

COMPOSITE BURN INDEX (CBI) PHOTO SERIES

California – Yosemite, Mixed 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 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 2002 Gin Flat PW-3 RX fire and the 2002 Wolf fire in Yosemite National Park in California. The fires were field sampled by NPS Crews in 2003.

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.)

Gin Flat PW-3 RX Fire 2002
2003 Plot PU20 CBI = 0.57



Patchy 40% burn with light charring of understory throughout. Low consumption of litter 25% and duff 20%. Consumption of down fuels 20%. Small 10% cover in newly exposed soil. Regenerated grasses and forbs in understory. Shrub and small tree mortality is moderate 60%. Overstory trees show slight scorch/girdle of 2%. Mixed conifer community.

PLOT PU20

| | |
|-----------------------|------|
| A. Substrates | 0.83 |
| B. Vegetation < 1 m. | 0.38 |
| C. Vegetation 1-5 m. | 1.50 |
| D. Intermediate Trees | 0.34 |
| E. Big Trees | 0.02 |
| Understory CBI | 0.90 |
| Overstory CBI | 0.18 |
| Total Plot CBI | 0.57 |

Gin Flat PW-3 RX Fire 2002
2003 Plot PU21 CBI = 0.91



Patchy 60% burn with light charring of understory throughout. Consumption of litter 50% and duff 25%. Consumption of down fuels 18% and deep char. Small change in soil cover and color 25%. Regenerated forbs and grasses in understory. Shrub and small tree mortality is very low. Overstory trees show slight torching and girdling 5%. Char height is < 1 m. Mixed conifer community.

PLOT PU21

| | |
|-----------------------|------|
| A. Substrates | 1.34 |
| B. Vegetation < 1 m. | N/A |
| C. Vegetation 1-5 m. | 1.08 |
| D. Intermediate Trees | 0.34 |
| E. Big Trees | N/A |
| Understory CBI | 1.22 |
| Overstory CBI | 0.34 |
| Total Plot CBI | 0.91 |

Gin Flat PW-3 RX Fire 2002
2003 Plot PL1 CBI = 1.64



Consistent 75% burn with moderate charring of understory throughout. Moderate consumption of litter 55% and duff 50%. High consumption of down fuels > 30% with deep char. Moderate 40% change in soil cover and color. Some patches of colonizing grasses and forbs in understory. Shrub and small tree mortality is > 95%. Intermediate trees have 5% torch and 40% scorch/girdle. Upper canopy has 2% torch/char and 8% scorch/girdle. 90% green. Char height is < 1.8 m for overstory. Mixed conifer community.

PLOT PL1

| | |
|-----------------------|------|
| A. Substrates | 2.08 |
| B. Vegetation < 1 m. | 1.75 |
| C. Vegetation 1-5 m. | 2.38 |
| D. Intermediate Trees | 1.42 |
| E. Big Trees | 0.74 |
| Understory CBI | 2.07 |
| Overstory CBI | 1.08 |
| Total Plot CBI | 1.64 |

Gin Flat PW-3 RX Fire 2002
2003 Plot PM4 CBI = 2.24

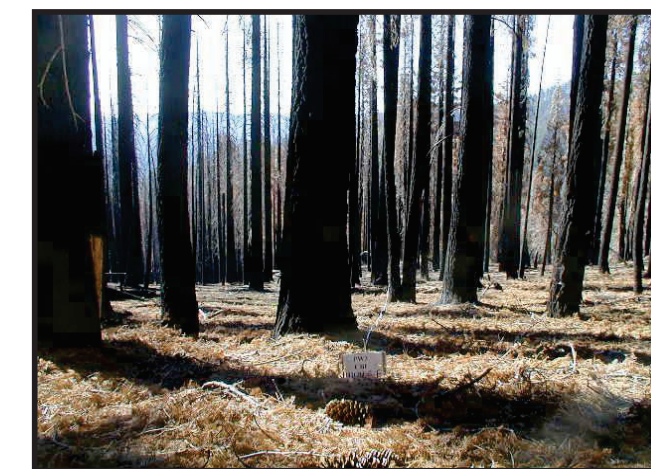


Consistent 100% burn with moderately high charring of understory throughout. High consumption of litter > 98% and duff 100%. High consumption of down fuels > 40% and deep char. Moderate-high increase in soil cover and color > 80%. Small patches of colonizers in understory. Shrub and small tree mortality is high > 95%. Intermediate trees have moderate mortality due to scorch/girdle 23%. Upper canopy is 50% green, 50% scorch/girdle with 10% mortality, no torch/char. Char height is > 7 m. Mixed conifer community.

PLOT PM4

| | |
|-----------------------|------|
| A. Substrates | 3.00 |
| B. Vegetation < 1 m. | 2.50 |
| C. Vegetation 1-5 m. | 2.80 |
| D. Intermediate Trees | 1.58 |
| E. Big Trees | 1.50 |
| Understory CBI | 2.78 |
| Overstory CBI | 1.54 |
| Total Plot CBI | 2.24 |

Gin Flat PW-3 RX Fire 2002
2003 Plot PH5 CBI = 2.76



Consistent 100% burn with high charring of understory throughout. High consumption of litter > 98% and duff 100%. High consumption of down fuels > 40% with deep char. High increase in soil cover and color > 80%. Very small patches of colonizers in understory. Shrub and small tree mortality of > 95%. Overstory tree mortality is 100% mostly from scorch/girdle with 35-40% torch/char. Char height is > 7 m. Mixed conifer community.

PLOT PH5

| | |
|-----------------------|------|
| A. Substrates | 3.00 |
| B. Vegetation < 1 m. | 2.50 |
| C. Vegetation 1-5 m. | 2.80 |
| D. Intermediate Trees | 2.76 |
| E. Big Trees | 2.70 |
| Understory CBI | 2.78 |
| Overstory CBI | 2.73 |
| Total Plot CBI | 2.76 |

Wolf Fire 2002
2003 Plot WU2 CBI = 0.61



Patchy 40% burn with light charring of understory throughout. Low consumption of litter 40% and duff 25%. Consumption of down fuels < 18% deep char. Small change in soil cover and color 12%. Regenerated forbs and grasses throughout understory. Shrub and small tree mortality is 20%. Intermediate tree mortality due to girdling 8%. Overstory trees are 100% green, char height is < .5 m. Mixed conifer community.

PLOT WU2

| | |
|-----------------------|------|
| A. Substrates | 1.16 |
| B. Vegetation < 1 m. | 0.23 |
| C. Vegetation 1-5 m. | 1.35 |
| D. Intermediate Trees | 0.30 |
| E. Big Trees | 0.10 |
| Understory CBI | 0.93 |
| Overstory CBI | 0.20 |
| Total Plot CBI | 0.61 |

Wolf Fire 2002
2003 Plot WL19 CBI = 0.94



Patchy 65% burn with light charring of understory throughout. Moderate consumption of litter 55% and duff 38%. Consumption of down fuels 16%. Small change in soil cover and color 25%. Regenerated forbs and grasses throughout understory with some patches of colonizers. Shrub and small tree mortality is 20%. Intermediate trees have 15% scorch-girdle. Overstory trees are 95% green, char height is < .5 m, mortality 15% due to girdling. Mixed conifer community.

PLOT WL19

| | |
|-----------------------|------|
| A. Substrates | 1.43 |
| B. Vegetation < 1 m. | 1.50 |
| C. Vegetation 1-5 m. | 1.53 |
| D. Intermediate Trees | 0.34 |
| E. Big Trees | 0.24 |
| Understory CBI | 1.48 |
| Overstory CBI | 0.29 |
| Total Plot CBI | 0.94 |

Wolf Fire 2002
2003 Plot WM7 CBI = 1.39



Consistent 85% burn with moderate charring of understory throughout. Moderately high consumption of litter 60% and duff 40%. Consumption of down fuels 30% deep char. Small change in soil cover and color < 20%. Some patches of colonizing grasses and forbs in understory. Shrub and small tree mortality is 85%. Intermediate trees have scorch/girdle 30%. Overstory trees show 10% scorch/girdle, no torch/char. Low overstory tree mortality 12%. Overstory tree char height > 1 m. Mixed conifer community.

PLOT WM7

| | |
|-----------------------|------|
| A. Substrates | 1.58 |
| B. Vegetation < 1 m. | N/A |
| C. Vegetation 1-5 m. | 2.60 |
| D. Intermediate Trees | 0.90 |
| E. Big Trees | 0.74 |
| Understory CBI | 2.03 |
| Overstory CBI | 0.82 |
| Total Plot CBI | 1.39 |

Wolf Fire 2002
2003 Plot WH3 CBI = 2.47



Consistent 85% burn with moderately high charring of understory throughout. High consumption of litter 95% and duff 100%. High consumption of down fuels > 40% and deep char. High increase in soil cover and color > 70%. Small patches of understory colonizers. Shrub and small tree mortality is 90%. Intermediate trees have 15% torch and scorch/girdle > 80%. Overstory trees show 10% green, 10% torch/char and > 70% scorch/girdle. High overstory tree mortality > 95%, char height > 6 m. Mixed conifer community.

PLOT WH3

| | |
|-----------------------|------|
| A. Substrates | 2.90 |
| B. Vegetation < 1 m. | 2.33 |
| C. Vegetation 1-5 m. | 2.65 |
| D. Intermediate Trees | 2.28 |
| E. Big Trees | 2.30 |
| Understory CBI | 2.63 |
| Overstory CBI | 2.29 |
| Total Plot CBI | 2.47 |

Wolf Fire 2002
2003 Plot WM12 CBI = 2.77



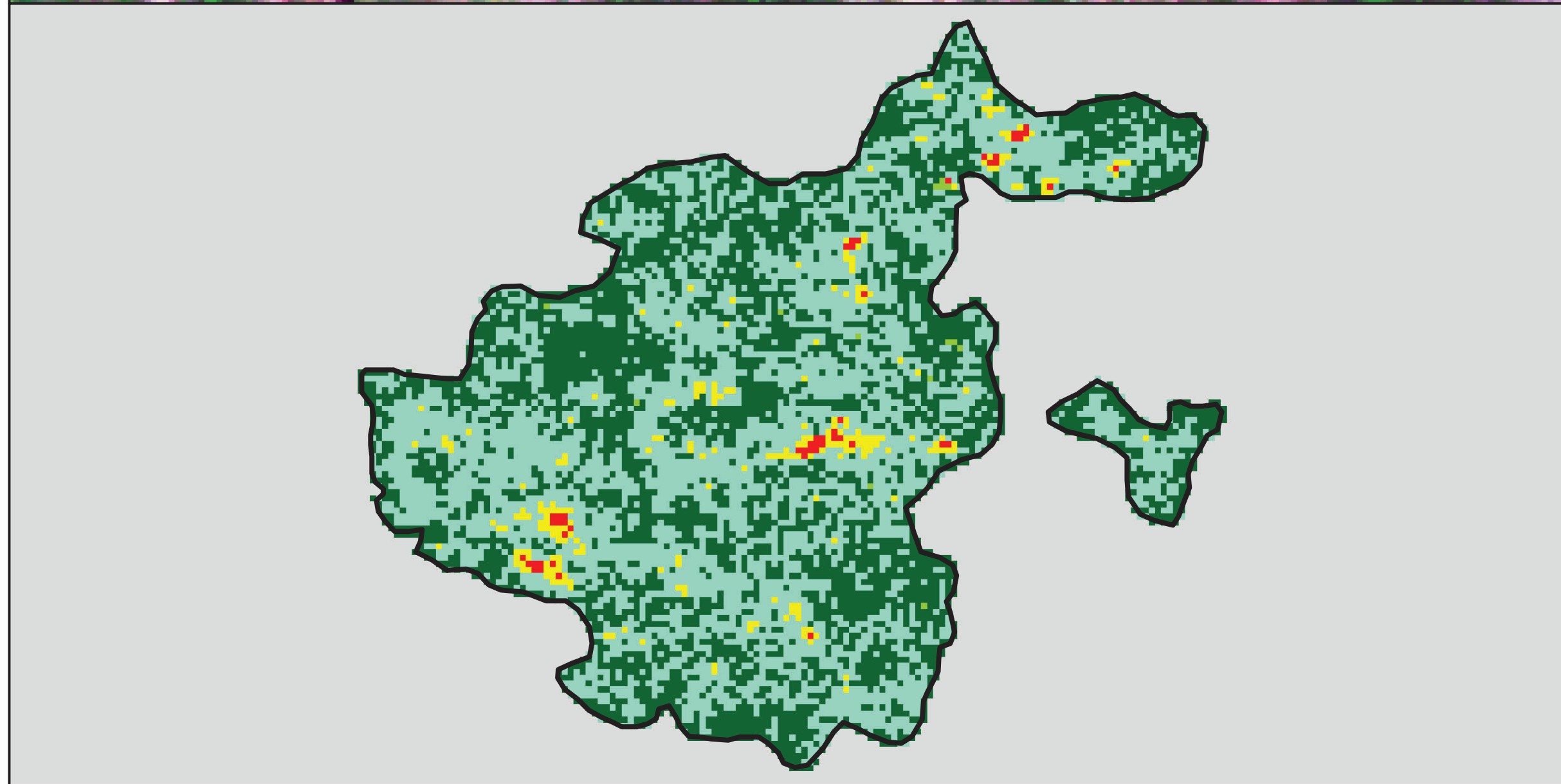
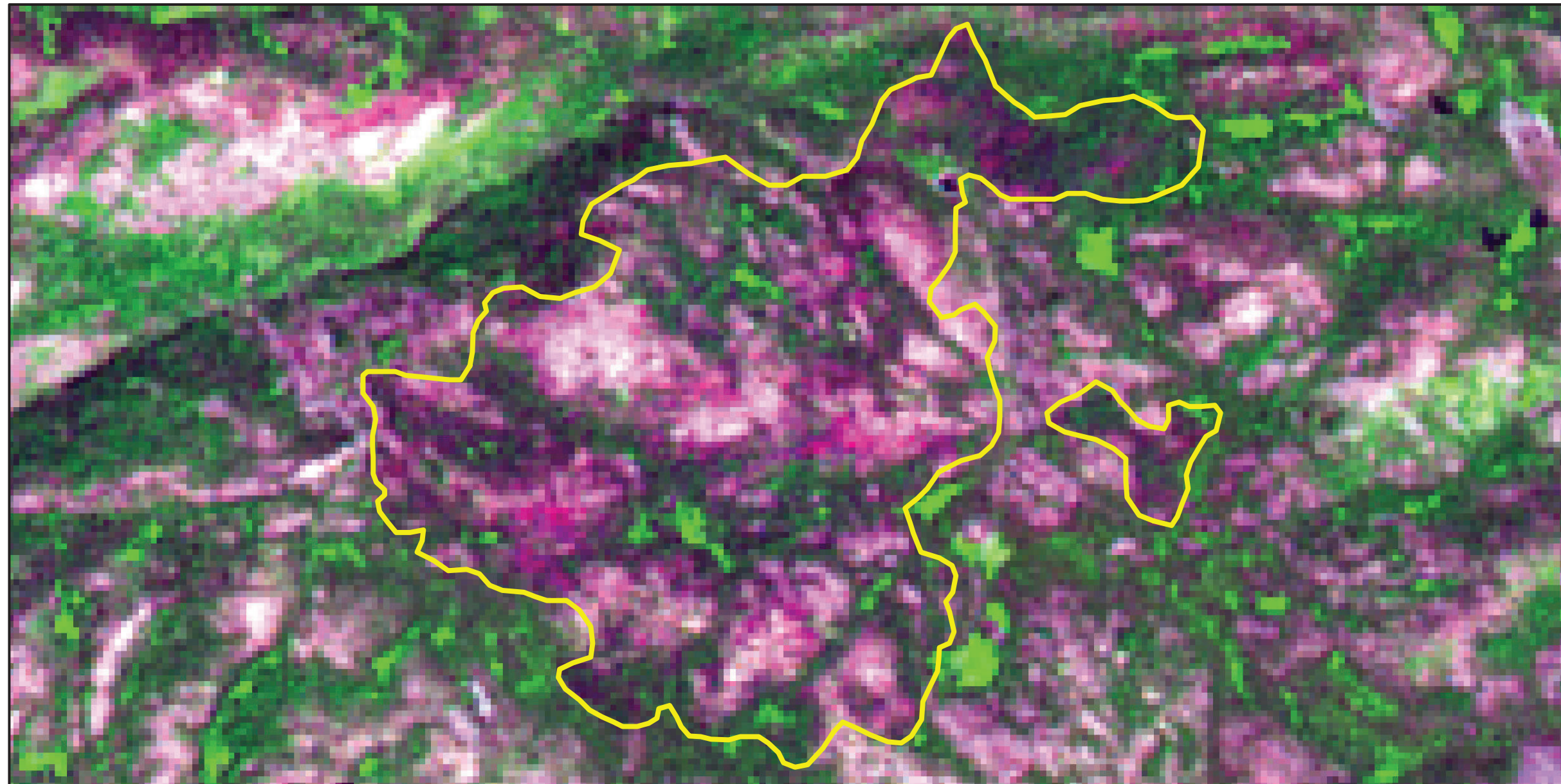
Consistent > 95% burn with high charring of understory throughout. High consumption of litter 96% and duff 98%. High consumption of down fuels > 40% with deep char. High increase in soil cover and color > 80%. Very small patches of understory colonizers. Shrub and small tree mortality is 99%. Intermediate trees show 90% torch and 10% scorch. Overstory has 25% torch/char and 65% scorch/girdle. Overstory tree mortality is 98%, char height > 6.5m. Mixed conifer community.

PLOT WM12

| | |
|-----------------------|------|
| A. Substrates | 2.92 |
| B. Vegetation < 1 m. | 2.63 |
| C. Vegetation 1-5 m. | 3.00 |
| D. Intermediate Trees | 2.88 |
| E. Big Trees | 2.42 |
| Understory CBI | 2.85 |
| Overstory CBI | 2.65 |
| Total Plot CBI | 2.77 |

2002 California: WOLF

ca3787411965320020711



Latitude: 37° 52' 26.4"
 Longitude: -119° 39' 10.8"
 Fire Ignition Date: July 11, 2002
 Assessment Type: Extended
 Pre-Fire Image Date: July 19, 2000 (Landsat 5)
 Post-Fire Image Date: July 12, 2003 (Landsat 5)



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.

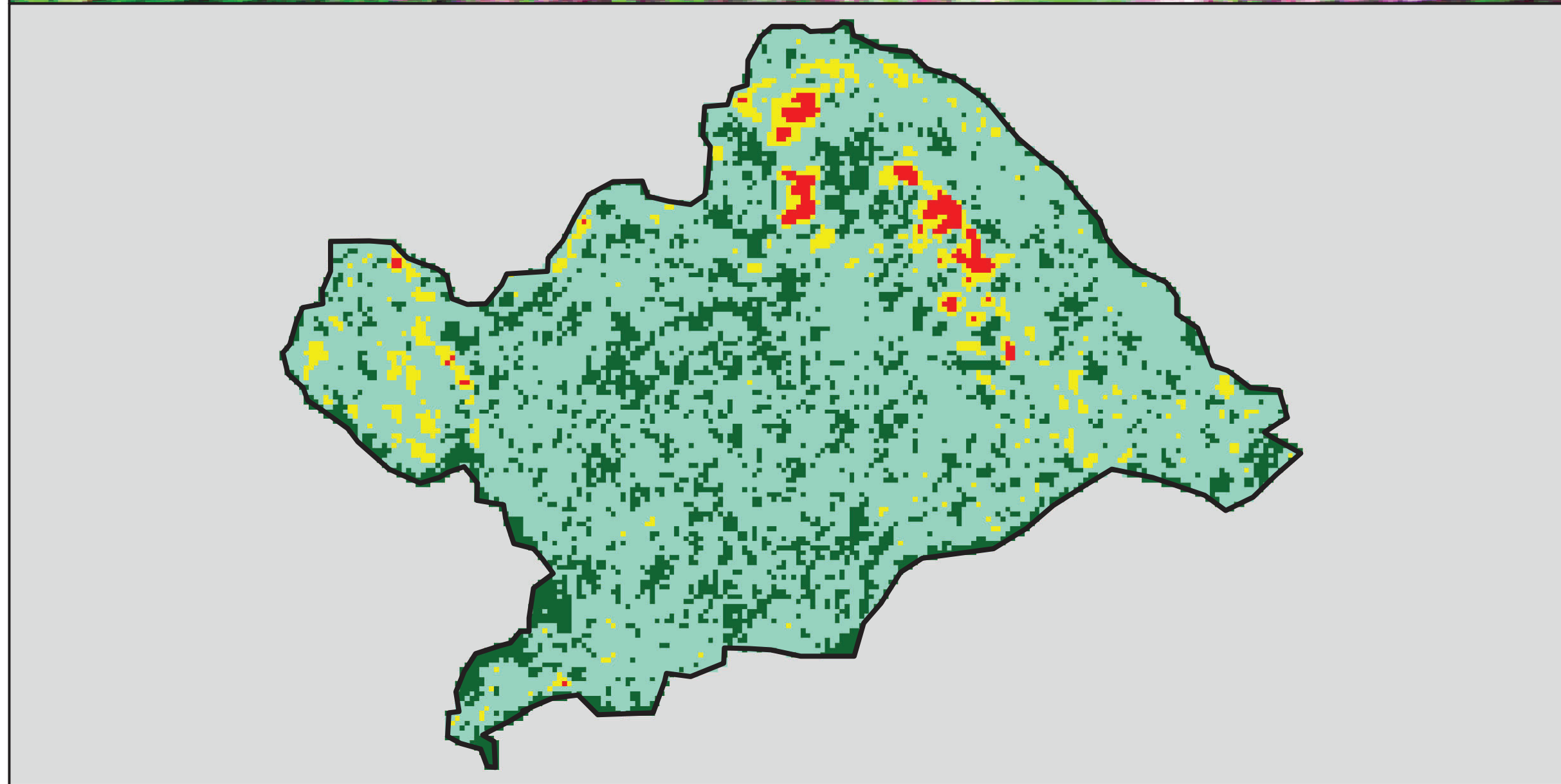
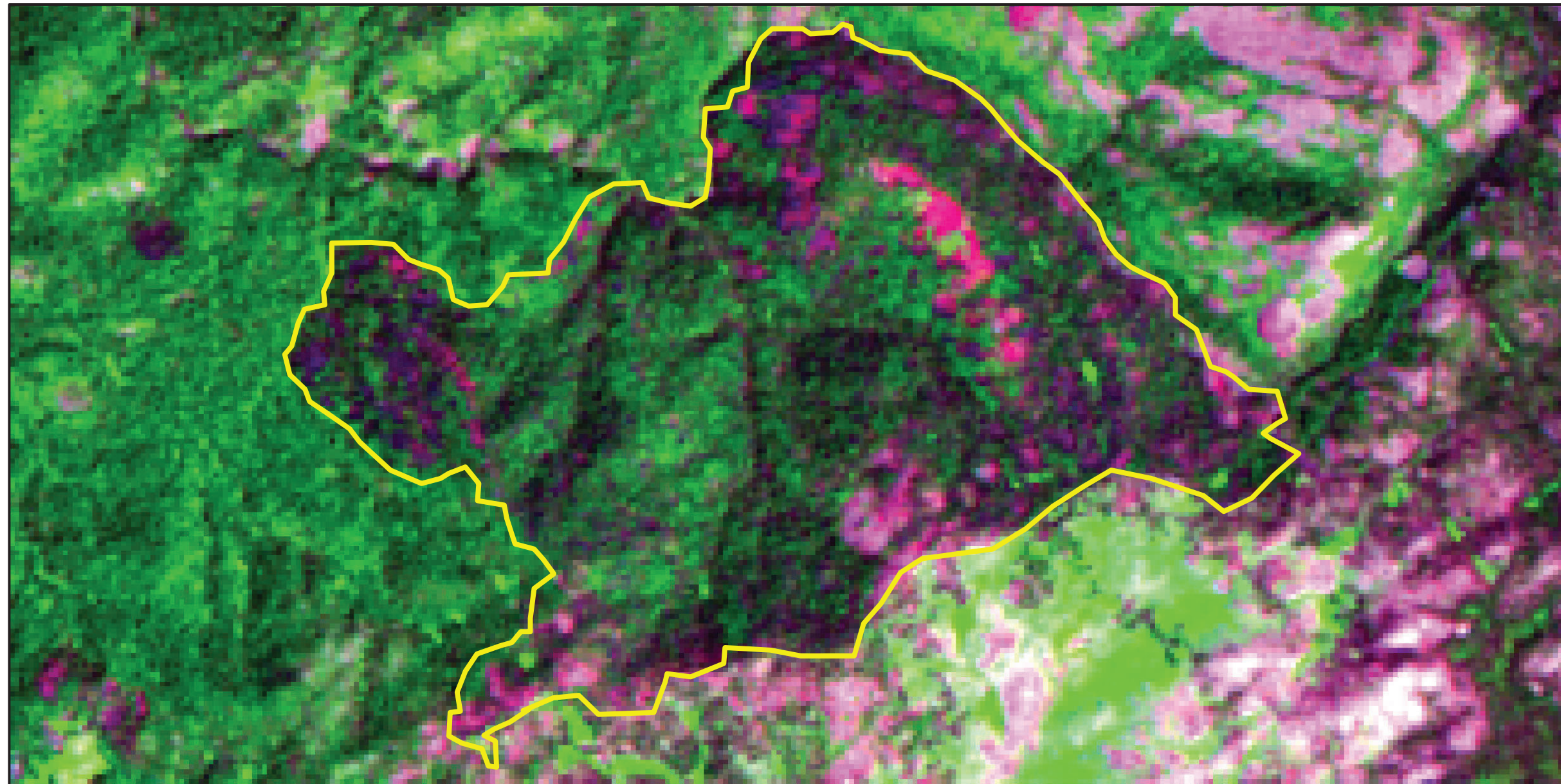


Acreage of Burn Severity

| Burn Severity | Acres |
|---------------------------|--------------|
| Unburned to Low | 823 |
| Low | 972 |
| Moderate | 56 |
| High | 12 |
| Increased Greenness | 3 |
| Non-Processing Area Mask* | 0 |
| Total | 1,865 |

2002 California: PW-03 GIN FLAT

ca3778911976020021003



Latitude: 37° 47' 20.4"
 Longitude: -119° 45' 36.0"
 Fire Ignition Date: October 03, 2002
 Assessment Type: Extended
 Pre-Fire Image Date: July 09, 2002 (Landsat 5)
 Post-Fire Image Date: July 12, 2003 (Landsat 5)



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.



Acreage of Burn Severity

| Burn Severity | Acres |
|---------------------------|--------------|
| Unburned to Low | 747 |
| Low | 2,453 |
| Moderate | 181 |
| High | 46 |
| Increased Greenness | 0 |
| Non-Processing Area Mask* | 0 |
| Total | 3,427 |