

Wildfire Emission Estimates for 2020

Background

California wildfire activity in 2020 was historic in scale. State data reported 500 wildfires totaling approximately 4.2 million acres, two to three times more area than in elevated wildfire activity years 2008, 2017, or 2018 (Figure 1). As in previous active years, a few large-area wildfires comprised most of the year’s burned area. Over half of the state total acreage burned was dominated by five fires: August Complex, SCU Complex, Creek, North Complex, and Hennessey. The August Complex was the largest area ever recorded for a single fire event. Large areas and high fuel loads (associated with forested lands) together with dry conditions fostered extensive fuel consumption and large magnitude emissions. California Air Resources Board (CARB) staff used Geographic Information Systems (GIS) based data on wildfire perimeters, vegetation fuels and fuel moisture, burn severity, as inputs to a fire emission model to estimate emissions from all fires in the dataset. Information related to these input data and model can be found in CARB’s Technical Documentation¹ and answers to frequently asked questions can be found [here](#)².

Emissions Modeling Results

A wildfire’s total emissions represents the contribution from the mosaic of vegetation types and fuels consumed within the wildfire area or “footprint”. Forest and woodland vegetation types contain greater fuel loads per unit area than vegetation types dominated by shrubs, herbaceous plants, or grasses. Table 1 provides a summary of total acres burned by wildfires in 2020, along with fuel consumed and both carbon dioxide (CO₂) and particulate matter (PM₁₀ and PM_{2.5})³ emissions.

Table 1. Summary of 2020 Wildfire Area, Fuel Consumption, And Emissions

Wildfire Area Burned (million acres)	Fuel Consumed (short tons)	CO ₂ (million metric tons)	PM ₁₀ (thousand short tons)	PM _{2.5} (thousand short tons)
4.2	81,097,083	106.7	1,394	1,181

Table 2 provides total acres burned and emissions for the top twenty largest wildfires, which comprised approximately 90 percent of total area burned and accounted for over 90 percent of total CO₂, PM₁₀, and PM_{2.5} emissions from all wildfires in 2020.

¹ [Method and Data Used in Wildfire Emission Estimation \(ca.gov\)](#)

² <https://ww2.arb.ca.gov/resources/documents/frequently-asked-questions-wildfire-emissions>

³ [Inhalable Particulate Matter and Health \(PM_{2.5} and PM₁₀\) | California Air Resources Board](#)

Table 2. Top 20 Wildfires of 2020.

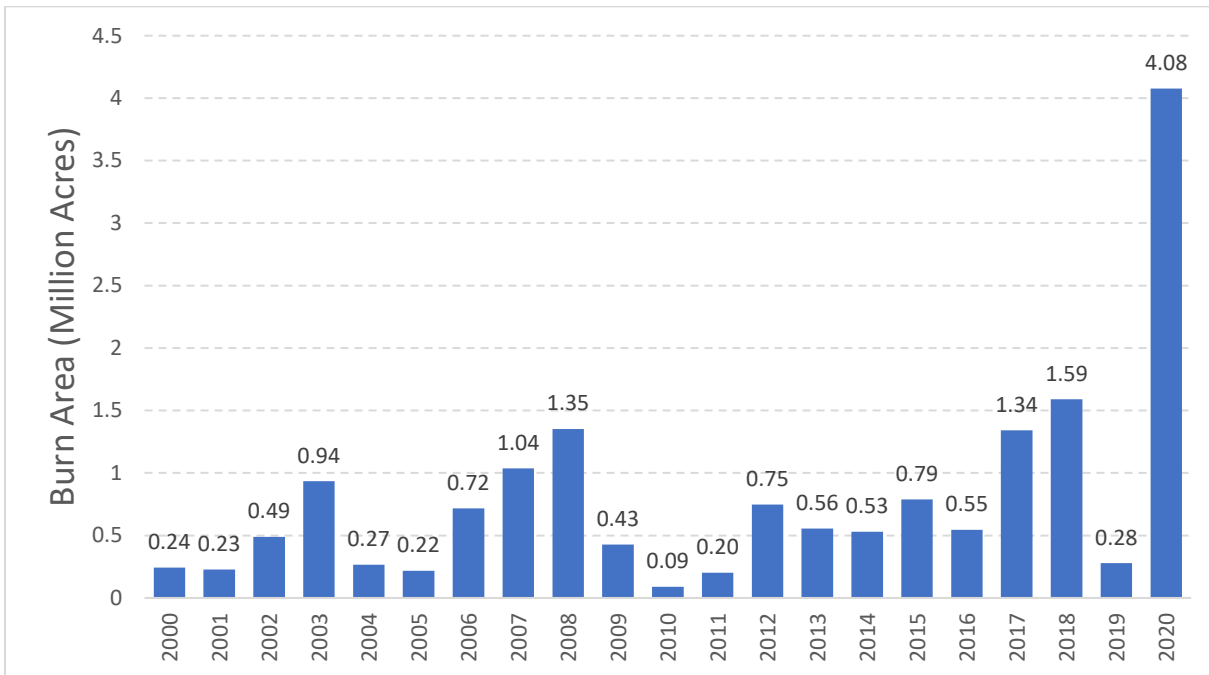
Fire Name	Wildfire Area Burned (acres) ¹	CO ₂ (million metric tons)	PM ₁₀ (thousand short tons)	PM _{2.5} (thousand short tons)
August Complex	1,032,700	27.7	368	312
SCU Complex	396,399	4.6	34	29
Creek	379,882	13.8	190	161
North Complex	318,777	10.9	132	112
Hennessey	305,352	3.5	27	23
Castle	170,648	6.4	84	71
Slater ²	157,430	6.7	88	74
Red Salmon Complex	143,836	4.6	63	54
Dolan	124,527	2.1	27	23
Bobcat	115,998	2.5	24	21
CZU Complex	86,553	5.4	104	88
W-5 Cold Springs ²	84,817	0.7	6	5
Caldwell	81,224	0.4	3	3
Glass	67,484	1.9	28	24
Zogg	56,338	0.7	6	5
Wallbridge	55,209	4.1	78	66
River	50,214	0.9	9	7
Loyalton	46,721	0.7	9	8
Dome	44,211	0.1	0.4	0.3
Apple	33,209	0.8	9	8

¹ Emission estimates are associated with wildland vegetation and do not include developed areas, croplands, or water bodies.

² Excludes emissions associated with areas beyond state boundary.

Figures 1 to 4 present annual wildfire acreages and emissions of CO₂, PM₁₀, and PM_{2.5} for 2000 to 2020.

Figure 1. Acreage of Burned Wildland Vegetation Area*.



* These acreages do not include areas where wildland vegetation data for model inputs are not available, e.g., developed areas and croplands.

Figure 2. Estimates of Wildfire CO₂ Emissions.

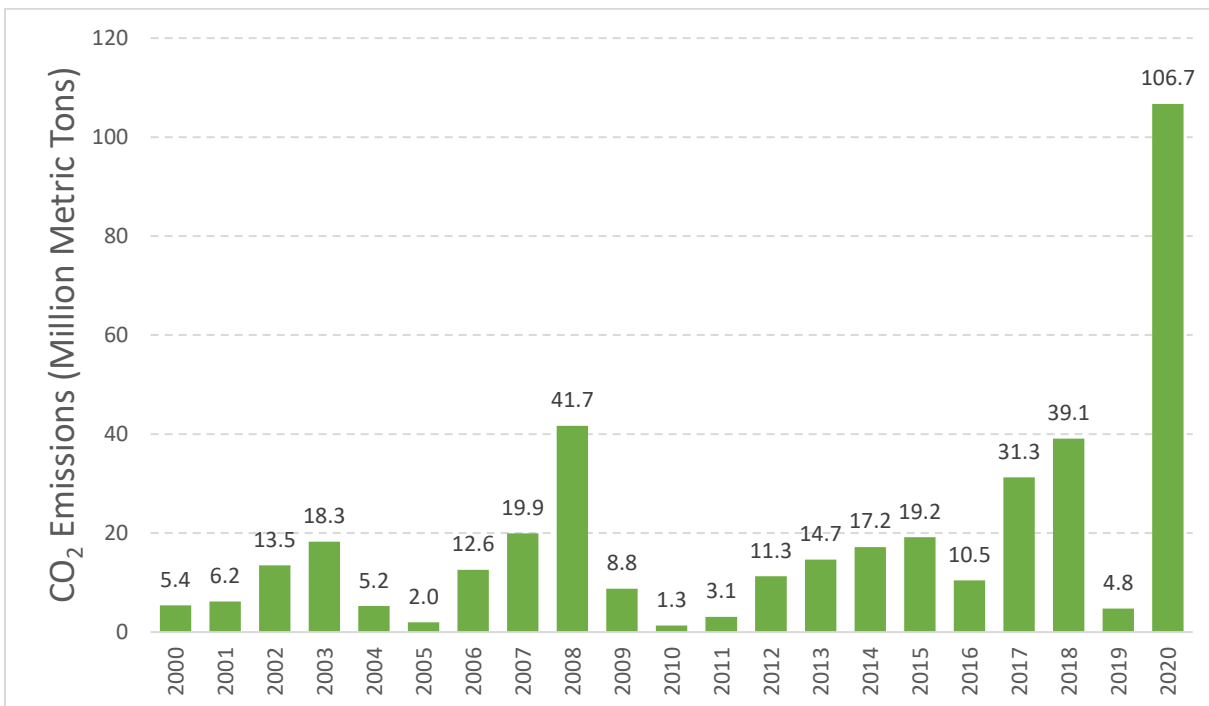


Figure 3. Estimates of Wildfire PM₁₀ Emissions.

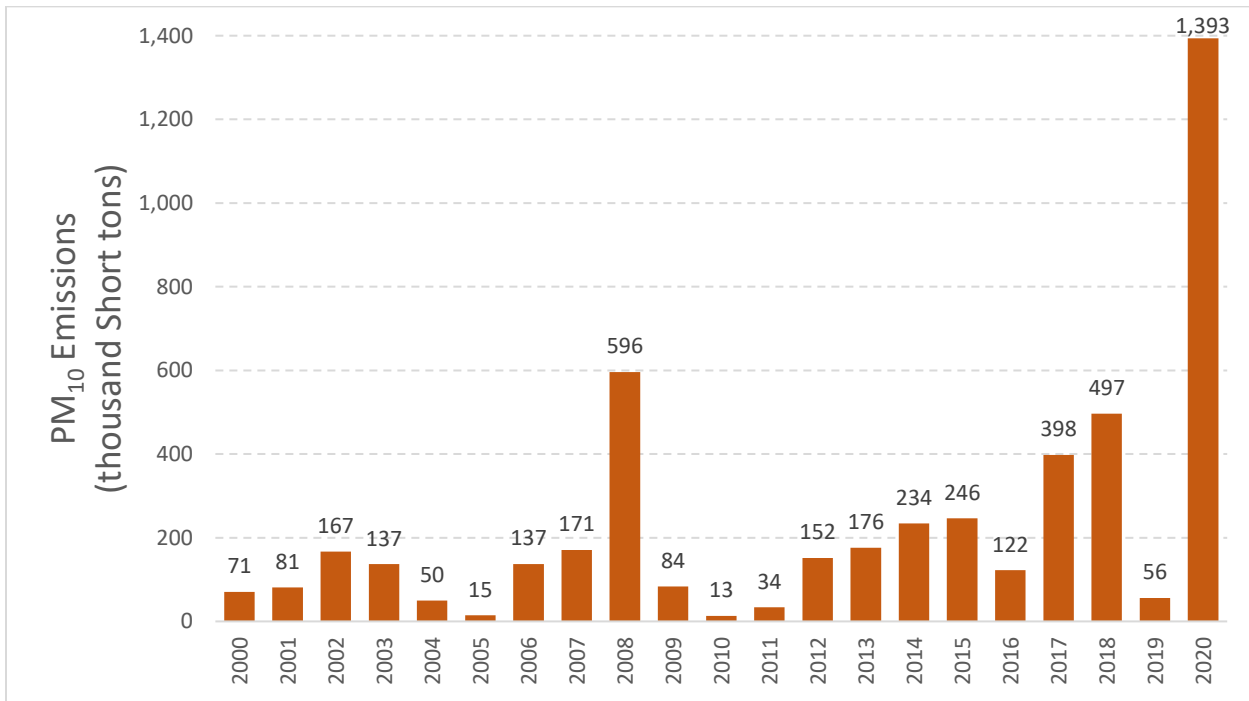


Figure 4. Estimates of Wildfire PM_{2.5} Emissions.

