

COMPOSITE BURN INDEX (CBI) PHOTO SERIES

Southwest – Grand Canyon, Mixed Conifer Forest

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The Composite Burn Index (CBI) Photo Series uses plot photos and data to illustrate the range of burn severity encountered across 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 the Poplar fire (2003) in Grand Canyon National Park in Arizona, field sampled by NPS crews in 2004.

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.)

Poplar Fire 2003
2004 Plot P15 CBI = 0.43



Patchy 35% burn with light charring of understory. Low 25% consumption of litter and duff; larger down fuels 10-15%. Small change 10% in soil cover. Grass and forb regeneration 95%, trace of colonizers. Stratum C <10% charred, >95% survival. Overstory trees 95% green, small amount of scorch/girdle. Ponderosa mixed conifer community type.

PLOT P15

A. Substrates	0.88
B. Vegetation < 1 m.	0.17
C. Vegetation 1-5 m.	0.48
D. Intermediate Trees	0.28
E. Big Trees	0.18
Understory CBI	0.57
Overstory CBI	0.23
Total Plot CBI	0.43

Poplar Fire 2003
2004 Plot P67 CBI = 1.02



100% burn; consumption of litter 75% and duff 30-40%; larger down fuels up to 40%. 10-15% increase in exposed soil. Forbs and grasses 90% regenerating with some patches of colonizers. Stratum C 80% scorch or char, but 95% resprouting. Intermediate trees 80% green; 15% scorched; trace of char. Big trees <5% scorch/girdle, no mortality. Char height is < 1 m. Ponderosa mixed conifer community type.

PLOT P67

A. Substrates	1.70
B. Vegetation < 1 m.	1.13
C. Vegetation 1-5 m.	1.33
D. Intermediate Trees	0.63
E. Big Trees	0.23
Understory CBI	1.45
Overstory CBI	0.43
Total Plot CBI	1.02

Poplar Fire 2003
2004 Plot P07 CBI = 1.33



90% burn, consistent low-moderate effects throughout. Moderately high consumption of litter 60% and duff 40%. High 40% reduction of heavy fuels deep char. Moderate increase in soil cover 35-40%. A few patches of colonizing grasses and forbs, otherwise 50% regeneration. Sapling tree mortality is > 75% mostly from scorch-girdle. Intermediate trees show and 60% scorch-girdle, <5% torch-char and the remainder green. Upper canopy has 10% scorch/girdle, 90% green, < 5% mortality; char height < 1.5 m. Ponderosa mixed conifer community type.

PLOT P07

A. Substrates	1.60
B. Vegetation < 1 m.	1.47
C. Vegetation 1-5 m.	1.60
D. Intermediate Trees	1.23
E. Big Trees	0.73
Understory CBI	1.57
Overstory CBI	0.98
Total Plot CBI	1.33

Poplar Fire 2003
2004 Plot P95 CBI = 0.43



100% burn with moderately-high charring over plot. Litter and light fuels consumed; duff nearly so; larger down fuels > 60% with deep char. Increase in exposed soil > 80%. 30% understory survival, moderate number of colonizers. All stratum C charred; up to 60% resprouting. Intermediate tree crowns 20% torch-char, 75% scorch/girdle, 5% green. Upper canopy has about 5% charred, 45% scorched/girdled and 45% green, mortality about 50%. Char height up to 5 m. Ponderosa mixed conifer community type.

PLOT P95

A. Substrates	2.90
B. Vegetation < 1 m.	2.00
C. Vegetation 1-5 m.	2.38
D. Intermediate Trees	2.10
E. Big Trees	1.88
Understory CBI	2.46
Overstory CBI	1.99
Total Plot CBI	2.26

Poplar Fire 2003
2004 Plot P33 CBI = 2.89



100% burn with consistent high charring throughout. High consumption of litter and duff 95-100%; and larger down fuels > 60% with deep char. Increase in soil cover > 80% with color change. Low 15% understory survival with high colonizer potential. Stratum C mostly conifer saplings charred or consumed; shrubs < 5% survival. Overstory crowns charred with branch loss; a trace of scorch; mortality is 100%. Fir/Ponderosa Pine/Aspen community.

PLOT P33

A. Substrates	3.00
B. Vegetation < 1 m.	2.73
C. Vegetation 1-5 m.	2.93
D. Intermediate Trees	2.87
E. Big Trees	2.83
Understory CBI	2.91
Overstory CBI	2.85
Total Plot CBI	2.89

Poplar Fire 2003
2004 Plot P86 CBI = 0.47



Patchy 55% burn with light charring of understory. Low consumption of litter 40% and duff 30%; larger down fuels < 5% shallow char. 10% change in soil cover. Herbs and grasses 90% regenerated. Loss of few conifer saplings, otherwise stratum C little affected. Overstory tree ground char height is < .5 m. Overstory trees unchanged, no mortality. Mixed Fir/Spruce/Ponderosa Pine community.

PLOT P86

A. Substrates	0.82
B. Vegetation < 1 m.	0.67
C. Vegetation 1-5 m.	0.75
D. Intermediate Trees	0.03
E. Big Trees	0.03
Understory CBI	0.76
Overstory CBI	0.03
Total Plot CBI	0.47

Poplar Fire 2003
2004 Plot P42 CBI = 1.10



100% burn, light charring over plot. Moderate consumption of litter 75% and duff 50%; larger down fuels 20-30%, partial charring. Soil cover <10% increase. Herb and grass regrowth about 90% with few colonizers. Stratum C crown char and scorch is 50%; mortality 40%, mostly sapling conifers. Trees in stratum D are about 65% green with 30% scorch/girdle and 5% char. Big trees are about 65% green, the remainder brown from scorch/ girdle. Tree char height is < 1 m; no overstory mortality. Ponderosa pine/mixed conifer community.

PLOT P42

A. Substrates	1.44
B. Vegetation < 1 m.	0.87
C. Vegetation 1-5 m.	1.30
D. Intermediate Trees	0.80
E. Big Trees	0.95
Understory CBI	1.25
Overstory CBI	0.88
Total Plot CBI	1.10

Poplar Fire 2003
2004 Plot P93 CBI = 1.53



95% burn. Moderately high consumption of litter, light fuels and duff 70-100%; larger down fuels 35-50% with deep char. Increase in soil cover > 70% under new needle fall. 60-70% survival of herbs and grasses; moderate colonizer potential. Stratum C shows 60% char-scorch with 90% survival. Intermediate trees are about 40% green with little 2% torch-char, and 60% scorch/girdle. Big trees are 85% green, with a trace of torch-char, and 10-15% scorch/girdle. Overstory tree mortality is 10%; ground char height < 2 m. Ponderosa with fir and aspen community.

PLOT P93

A. Substrates	2.32
B. Vegetation < 1 m.	1.43
C. Vegetation 1-5 m.	1.18
D. Intermediate Trees	1.55
E. Big Trees	0.93
Understory CBI	1.72
Overstory CBI	1.24
Total Plot CBI	1.53

Poplar Fire 2003
2004 Plot P98 CBI = 2.14



100% burn with mixed strata impacts. High consumption of litter and light fuels 90-100%; and duff 80%. Larger down fuels 35-50% with deep char. Increase in soil cover > 80% under new needle fall. Herb and grass survival 65%, with moderate colonizer potential. Stratum C crowns completely charred or consumed < 15% survival. Intermediate trees 25% green, 55% scorched and 20% charred. Big trees are 60% green, 30% scorched and 10% charred. Overstory tree mortality is 40%; ground char height > 5 m. Ponderosa Pine community.

PLOT P98

A. Substrates	2.72
B. Vegetation < 1 m.	1.33
C. Vegetation 1-5 m.	2.50
D. Intermediate Trees	1.95
E. Big Trees	1.93
Understory CBI	2.28
Overstory CBI	1.94
Total Plot CBI	2.14

Poplar Fire 2003
2004 Plot P58 CBI = 2.87



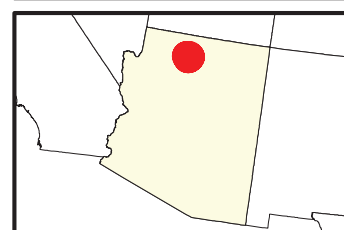
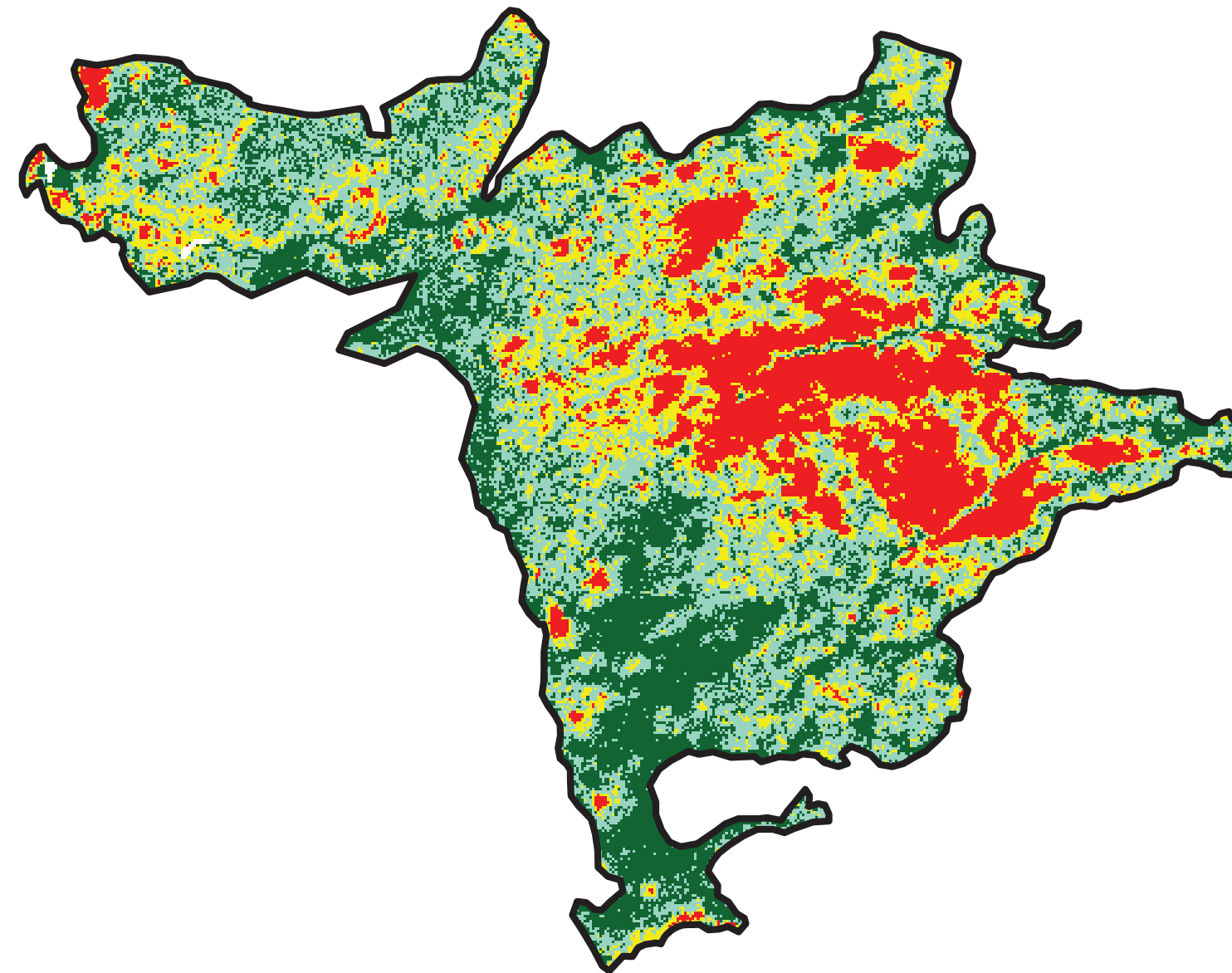
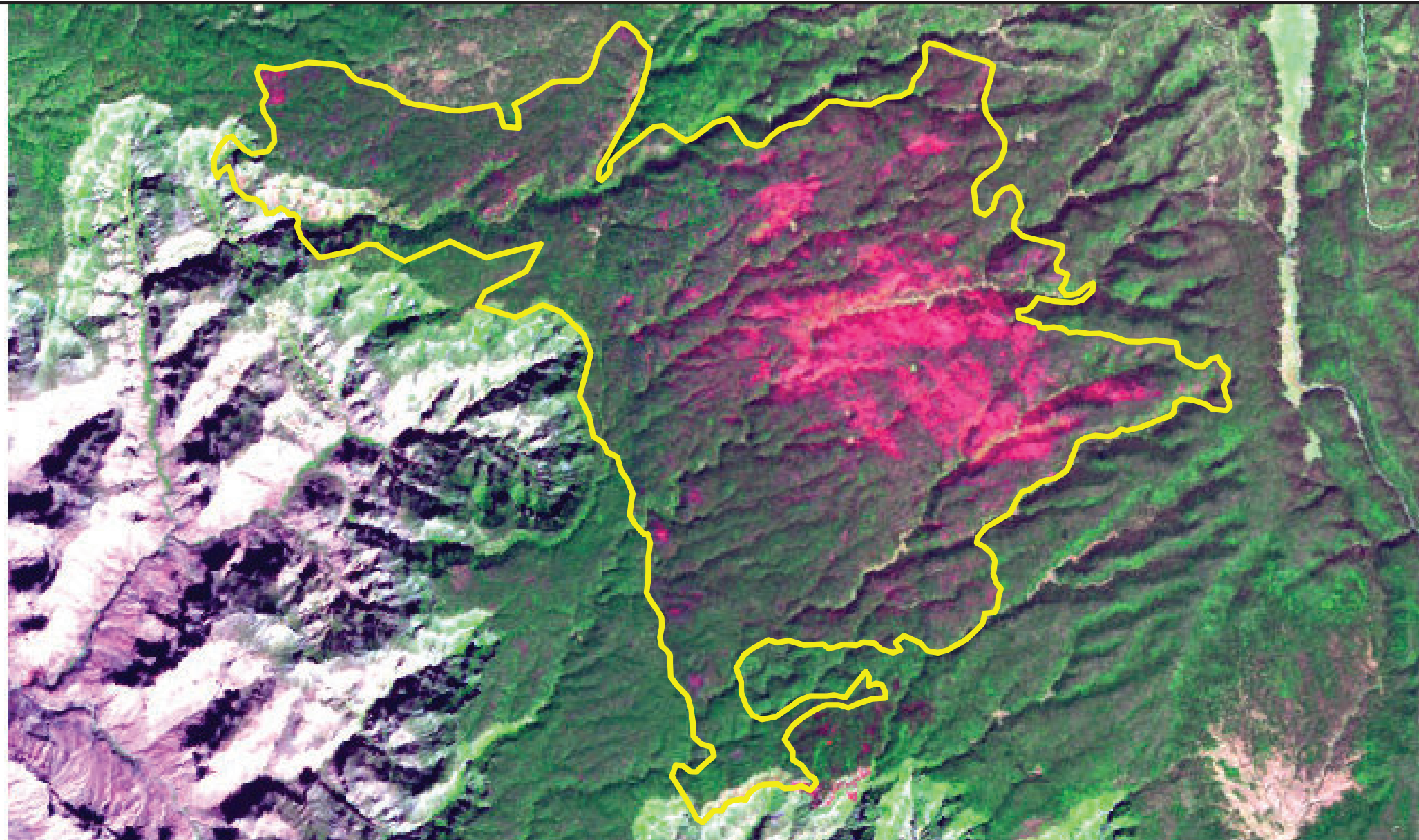
100% burn with consistent high charring over all strata. High consumption of litter, light fuels and duff near 100%. High consumption of larger fuels > 60% deep char. Increase in soil cover > 80% with color change. < 10% herb and grass regrowth with small patches of colonizers. Stratum C crowns 100% charred or consumed, survival about 35%. Overstory is > 95% charred with significant branching consumed; 100% tree mortality. Spruce/Fir/Aspen mixed conifer community.

PLOT P58

A. Substrates	3.00
B. Vegetation < 1 m.	2.80
C. Vegetation 1-5 m.	2.65
D. Intermediate Trees	2.93
E. Big Trees	2.93
Understory CBI	2.83
Overstory CBI	2.93
Total Plot CBI	2.87

2003 Arizona: POPLAR

az3631111220120030930



Latitude: 36° 18' 03.6"
 Longitude: -112° 12' 28.8"
 Fire Ignition Date: September 30, 2003
 Assessment Type: Extended
 Pre-Fire Image Date: September 11, 2003 (L5)
 Post-Fire Image Date: September 13, 2004 (L5)



Acreage of Burn Severity

Burn Severity	Acres
Unburned to Low	4,876
Low	6,121
Moderate	3,232
High	2,630
Increased Greenness	2
Non-Processing Area Mask*	14
Total	16,875

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) program jointly implemented by the USGS EROS and the USFS GTAC. The MTBS program ascertains the locations of fires based on available fire occurrence information provided by federal and state agencies, and other reliable sources. The MTBS program 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.

