Appendix S2: Table S1. High-severity fire effects in the 1911 Greenhorn timber inventory area

Forest Type	Location Code[1]	# Transects High-Severity Fire	Reason for High-Severity[2]
Ponderosa pine	25321404	0.5	1
Ponderosa pine	25321411	1.0	1
Ponderosa pine	25321513	0.2	1
Ponderosa pine	25321516	1.0	1
Ponderosa pine	25322204	1.0	1
Ponderosa pine	26312304	1.0	1
Ponderosa pine	26312312	1.0	1
Ponderosa pine	26312416	1.0	2
Ponderosa pine	26312509	1.0	1
Ponderosa pine	26312513	1.0	1
Ponderosa pine	26312514	1.0	1
Ponderosa pine	26312606	1.0	1
Ponderosa pine	26313509	1.0	1
Ponderosa pine	26313515	1.0	1
Ponderosa pine	26313516	1.0	2, 3
Ponderosa pine	26313603	1.0	1
Ponderosa pine	26313606	1.0	1
Ponderosa pine	26313609	0.55	1
Ponderosa pine	26313610	1.0	1
Ponderosa pine	26313611	1.0	1
Ponderosa pine	26313613	0.6	3
Ponderosa pine	26313614	0.55	3
Ponderosa pine	26313615	1.0	1
Ponderosa pine	26313616	1.0	1
Ponderosa pine	26323009	1.0	1
Ponderosa pine	26323012	1.0	1
Ponderosa pine	26323113	1.0	1
Ponderosa pine	263134SEofNE	0.65	6
Ponderosa pine	263134SWofNE	0.25	6
Ponderosa pine	253231NWofNE	1.0	6
Mixed conifer	25320405	1.0	1
Mixed conifer	25320503	0.25	3
Mixed conifer	25320508	0.5	4
Mixed conifer	25320707	0.5	4
Mixed conifer	25320710	1.0	1
Mixed conifer	25320912	0.5	3
Mixed conifer	25321403	0.75	1
Mixed conifer	25321502	1.0	1
Mixed conifer	25321503	1.0	1
Mixed conifer	25321514	0.5	1
Mixed conifer	25321609	0.75	1
Mixed conifer	25321610	0.55	4
Mixed conifer	25321611	0.6	2, 4
Mixed conifer	25321612	1.0	1

Mixed conifer	25321616	0.6	2
Mixed conifer	25321707	1.0	1
Mixed conifer	25321708	1.0	1
Mixed conifer	25321712	0.25	4
Mixed conifer	25321716	1.0	1
Mixed conifer	25322001	1.0	1
Mixed conifer	25322002	0.5	1
Mixed conifer	25322007	0.5	2
Mixed conifer	25322010	0.15	1
Mixed conifer	25322014	0.65	1
Mixed conifer	25322105	1.0	1
Mixed conifer	25322112	0.75	1
Mixed conifer	25322202	1.0	1
Mixed conifer	25322212	0.5	4
Mixed conifer	25322808	1.0	3
Mixed conifer	25322903	0.13	5
Mixed conifer	25322904	0.5	1
Mixed conifer	25322905	0.55	1
Mixed conifer	25322906	0.45	4
Mixed conifer	25322912	0.43	1
Mixed conifer	25322913	0.65	4
Mixed conifer	25322914	0.6	4
Mixed conifer	25323108	0.88	4
Mixed conifer	25323109	0.5	2, 4
Mixed conifer	25323115	0.5	4
Mixed conifer	25323116	0.7	3
Mixed conifer	25323203	0.25	4
Mixed conifer	25323204	0.2	4
Mixed conifer	25323210	0.5	3
Mixed conifer	25323211	1.0	1
Mixed conifer	25323215	0.75	4
Mixed conifer	25323307	0.6	1
Mixed conifer	26312108	0.25	3
Mixed conifer	26312201	1.0	1
Mixed conifer	26312205	0.8	1
Mixed conifer	26312304	1.0	1
Mixed conifer	26312307	1.0	1
Mixed conifer	26312402	0.5	4
Mixed conifer	26312406	1.0	1
Mixed conifer	26312410	0.75	1
Mixed conifer	26312504	1.0	1
Mixed conifer	26312512	1.0	1
Mixed conifer	26312613	1.0	1
Mixed conifer	26312614	1.0	1
Mixed conifer	26313406	1.0	1
Mixed conifer	26313409	1.0	1
Mixed conifer	26313414	0.65	3
Mixed conifer	26313415	0.65	3

Mixed conifer	26313416	1.0	1
Mixed conifer	26313503	1.0	1
Mixed conifer	26313504	1.0	1
Mixed conifer	26313505	1.0	3
Mixed conifer	26313604	1.0	2
Mixed conifer	26320407	0.5	2
Mixed conifer	26320504	0.15	3
Mixed conifer	26320510	1.0	1
Mixed conifer	26320511	1.0	1
Mixed conifer	26320515	1.0	1
Mixed conifer	26320601	0.75	1
Mixed conifer	26320602	0.65	1
Mixed conifer	26320607	1.0	1
Mixed conifer	26320608	1.0	2
Mixed conifer	26320609	0.4	2
Mixed conifer	26320614	0.1	3
Mixed conifer	26320703	0.5	3
Mixed conifer	26320709	0.3	4
Mixed conifer	26320712	0.75	2
Mixed conifer	26320713	0.65	2
Mixed conifer	26320715	0.2	1
Mixed conifer	26320716	1.0	1
Mixed conifer	26321810	1.0	1
Mixed conifer	26321812	0.5	1
Mixed conifer	27310203	1.0	1
Mixed conifer	27310205	1.0	2
Mixed conifer	27310206	1.0	1
Mixed conifer	253232SWofSW	1.0	6
Mixed conifer	253232SEofSW	1.0	6
Mixed conifer	263125NEofNE	0.25	6
Mixed conifer	263126SEofSW	1.0	6
Mixed conifer	253220NEofSW	1.0	6
Mixed conifer	253220NWofSW	1.0	6
Mixed conifer	253220SEofNW	1.0	6
Mixed conifer	253220SWofSW	1.0	6
Mixed conifer	253231NEofSW	1.0	6
Mixed conifer	253231NWofSE	1.0	6
Mixed conifer	253231SEofSW	1.0	6
Mixed conifer	253231SWofNE	1.0	6
Mixed conifer	253231SWofSW	1.0	6
Mixed conifer	263204NEofNE	1.0	6

[1] See Stephens et al. (2015), Appendix A, for 1911 field survey notes under the "Condition of Timber" heading on the survey form, corresponding to the Location codes ("Lot_id" in Stephens et al. 2015) in the second column above. In each eight-digit code, the first pair of numbers pertains to Township (latitude), the second pair to Range (longitude), the third pair to map section (each 259.1 ha), and the fourth to the "forty" subsection (each 16.2 ha) through which the transect was conducted. For subsections with high-severity fire inferred from section-level maps and

notes, Township, Range, section, and subsection are listed ("SWofNE", for example, refers to the southwestern subsection of the northeastern quadrant of a 259.1-ha map section).

[2] The 1911 field notes for each transect pertaining to "Condition of Timber" are reproduced in Appendix A of Stephens et al. (2015); however, in most cases Stephens et al. (2015) did not include notes pertaining to "Immature Growth Under Merchantable Timber" or "Underbrush", which often presented a more complete picture of previous high-severity fire than could be gained from the "Condition of Timber" notes alone. In the fourth column of the table above, the following numerical codes are used to describe the reason for categorizing some or all of a given transect as having previous high-severity fire: (1) widely scattered mature trees with substantial fire damage, and chaparral within the conifer zone, young oak regeneration, and/or immature conifer regeneration in the understory—often with numerous snags and/or downed logs; (2) immature regenerating conifer stand, often with no fire effects; (3) chaparral within the conifer zone, often with immature conifer regeneration; (4) immature oak regeneration occurring within mixed-conifer forest, often with scattered immature conifer regeneration; (5) a patch of standing fire-killed trees; and (6) 16.2-ha subsections with no merchantable timber in 1911, based on section-level maps and notes, but where currently either ponderosa pine or mixed-conifer forest is the dominant vegetation types in these subsections.

Appendix S2: Table S2. Additional data sources regarding historical high-severity fire occurrence in ponderosa and Jeffrey pine forests of the southern Sierra Nevada.

Source	Indication	Observations Indicating High-Severity Fire
Childs (1912)	Very large, intense fire	Reporting (p. 144) that "some forty years ago a wide spread and destructive fire swept through the southwestern portions of the Forest west of Kern River"
Patterson & Wynne (1911)	Small high-severity fire patches	"Then the general prevalence of brush patches under the timber and densely crowding small openings, is the work of fire." (p. 6)
Patterson & Wynne (1911)	Large high-severity fire patches	Referencing the "large brush areas where the forest has been cleared off entirely by fire" (p. 5), and "the large areas of pure brush within the timberline and the extension of brush into the zone at the lower edge of the former timber belt" as a "result of fire" (p. 6)
Patterson & Wynne (1911)	Small and large high-severity patches	"Brush and fire have not only forced back the line of the forest, but have under-run the timber stands often, to the exclusion of reproduction." (p. 9)
Flintham (1904)	Large high-severity fire patches	Noting that fires had "removed the protective forest cover from considerable areas of the upper and lower watersheds…allowing imperfect cover of chaparral to gain permanent possession." (p. 4)
Flintham (1904)	Large high-severity fire patches	"The effect of the fires has been to drive back up the slopes the lower line of the timber belt, and to prevent the gradual restocking of reproduction and reoccupation by the forest of the areas thus denuded, by reason of the more rapid encroachment of chaparral." (p. 29)
Flintham (1904)	Large high-severity fire patches	"Elsewhere under dense chaparral cover charred down-timber and shells of pines burned to the ground are to be noted, where no pine now stands" (p. 29)
Flintham (1904)	Natural succession	Noting areas of formerly dense, mature ponderosa pine forest where "pines occur as very scattering seed trees, growing thinly over heavy chaparral cover, and reproduction growing up slowly through this cover" (p. 29)
Flintham (1904)	Natural succession	"Often the height growth appears stimulated by the shading brush cover, and the chaparral in this situation must afford considerable protection" (p. 45)
Flintham (1904)	Natural succession	Jeffrey pine is "frequently found at 6,500 to 7,500 feet elevation, growing up out of very dense chaparral…through which young saplings have pushed up and made rapid growth" (pp. 77-78)

Appendix S2: Table S3. Additional data sources regarding historical high-severity fire occurrence in mixed-conifer forests of the southern Sierra Nevada.

Source	Indication	Observations Indicating High-Severity Fire
Patterson and Wynne (1911)	Prevalence of early-successional patches	"Cedar and fir thickets are common also, but mainly of material under 6" diam. and growing too thickly in even aged stands" (p. 4 of Eshom Creek section)
Patterson and Wynne (1911)	Small high-severity patches	"Then the general prevalence of brush patches under the timber and densely crowded small openings, is the work of fire." (p. 6)
Patterson and Wynne (1911)	Heterogeneity	"All stages in the process may be seen…[f]rom pure brush areas with only one or two old snags, to a timber stand underlain with brush of varying density and hight [sic]" (p. 9)
Patterson and Wynne (1911)	Large high-severity patches	"The forest is often entirely destroyed…the seed trees are all below the burn." (p. 10)
Flintham (1904)	Large high-severity patches	"Frequent large, opened areas occur on the upper slopes from which the fir stand has been denuded" (p. 21)
Flintham (1904)	Spatially common occurrence of high-severity	"Fires at the higher altitudes and in the forests of the fir type have had uniformly most disastrous effects on the forest cover." (p. 31)
Flintham (1904)	Small and large high-severity patches	"There result within the forest small open spots, in which dead stubs of the fire-killed timber stands…and frequently on the upper slopes and crests of ridges great areas of openings, which fire or death following upon it have completely denuded of the cover formerly occupying the site as evident from charred logs and occasional stubs of trees left standing." (p. 32)
Flintham (1904)	Small high-severity patches	Referencing "stands of small polewood in the midst of heavier timber, which have apparently grown up after the spread of former fires like the small sapling reproduction growing up in forest openings" (p. 52)
Flintham (1904)	High-severity in mixed-conifer/sequoia	"Reproduction is uniformly best in burned areas, and germination has followed severest burns, which seem to best prepare the soil—baring, loosening and fertilizing it." (p. 93)
Flintham (1904)	Lower mixed-conifer high-severity	"Large even-aged bodies [of incense-cedar] and bunches of sapling reproduction of various ages, and areas abundantly stocked with seedlings are of very general occurrence" (pp. 101-102)
Flintham (1904)	Large high-severity patches	"Recurrent fires have frequently denuded the stand entirely from large areas, and extension of reproduction thereafter is dependent upon the location and capabilities of the nearest stand of seed trees,--located generally at some distance" (p. 171)
Flintham (1904)	Large patches	"Frequently severe and probably recurrent burns" led to the "occupation of whole ridge crests and slopes by dense chaparral" (p. 172)

Appendix S2: Table S4. Additional historical data sources regarding forest density and structure in mixed-conifer (MC) and ponderosa pine (PP) forests of the southern Sierra Nevada.

Source	Forest Type	Location	Description/Result
Hodge (1906), p. 91	MC	Greenhorn Mountains	U.S. Forest Service survey of a "typical" stand, reporting 2,277 trees/ha <48.3 cm at stump height (approximately 35 cm dbh;76% fir/cedar), 27 trees/ha 48.3-91.4 cm at stump height (64% fir/cedar), and 17 trees/ha >91.4 cm at stump height (43% fir/cedar).
Pratt and Greeley (circa 1910)[1]	MC	Greenhorn Mountains	Survey of a 3,600.7-ha tract of forest, reporting: (a) in the "sugar pine type", 296 conifer saplings/ha (77% fir/cedar), 56 trees/ha 15-48.3 cm dbh (66% fir/cedar), and 42 trees/ha >48.3 cm dbh (58% fir/cedar); (b) in the "yellow pine type", 356 conifer saplings/ha (63% fir/cedar), 41/ha 15-48.3 cm dbh (63% fir/cedar), and 25/ha >48.3 cm dbh (43% fir/cedar); (c) in the "white fir type", 348 conifer saplings/ha (91% fir/cedar), 60/ha 15-48.3 cm dbh (91% fir/cedar), and 40/ha >48.3 cm dbh (92% fir/cedar); and in the "mixed oak and conifer" type, 170 conifer saplings/ha (conifers 90% fir/cedar), 18/ha 15-48.3 cm dbh (conifers 84% fir/cedar), and 12/ha >48.3 cm dbh (63% fir/cedar). Also noted is an area of immature conifers averaging 2,033 trees/ha. The report states that the stand structure—few remaining large trees, a notable scarcity of intermediate-aged trees, and a high density of young regeneration—was due to "severe" fire that occurred in that area decades earlier.
Childs (1912)	PP, MC	Sequoia National Forest	This U.S. Forest Service report includes data on the average "crown density" (e.g., p. 10) for mature forests of various types on the Kern [Sequoia] National Forest. It states that the average crown density was 60% for ponderosa pine forests (p. 14), 80-90% for mixed-conifer forests (p. 15), and 60% for Jeffrey pine forests (p. 19). The report also noted, for mixed-conifer/fir forests, an average of 198 saplings/ha and 79 "mature" trees/ha, but did not include figures for densities of conifers intermediate in size between saplings and mature trees.
USFS (1912)	PP	Sequoia National Forest	Reporting that 25% of the ponderosa pine forest was in a "young unmerchantable" stage of succession (p. 20). Only 1% of the forest had been logged (p. 19).

[1] Document is undated, but is located at the National Archives with documents dated circa 1910-1912, and makes reference to people and locations from that time period.

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