah National Park
Ziegler, Chris	READ	Wilderness Backcountry and Trails Branch Chief, Shenandoah National Park

7. Activity Log:

Date/Time	Notable Activities
4/17/2016 (Sun)	Came on fire at 1200hrs and met holding resources at Two-Mile Run OL for scouting & planning.
4/18/2016 (Mon)	Worked in Beldor Hollow with Hand crew (K. Painter) scouting / flagging boundary cemetery & weed zones. Scouted / flagged Gap Run from the West with Steve for holding and avoiding hemlock.
4/19/2016 (Tue)	Scouted the boundary and flagged ahead of the State dozer (Rhodes) on private land. During the day was notified (by Jeff K and Jim S) that we would move dozer line onto park but keep it out of Wilderness. We worked behind the Lamb's across Two Mile Run, One Mile Run, and to wet spot South of "clover patch"). The dozer line was moved onto the park starting South of the One Mile Run trail.
4/20/2016 (Wed)	Scouted the boundary and flagged ahead of the State dozer (Rhodes) on park non-Wilderness land going South toward Big Run. Reached Big Run by 1200 and the dozer went back north to help with spots and on private land. Met Bob on his arrival and worked him into the Sellers land with Steve to help monitor burn out and dozer work late in the day as the fire reached the control lines in Div S and Div M. Used dozer to push across the bottom of the "crescent" inside the park at the top of Div M at the request of Field Ops.
4/21/2016 (Thur)	Scouted the boundary and flagged ahead of the State dozer (Stoneburner) Div S working south from clover patch with Black Mesa IHC improving line. Worked with Bob and Howard coming from Miller's pond to find a place to have the dozer "walk" across Big Run (out of the park) and up toward Miller's pond with contingency line South of Big Run. Alan and Howard moved to DP6 and scouted for dozer and hand lines along the boundary back toward Miller's Pond while Bob stayed with dozer. Consulted via phone with Field OPS that chipping slash from Madison Run FR onto the ground would be OK.
4/22/2016 (Fri)	Scouted Big Run for issues of "holding" the fire in Big Run. Looked at hemlocks that Bob and Steve had already scouted, assessed the access issues for UTV, pumps etc. Worked in ICP at planning meetings advocating for biodegradable bar oil , and alternative dip sites to farm ponds.
4/23/2016 (Sat)	Drove the fire area and inventoried potential issues needing repair / rehab. Observed chipping starting at the top of Madison Run FR. Mapped spots and odd flagging on Skyline drive. Overcast and light rain on Skyline Drive. At ICP met with Kate and attended planning meetings and worked on documentation adding info to ICP 204 for rehab needs.
4/24/2016 (Sun)	GPSed cold trail and line/ trail prep in DIV S into Big Run by Black Mesa IHC. Watched burnout down to Big Run along the Brown Mtn Trail. Scouted control lines in Div S looking for rehab needs.
4/25/2016 (Mon)	Office day at park HQ with Steve. Documentation and cleanup of GPS, photos, and begin working on repair plans. Rest of READS on tasks at fire.
4/26/2016 (Tue)	Attended planning meetings and worked on documentation adding info to ICP 204 for rehab needs.
4/272016 (Wed)	Kate and Alan shuttled READs into the field with Augusta IHC members to assess trails for repair needs. In PM took a helicopter flight over burn area to photograph burn severity.
4/28/2016 (Thur)	Rain in AM; Operational Stand down; ICP documentation / planning day.
4/29/2016 (Fri)	DAY OFF (Transition back to park IC Type 4 in PM), Kate last day.
4/30/2016 (Sat)	Worked with SHEN hand crew mapping & repairing hand line South of DP7
5/1/2016 (Sun)	Rain Office Day documentation, GIS, BAER plan / report writing
5/2/2016 (Mon)	Checked TLTEM 3L467 near AT, Hiked Brown Mtn Trail to advise crews clearing the trail, checked TLTEM 3L530, photo documented burn severity. Had Bob hike Rocky Mount trail advise crews and check RTE, and TLTEM 3L464, 3L463.
5/3/2016 (Tue)	Office Day documentation, GIS, BAER plan / report writing

8. Prepared by: Name: Alan Williams Position/Title: READ Date: 5/3/2016

ACTIVITY LOG (ICS 214)

1. Incident Name: Rocky Mt Fire	2. Operational Period: Date From: 4/18/2016 Date To: 5/5/2016	
3. Name: Stephen Paull	4. ICS Position: READ	5. Home Agency (and Unit): NPS, Shenandoah National Park

6. Resources Assigned:

Name	ICS Position	Home Agency (and Unit)

7. Activity Log:

Date/Time	Notable Activities
4/18/2016	Gather READ supplies with Lead READ Williams; provide transport for VA Type 2 hand crew; weather observations on Beldor Fire Road
4/19/2016	On line, Divs E & M; Gap Run hand line assessment; boundary line scouting and flagging of boundary markers on Div M
4/20/2016	On line, Divs M & S; Scout line location in Big Run portal area and on Miller property; discussed use of dozer in park on Div M with DIVS and Field Ops; assisted with holding effort on Div M as fire hit line
4/21/2016	Did not work on fire
4/22/2016	On line, Divs E,M & S; Gap Run post-burn hemlock assessment; hand line assessment north of "crescent"; assessed impacts of slopover suppression on Onemile Run; assessed suppression impacts in Hawksbill Creek drainage
4/23/2016	On line, Divs S & V; assessed dozer line in park behind Miller property; accompanies saw crews in Big Run drainage and advised on MIST (prevented unnecessary cutting of snags)
4/24/2016	On line, Div S; assist crews with resource advice on prepping, burning out, holding and securing lower Brown Mountain Trail and Big Run
4/25/2016	Office; compilation of notes, photos, and GIS data; work on READ/BAER report
4/26/2016	On line, Divs M & S; post-burn assessments of Onemile Run hemlock population and lower Onemile Run trail; collected water sample from Twomile Run long-term sampling site for SHEN water quality staff
4/27/2016	On line, Divs W & S; post-burn assessment of Rocky Mountain Run Trail
4/28/2016	Office; compilation of notes, photos, and GIS data; work on READ/BAER report
4/29/2016	On line, Divs A & W; helped direct rehab efforts on Appalachian Trail and along Skyline Drive
4/30/2016	Office; work on READ/BAER report and incident maps
4/31/2016	On line, Divs E & M; assessed rehab needs along Gap Run; directed rehab efforts of hand crew on dozer and hand line on Park property in the "crescent" area
5/1-5/2016	Office; work on READ/BAER report; compilation of notes and photos; READ AAR and lessons learned;

8. Prepared by: Name: Stephen Paull Position/Title: READ

ICS 214, Page 1 Date 5/3/2016

ACTIVITY LOG (ICS 214)

1. Incident Name: Rocky Mt Fire	2. Operational Period: Date From: 4/19/2016 Date To: 5 /5/2016	
3. Name: Bob Dellinger	4. ICS Position: READ	5. Home Agency (and Unit): NPS BITH; Big Thicket National Preserve

6. Resources Assigned:

Name	ICS Position	Home Agency (and Unit)

7. Activity Log:

Date/Time	Notable Activities
4/19/2016	Travel from BITH to Houston, TX
4/20/2016	Travel from Houston, TX to Grottoes, VA, Check in at ICP, orientation to incident w Allan Williams (LEAD READ), Scout location of Wilderness Boundary in Div. M with Steve Paull, fire had spread to Wilderness boundary and with active fire behavior and proximity to private land Steve and I assisted to holding, watching the green and catching spot fires.
4/21-22/2016	On line, Div. S and V; scout Dozer line location, recommend using existing 2 tracks w light scrape over much of area, which was done, some deeper Dozer line was put into tie in w hand line around private land between DP 5 & 7
4/23-26/2016	On line, Div. S & W; Assist crews with resource advice on prepping, burning out, holding and securing lower Brown Mt. and Big Run
4/27/2016	On line, scouting resource issues and workload for clearing and hazard tree removal on Brown Mt. trail
4/28-29/2016	On line in Div. S & U, scouting repair/rehab of fire line
4/30/2016	On line, Div. M and E, resource advice on trail and fire line repair/rehab
5/1/2016	Office; compiling notes
5/2/2016	On line, resource advice on Rocky Mount trail, LTEM and rare plant assessment
5/3/2016	Office; compiling notes
5/4/2016	Office; compiling notes Demob; Travel from SHEN to Charlottesville, VA
5/5/2016	Travel to Home unit

8. Prepared by: Name: Bob Dellinger Position/Title: READ

ICS 214, Page 1 Date 5/3/2016

APPENDIX F. SIGNED DELEGATION OF AUTHORITY

Rocky Mtn. Fire, Shenandoah National Park, VA
Delegation of Authority

Date: April 19, 2016

To: Incident Commander, Mike Dueitt

From: Superintendent, Shenandoah National Park

Effective April 20, 2016, at 0600 hours, I am delegating full authority to manage the Rocky Mtn. Fire 2016 Wildland Fire, Incident Number VA-SHP-160006, Shenandoah National Park (the Park), to you and your team. You have full authority and responsibility for managing fire within the framework of law, agency policy, and direction provided in this Delegation of Authority. The Rocky Mtn. Fire 2016 Wildland Fire was first documented approximately 13:15 on April 16, 2016, and continues to burn on National Park land, but has the potential to reach private land.

My considerations for management of this fire are:

1. Ensure firefighter safety by adhering to the 10 Standard Fire Fighting Orders, 18 Watch-out Situations, LCES, and 2:1 work rest ratio.
2. Keep the fire within the boundaries of the Park, west of the Skyline Drive, east of Two Mile Run community, west of Beldore Hollow fire road and north of the Madison Run road to minimize impact to private lands.
3. Provide for public safety, protection of private property, and critical infrastructure.
4. Manage initial and extended attack for new fire starts within the response areas identified on attached map.
5. Maintain continuous communications with the Virginia Department of Forestry, Rockingham County Emergency Services and other firefighting organizations surrounding this incident.
6. Utilize Public Information Officers to communicate the suppression and management of the fire to park neighbors, stakeholders and cooperators through media interviews and neighbor contacts. Public information releases should be approved through the Agency Representative prior to release. All political contacts are to be forwarded to Superintendent, Shenandoah National Park. Keep me informed regarding all political aspects.
7. Minimize smoke impacts along Skyline Drive and roads/communities adjacent to the Park.
8. Avoid using the Appalachian National Scenic trail as holding line, protect related historic structures, and manage the high volume of trail users to allow them to continue their trip.
9. Provide protection for wilderness character by minimizing long term evidence of suppression efforts and contacting appropriate level of line officer prior to use of mechanized equipment in wilderness. Additional MIST guidance can be found attached to this delegation.
10. Where possible, fire should be allowed to play its role as a natural process benefitting fire-dependent ecological communities, and creating a diverse mosaic on the landscape.
    - Implement fire management strategies which will mitigate and minimize disturbance to riparian areas, cultural, and natural resource values within the Park. Utilize Resource Advisors in the

placement of control lines. Protect remnant (individually-treated) Eastern hemlock trees in defined riparian areas from intense fire or mechanical damage.

- In developing strategy, the potential degradation of wilderness character will be considered before, and given significantly more weight, than economic efficiency and convenience. MIST techniques will be used and heavy equipment use must be pre-approved by the Agency Rep.

11. The use of bulldozers and tractor plows to create lines or roads is generally prohibited within the park boundary, but may be considered for use by the park superintendent upon emergency request detailing extreme threats to life and or property.

12. Use only approved water sources.

13. Provide training opportunities for the personnel of Shenandoah National Park and other agencies so as to strengthen our organizational capabilities.

14. Complete initial rehabilitation plans and make significant rehabilitation progress before resources are released.

15. Prepare a list to be used in developing letters of appreciation for any cooperative agencies and their personnel that may have been involved in the incident.

16. Prepare a final fire documentation package, including fire narrative, maps, evaluations, analysis, and fiscal documentation.

17. Additional resource considerations are attached and a part of this delegation. This delegation and will remain in effect until you transition to another organization or until rescinded.

Mike Dueitt 4/20/16
Mike Dueitt DATE
Incident Commander

Jim Northup 4/20/16
Jim Northup DATE
Superintendent

John Miller 4/20/16
John Miller DATE
Virginia Department of Forestry
Director of Resource Protection

Should any problems or concerns arise, please contact me. I am prepared to discuss any needs to revise or revisit this delegation. Agency personnel can be contacted at the following numbers:

Name	Title	Office	Cell Phone	Home
Jim Northup	Agency Administrator	540-999-3500,x 3100	540-908-0729	540-743-5151
Jeff Koenig	Agency Representative	540-999-3500,x 3441	540-622-3507	540-294-5084
Matt Way	Assistant FMO	540-999-3500,x 3443	540-622-7716	
Alan Williams	Resource Advisor	540-999-3500,x 3431	540-244-7587	
Lisa Wilkolak	Public Affairs Officer	540-999-2152	651-428-3008	

Sally Hurlbert	Public Affairs Officer	540-999-2152	540-908-1997	

cc: Incident File

SPECIFIC FIRE MANAGEMENT OBJECTIVES FOR SHENANDOAH NATIONAL PARK
Attached and Made a Part of the Delegation of Authority Dated April 19, 2016

Fire Management Objectives:

1. Maintain firefighter safety by adhering to the 10 Standard Fire Fighting Orders, 18 Watch-out Situations, LCES, and 2:1 work rest ratio.
2. Provide for public safety, protection of private property, and critical infrastructure.
3. Contain all new fires at the smallest size practical size emphasizing firefighter safety and resource objectives and constraints unless otherwise directed by the fire duty officer.
4. Limit the growth of the Rocky Mtn Fire 2016 within the park boundary to the North and West, to the Skyline Drive to the East, and Madison Run Road to the South.
5. In developing strategy, the potential degradation of wilderness character will be considered before, and given significantly more weight, than economic efficiency and convenience. MIST techniques will be used and all off-trail vehicle use must be pre-approved by the Agency Rep.
6. Implement fire management strategies which will mitigate and minimize disturbance to soils, cultural, and natural resource values within the Park.
7. Manage the fire(s) in a cost effective and efficient manner commensurate with estimate developed or revised in the WFDSS.
8. Minimize smoke impacts to Skyline Drive and the neighboring communities.

SPECIFIC MINIMUM IMPACT SUPPRESSION TACTICS FOR SHENANDOAH NATIONAL PARK
Attached and Made a Part of the Delegation of Authority Dated April 19, 2016

To meet Wilderness management law and policy, fire management decisions should emphasize techniques that minimize negative impacts to the naturalness, solitude, and undeveloped nature of the park's wilderness areas.

All aspects of fire management must be given careful consideration prior to engagement with fire personnel and equipment. Initial engagement decisions can affect future fire management options, costs, implementation exposure, and limit the ability to protect the natural character of the wilderness. Long-term effects of suppression, both in tactics and exclusion of fire, should be given considerable attention when developing engagement options.

Pre-emptive burnouts should be done with careful consideration of the tradeoffs with letting the fire burn in a natural mosaic, and implanted with that in mind. Large scale burns should be done in consultation with the Agency Rep and/or Natural Resource Advisor.

In order to meet park management and fire management goals, the following Minimum Impact Suppression Tactics (MIST) have been developed for broad use across the designated wilderness of Shenandoah NP:

- Where possible, fire should be allowed to play its role as a natural process, creating a diverse mosaic on the landscape.

- Select procedures, tools, and equipment that least impact the environment.
- Chainsaws, leafblowers, mechanized pumps, and aircraft may be used on a limited basis within the park during suppression activities.
- Generally avoid the use of natural surface water in the park.
- In **light fuels**:
    - allow fire to burn to natural barriers
    - consider burn outs
    - constantly recheck cold trailed fireline
- In **medium/heavy fuels**:
    - consider use of natural barriers
    - minimize bucking to establish fireline; preferably build line around logs
- **Aerial fuels**:—brush, trees, and snags:
    - adjacent to fireline: limb only enough to prevent additional fire spread
    - inside fireline: remove or limb only those fuels which if ignited, would have potential to spread fire outside the fireline
- **Trees, burned trees, and snags:**
    - minimize cutting of trees, burned trees, and snags
    - live trees will not be cut, unless determined they will cause fire spread across the fireline or seriously endanger workers. If tree cutting occurs, cut stumps flush with the ground
    - scrape around tree bases near fireline if hot and likely to cause fire spread
    - identify hazard trees with either an observer, flagging, and/or glowsticks
- **When using indirect attack:**
    - do not fall snags on the intended unburned side of the constructed fireline, unless they are an obvious safety hazard to crews working in the vicinity
    - on the intended bumout side of the line, fall only those snags that would reach the fireline should they burn and fall over.
    - review items listed above (i.e., aerial fuels; brush, trees, and snags)

A resource advisor will be assigned to the wildland fire. Each resource advisor will:

- Ensure initial attack and incident commander are aware of wilderness resources and management direction.
- Coordinate with fire suppression personnel to ensure appropriate suppression actions are used that minimize the rehabilitation requirements.
- Support appropriate rehabilitation actions prior to release of suppression forces.

APPENDIX G. READ PHOTOS

FIRE BEHAVIOR













SUPPRESSION IMPACTS



Dozer line before and after, North of Big Run



Burnout before and after, Big Run Portal





Onemile Run before and after dozer crossing



Pumping water out of Big Run to support burnout along Brown Mtn Trail



Hand crew suppression gear

REPAIR / REHABILITATION

Handline	Handline after repair
	
	
Dozer line	Dozer line after repair
	

READs IN ACTION

















Photo by Trent Gooden

TRAILS



Burn scar with potential for extra runoff on trail and erosion.



Blaze damage.



Water bar enlarged on trail by suppression crews to assist with additional water management.



Light burn with minimal potential for additional damage along the AT.





Backcountry campsite along Brown Mtn Trail with minimal damage; Onemile Run Trail near boundary

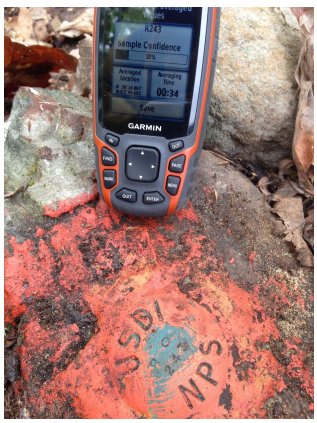
BOUNDARY



























Stone work along Hawksbill Creek in Beldor.



Doyles Cabin leaf blown and prepared to “wrap” if needed.

FLORA



Scorched hemlock regeneration along Onemile Run



Patchy fire in hemlock stand along Onemile Run



Leaf blowers employed to protect some hemlocks along Gap Run



Fire-damaged paper birch (*Betula papyrifera*)



Rich herb layer at edge of natural out in Hawksbill Creek drainage



Bellwort flowering shortly after fire

MISCELLANEOUS







4/22/2016 - NASA



From Brown Mtn Trail Looking up Big Run





Night fire activity. Photo courtesy of Willard Worley.



Camouflaged copperhead



Camouflaged black ratsnake