Appendix S3. Evidence for an 1880-1885 fire in the Greenhorn Mountains

Forests in the Stephens et al. (2015) study area were similar to forests in the larger upper elevation focal area above 1430 m elevation (Figure 2 Main text, Appendix S3: Table S1) enabling comparisons that suggest an 1880-1885 fire. Mean GLO density of conifers ≥ 30.5 cm dbh inside the Stephens et al. area (92.8 trees/ha, s.d.=51.8) was not significantly different (α=0.05) from mean density outside (96.0 trees/ha, s.d.=74.1), in the larger area above 1430 m elevation (t(21)=-0.14, p=0.893). Mean basal area of conifers ≥ 30.5 cm dbh inside the Stephens et al. area (17.8 m^2/ha, s.d.=4.4) also was not significantly different from mean basal area (15.5 m^2/ha, s.d.=11.1), in the larger area above 1430 m elevation (t(18)=0.70, p=0.494). Thus, pine/ponderosa forests inside the Stephens et al. study area are representative of forests at similar elevations in our full study area. In the pine/ponderosa pine part of the larger area above 1430 m elevation, GLO-reconstructed overall mean tree density for conifers ≥ 30.5 cm dbh was 95.0 trees/ha (s.d.=67.5, n=31) and overall mean basal area for conifers ≥ 30.5 cm dbh was 16.2 m^2/ha (s.d.=9.6, n=21).

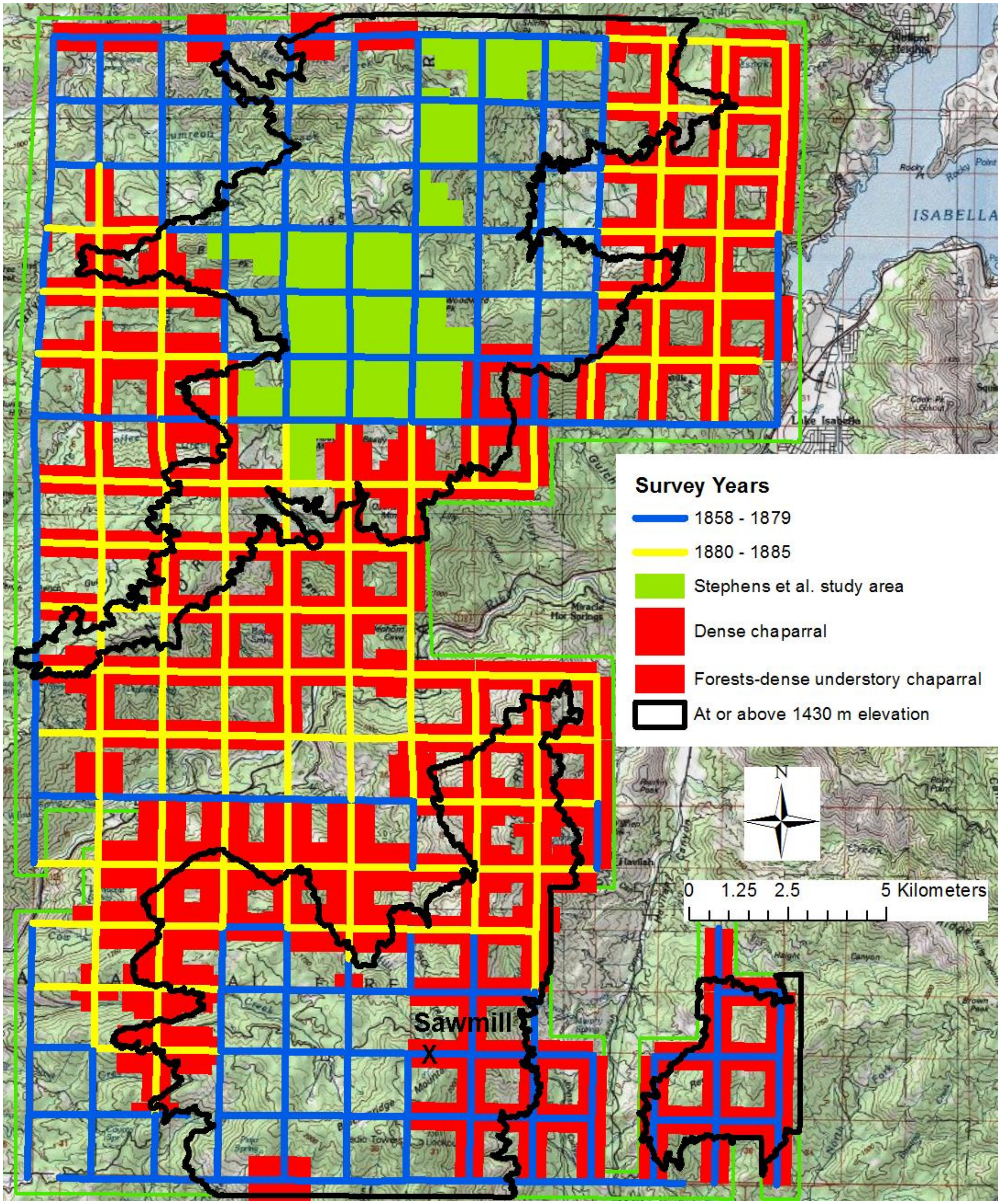
Landscapes in the area at or above 1430 m elevation, outside the Stephens et al. study area, had more oak-pine/ponderosa pine and especially more chaparral than occurred inside the Stephens et al. study area (Appendix S3: Table S1, Appendix S3: Figure S1). Foothill pine-oak was higher too, but was excluded from analysis, because it is generally a lower-elevation forest type. Dense chaparral, either as a large shrub field or as a dense understory in forests, was strongly and significantly associated with surveys done in 1880-1885, whereas surveys done in 1879 or before showed significantly less of this dense chaparral (Figure 3, X^2 = 208.1, df = 1, p < 0.001). An exception is in the bottom tier of sections, where forests with dense understory chaparral were evident in the 1858-1879 period (Appendix S3: Figure S1), a portion of which was possibly associated with the sawmill or an earlier fire. Except for this western portion of the bottom tier of sections, this chaparral pattern suggests a likely mixed/high-severity fire in 1880-1885, as discussed later. Evidence we added here of high-severity fire effects in 27% of the 1911 inventory transects is consistent with this mixed/high-severity fire. Adjoining areas surveyed in 1858-1879 likely represent forests not burned, or not yet burned, in the likely 1880-1885 fire. The original town of Kernville was a few km northeast of the Stephens et al. study area, and "In 1883 fire destroyed a part of the business section of the town and many dwellings" (Morgan 1914 p. 189) and also destroyed the workings of the Big Blue Mine, several km northeast of Kernville (Koschmann and Bergendahl 1968). This 1883 fire year is not confirmed, but is plausible as the year of the mixed/high-severity wildfire in the 1880-1885 period.

This likely 1880-1885 fire may explain the discrepancy between the GLO-reconstructed tree density of 92.8 conifers/ha ≥ 30.5 cm dbh in the pine/ponderosa pine area inside the Stephens et al. study area and the 25.2 conifers/ha ≥ 30.5 cm dbh from the 1911 inventory (Table 3 Main text). There is only one GLO tree-density reconstruction polygon in pine/ponderosa pine fully in the 1880-1885 likely burn area and it had 32 conifers/ha ≥ 30.5 cm dbh (Figure 2 Main text). An adjacent polygon with 58 conifers/ha is about half inside and half outside the likely 1880-1885 burn area. The mean in these polygons is 45.0 conifers/ha. The correct estimate is likely bracketed by the 25.2 conifers/ha timber-inventory estimate and the 45.0 conifers/ha from the GLO reconstruction. This implies large conifer density was reduced from the 92.8 trees/ha in the pre-1880 area to either 25.2 or 45.0 trees/ha, a 51.5-72.8% range of reduction in density of dominant/codominant conifers by the fire, indicating a mixed- to high-severity fire. In contrast, the density of small trees (< 30.5 cm dbh) increased from the GLO-reconstructed 78.2 trees/ha to the 1911 timber-inventory estimated 171.2 trees/ha (Table 3 Main text), likely a post-fire tree-regeneration response. Total conifer density hardly changed (Table 3 Main text), but the forest changed from abundant large conifers to abundant small conifers, as expected after a few decades of succession following a mixed- to high-severity fire.

Appendix S3: Table S1. Section-line length, by historical vegetation type, in the upper-elevation focal area (at or above 1430 m elevation) versus the Stephens et al. (2015) study area.

	Upper elevation focal area		Stephens et al. study area	
Historical vegetation type	Section-line length (km)	Percentage (%) of total line length	Section-line length (km)	Percentage (%) of total line length
1 Mixed conifer	7.3	2.7	5.3	10.7
2 Pine/ponderosa pine	167.4	61.4	38.3	77.6
3 Oak	9.5	3.5	1.6	3.2
4 Oak-pine/ponderosa pine	31.8	11.7	3.4	6.9
5 Chaparral	32.1	11.8	0.1	0.2
6 Canyon live oak	3.8	1.4	0.0	0.0
7 Foothill pine-oak	18.3	6.7	0.7	1.4
8 Miscellaneous	2.3	0.8	0.0	0.0
Total	272.5	100.0	49.4	100.0

Appendix S3: Figure S1. The relationship between the occurrence of dense chaparral in brush fields, or dense chaparral in the understory of forests, versus the survey years within the study area.



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