

# COMPOSITE BURN INDEX (CBI) PHOTO SERIES

## Southeast – Virginia, Deciduous and Conifer Forest

Carl Key, USGS Northern Rocky Mountain Science Center; Nate Benson, NPS Fire Management Program Center; Scott Lang, NPS Glacier. 2008.



The Composite Burn Index (CBI) Photo Series uses plot photos and data to illustrate the range of burn severity encountered in ecosystems of the U.S. We selected examples from over 2,500 plots and 85 fires, spanning very low to very high degrees of ecological change from fire. The series offers managers and scientists a way to calibrate their field interpretations, providing a sense of what the CBI represents visually on the ground. It also provides insight into the variety of fire effects and combinations of effects that make up the overall post-fire condition on a site. One can see that low and high severity conditions may be relatively distinctive and consistent, while there are many possible ways involving different combinations of dissimilar levels of effect that can end up in the moderate range of severity overall. Hence, mid-range CBI values often translate into variable and broader ranges of possible conditions that may be more difficult to interpret. This poster covers Southeast forest ecosystem fires in Virginia: the Shenandoah Complex (2000), Rocky Top fire (2002), and Fultz Run fire (2002), sampled by USGS and NPS crews in 2002.

The CBI is a 0.0 to 3.0 field rating of burn conditions averaged over a site. It is based on averaging 4-5 rating factors within each of 5 strata (A. - E.), and within Understory (A. - C.), Overstory (D. - E.) and over all for rating the Total Plot (A. - E.)

Shenandoah Complex 2000  
2002 Plot 5S CBI = 0.49



100% burn with light charring of understory. 85% of pre-fire litter and light fuels consumed, but only 15% of duff, and 10% of larger fuels. No change in exposed soil cover. Regenerated forbs, grasses, and shrubs dominate understory. Tall shrub and small tree mortality is low 20% with little effect to crowns. Overstory trees show small 2% amount of girdling. Mixed hardwood community.

**PLOT 5S**

A. Substrates	0.66
B. Vegetation < 1 m.	1.27
C. Vegetation 1-5 m.	0.58
D. Intermediate Trees	0.05
E. Big Trees	0.03
Understory CBI	0.78
Overstory CBI	0.04
Total Plot CBI	0.49

Rocky Top Fire 2002  
2002 Plot 5R CBI = 0.99



100% burn with light charring of understory. >80% litter and light fuels consumed, 25% for duff. Larger fuels 10-20% consumed. Slight 2% change in soil cover. Regenerated forbs, grasses, and shrubs dominate understory with some colonizers. Stratum C scorched >95% but mortality is low <10%. Overstory tree mortality is 5%, 15% crown scorch, no char. Basal char height is < 1 m. Mixed hardwood/conifer community.

**PLOT 5R**

A. Substrates	1.14
B. Vegetation < 1 m.	0.95
C. Vegetation 1-5 m.	1.38
D. Intermediate Trees	0.48
E. Big Trees	N/A
Understory CBI	1.15
Overstory CBI	0.48
Total Plot CBI	0.99

Fultz Run Fire 2002  
2002 Plot 7F CBI = 1.94



Consistent burn with high consumption of litter, light fuels and duff > 95%. Larger fuel consumption > 80%. 50% increase in soil cover. Only about 10% loss of pre-fire herbs, but moderate-high establishment of colonizing forbs and grasses. Taller shrubs and saplings largely charred, but about 80% surviving. Intermediate tree canopy mortality is 70%, all due to scorch-girdle, as is the big tree canopy mortality of about 20%. Char height is < 1.8 m. Mixed hardwood/conifer community.

**PLOT 7F**

A. Substrates	2.63
B. Vegetation < 1 m.	2.05
C. Vegetation 1-5 m.	1.57
D. Intermediate Trees	2.00
E. Big Trees	1.35
Understory CBI	2.13
Overstory CBI	1.68
Total Plot CBI	1.94

Fultz Run Fire 2002  
2002 Plot 2F CBI = 2.25



100% burn with consistent high charring throughout. > 95% litter and light fuels consumed, duff about 50%, and 40% for larger fuels. Moderate 25% increase in soil cover. High >90% survivorship of herbs, but significant establishment of new colonizers and shifting species composition. Strata C and D show >90% crown-charred, <10% scorched, but with basal resprouting. Intermediate tree canopy mortality is 100%. Mixed hardwood/conifer community.

**PLOT 2F**

A. Substrates	2.04
B. Vegetation < 1 m.	2.10
C. Vegetation 1-5 m.	2.15
D. Intermediate Trees	2.78
E. Big Trees	N/A
Understory CBI	2.09
Overstory CBI	2.78
Total Plot CBI	2.25

Rocky Top Fire 2002  
2002 Plot 4R CBI = 2.61



100% burn with high consumption or charring throughout. High consumption of litter, light fuels and duff 90-100%; larger fuels > 65% and deep char. Increase in soil cover > 75%. Stratum B survivorship only 30%, colonizers becoming established. Shrub crowns charred or consumed, about 65% resprouting. One tree stratum, crown mortality 99% mostly from torch-char, some fine branching consumed. Mixed hardwood/conifer community.

**PLOT 4R**

A. Substrates	2.78
B. Vegetation < 1 m.	2.53
C. Vegetation 1-5 m.	2.43
D. Intermediate Trees	2.65
E. Big Trees	N/A
Understory CBI	2.60
Overstory CBI	2.65
Total Plot CBI	2.61

Fultz Run Fire 2002  
2002 Plot 27F CBI = 0.57



100% burn with light charring of understory. Most all litter consumed but many light fuels remain; 15-25% duff consumption. Larger fuels lightly charred up to 10% consumed. Essentially no change in soil cover. Stratum B nearly fully regenerating. Tall shrubs and small trees show signs of crown scorch, but 95% resprouting. Trees show only low char height; crowns unaffected. Mixed hardwood community.

**PLOT 27F**

A. Substrates	1.02
B. Vegetation < 1 m.	0.73
C. Vegetation 1-5 m.	0.93
D. Intermediate Trees	0.03
E. Big Trees	0.03
Understory CBI	0.90
Overstory CBI	0.03
Total Plot CBI	0.57

Shenandoah Complex 2000  
2002 Plot 8S CBI = 0.78



100% burn; consistent moderate charring in strata A and B offset by low effects in other strata. Litter and light fuels 95% consumed; duff about 55%; larger fuels 10-20%. Soil cover increased 10%. Regenerated herbs and shrubs dominate understory with some colonizers. Little change to stratum C, some signs of scorch, light char >90% survival. Only very low ground char noted on overstory trees. Mixed hardwood/ conifer community.

**PLOT 8S**

A. Substrates	1.54
B. Vegetation < 1 m.	1.45
C. Vegetation 1-5 m.	0.65
D. Intermediate Trees	0.05
E. Big Trees	0.00
Understory CBI	1.24
Overstory CBI	0.03
Total Plot CBI	0.78

Fultz Run Fire 2002  
2002 Plot 6F CBI = 1.93



Fairly consistent moderate burn throughout, with highest impacts to substrates. 70-75% duff consumption, higher for other fuels. Some 15% increase in soil cover. Herbs 80% survival with moderate colonizer establishment. Taller shrub crowns charred but up to 90% resprouting. Intermediate tree crown mortality is about 50% from scorch-girdle. Big tree canopy is 70% green mortality 30% from scorch-girdle. Char height < 3 m. Mixed hardwood community.

**PLOT 6F**

A. Substrates	2.44
B. Vegetation < 1 m.	2.13
C. Vegetation 1-5 m.	1.53
D. Intermediate Trees	1.83
E. Big Trees	1.50
Understory CBI	2.11
Overstory CBI	1.66
Total Plot CBI	1.93

Rocky Top Fire 2002  
2002 Plot 3R CBI = 2.39



100% burn with consistent moderate-high charring. High > 95% litter and light fuel consumed; duff 75%; larger fuels 60-70%. About 60% increase in soil cover. 55% survival in stratum B with shifting species composition. Stratum C crowns charred and partly consumed, about 50% resprouting. Intermediate tree canopy <5% green, 20% charred, >75% scorched. Canopy mortality estimated near 60% offset by shoot resprouting. Mixed young hardwood/conifer community.

**PLOT 3R**

A. Substrates	2.74
B. Vegetation < 1 m.	2.13
C. Vegetation 1-5 m.	2.38
D. Intermediate Trees	2.20
E. Big Trees	N/A
Understory CBI	2.47
Overstory CBI	2.20
Total Plot CBI	2.39

Rocky Top Fire 2002  
2002 Plot 12R CBI = 2.78



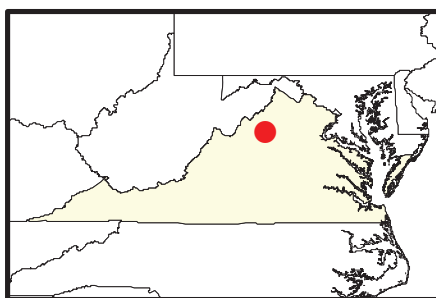
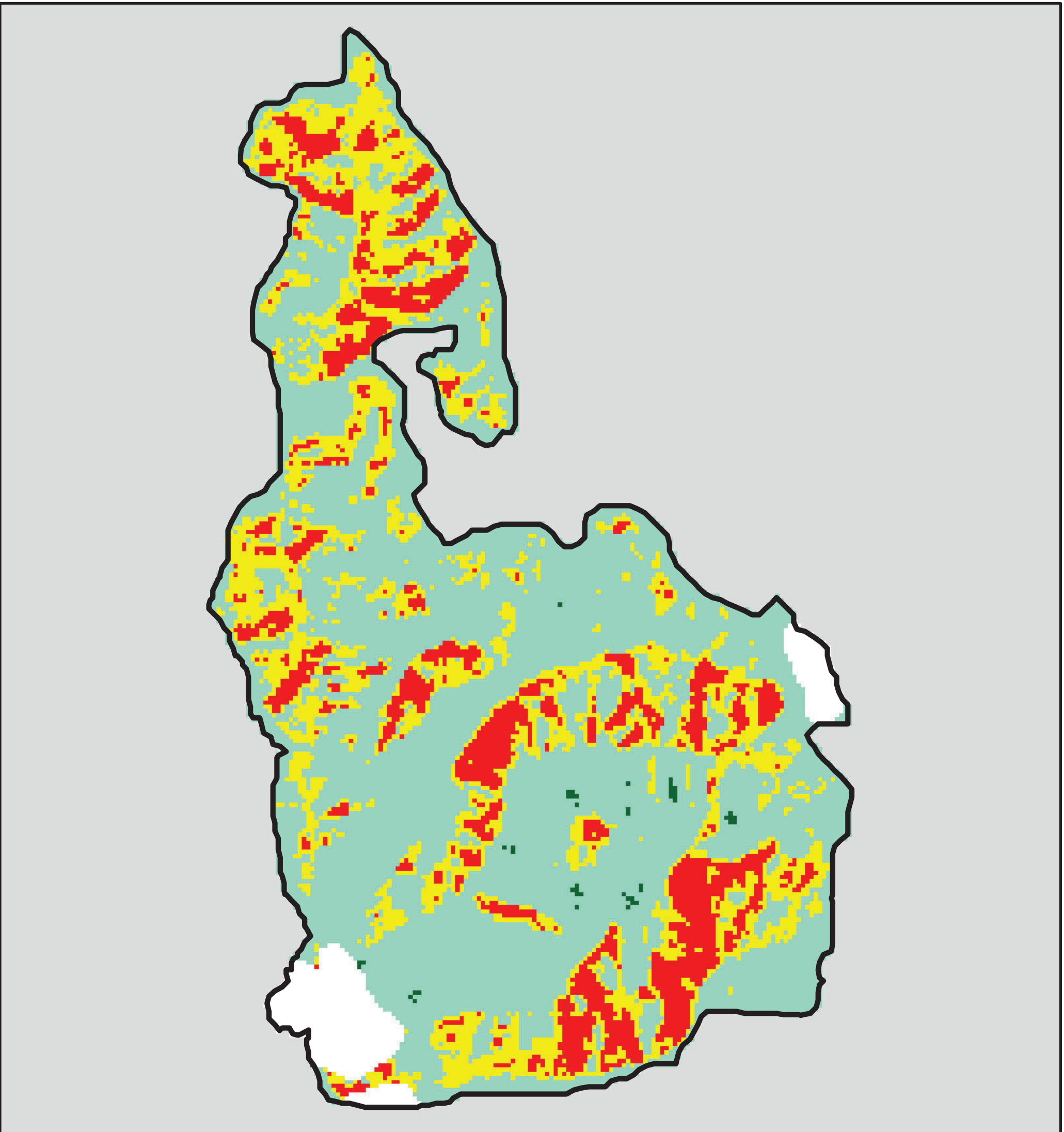
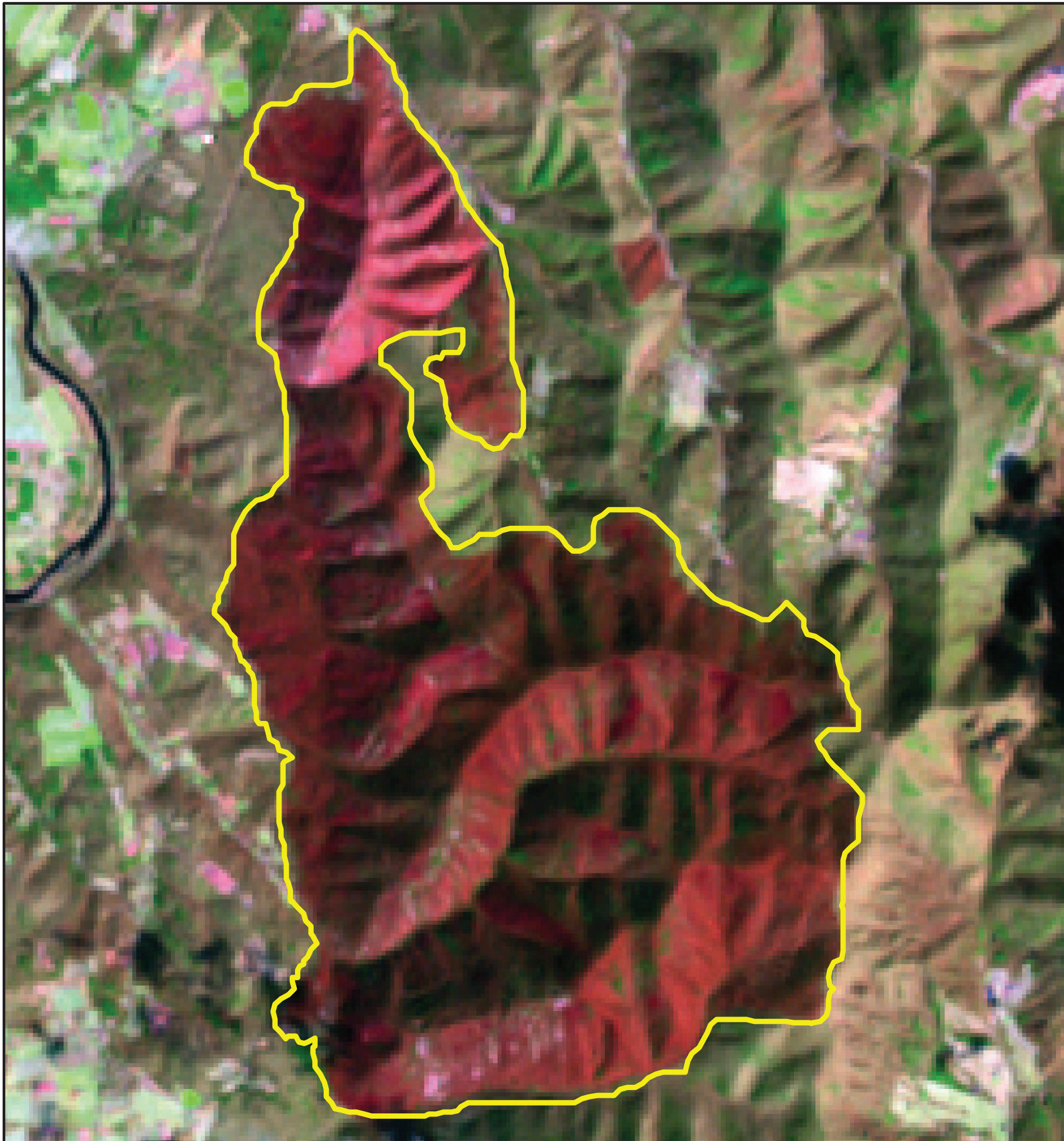
Consistent 100% burn with high charring and consumption throughout. High consumption of litter and duff > 98%, and down fuels > 70%. Increase in soil cover > 60%. Less than 20% survivorship in strata B and C. Scattered colonizers. Shrub and small tree crowns charred or consumed. Mixed young hardwood/conifer community.

**PLOT 12R**

A. Substrates	2.86
B. Vegetation < 1 m.	2.60
C. Vegetation 1-5 m.	2.80
D. Intermediate Trees	N/A
E. Big Trees	N/A
Understory CBI	2.78
Overstory CBI	N/A
Total Plot CBI	2.78

# 2002 Virginia: FULTZ RUN

va3851407855120020226



Latitude: 38° 30' 50.4"  
 Longitude: -78° 33' 03.6"  
 Fire Ignition Date: February 26, 2002  
 Assessment Type: Initial (SS)  
 Pre-Fire Image Date: N/A  
 Post-Fire Image Date: March 05, 2002 (Landsat 7)



Acreage of Burn Severity	
Burn Severity	Acres
Unburned to Low	11
Low	2,740
Moderate	1,085
High	608
Increased Greenness	0
Non-Processing Area Mask*	191
<b>Total</b>	<b>4,635</b>

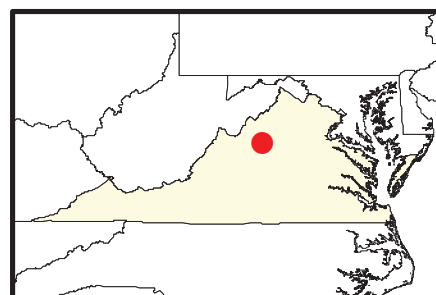
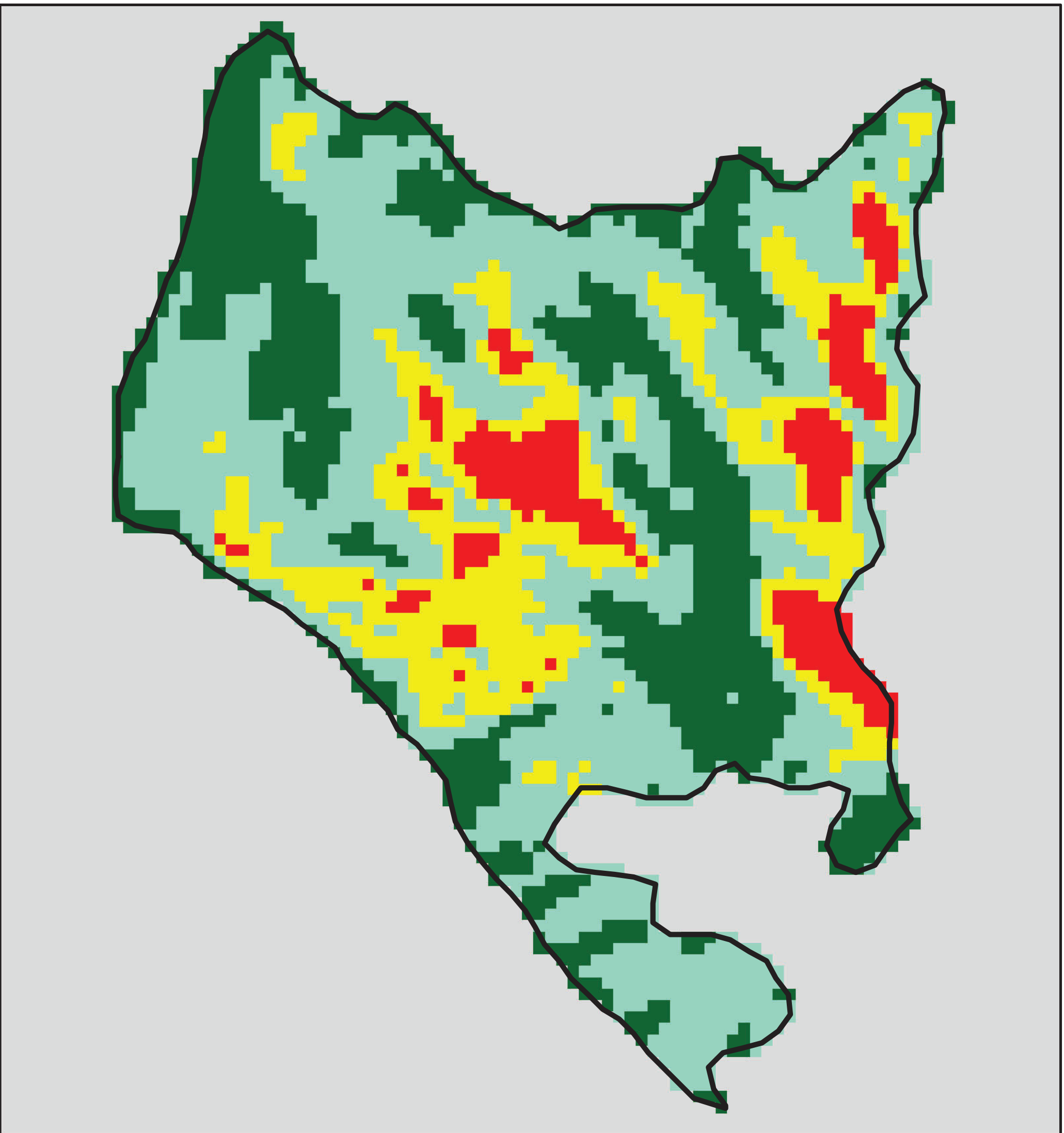
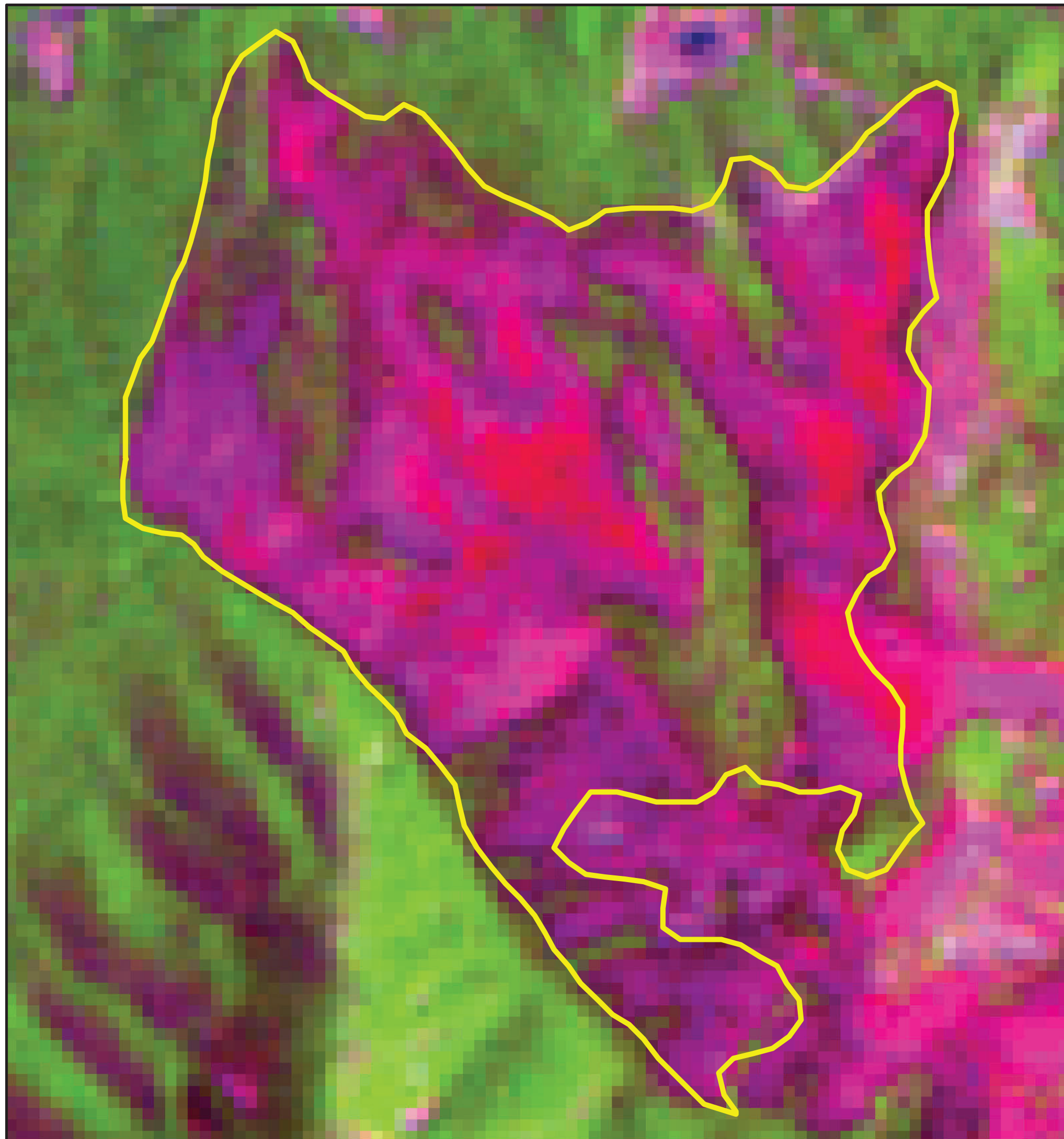
This map portrays fire severity for the fire specified in the map title and summarizes proportions of fire severity classes. These data are produced under the Monitoring Trends in Burn Severity (MTBS) project jointly implemented by the USGS EROS and the USFS RSAC. The MTBS project ascertains the locations of fires based on available fire occurrence information provided by federal and state agencies, and other reliable sources. The MTBS project reserves the right to correct, update or modify geospatial inputs to this map without notification.

\* Areas in either the pre-fire or post-fire reflectance imagery containing clouds, snow, shadows, smoke, significantly sized water bodies, missing lines of image data, etc.



# 2002 Virginia: ROCKYTOP2

va3830007872020020703



Latitude: 38° 17' 60.0"  
 Longitude: -78° 43' 12.0"  
 Fire Ignition Date: July 03, 2002  
 Assessment Type: Initial (SS)  
 Pre-Fire Image Date: N/A  
 Post-Fire Image Date: August 04, 2002 (Landsat 5)



Acreage of Burn Severity	
Burn Severity	Acres
Unburned to Low	234
Low	372
Moderate	143
High	66
Increased Greenness	0
Non-Processing Area Mask*	0
<b>Total</b>	<b>815</b>

This map portrays fire severity for the fire specified in the map title and summarizes proportions of fire severity classes. These data are produced under the Monitoring Trends in Burn Severity (MTBS) project jointly implemented by the USGS EROS and the USFS RSAC. The MTBS project ascertains the locations of fires based on available fire occurrence information provided by federal and state agencies, and other reliable sources. The MTBS project reserves the right to correct, update or modify geospatial inputs to this map without notification.

\* Areas in either the pre-fire or post-fire reflectance imagery containing clouds, snow, shadows, smoke, significantly sized water bodies, missing lines of image data, etc.

