Table S1. Descriptive statistics of RE-NBR values for training and validation samples by assessment area, date, subset, and class in the Nevado de Colima Adjacent Study Area (2019 and 2025). (Part 1)

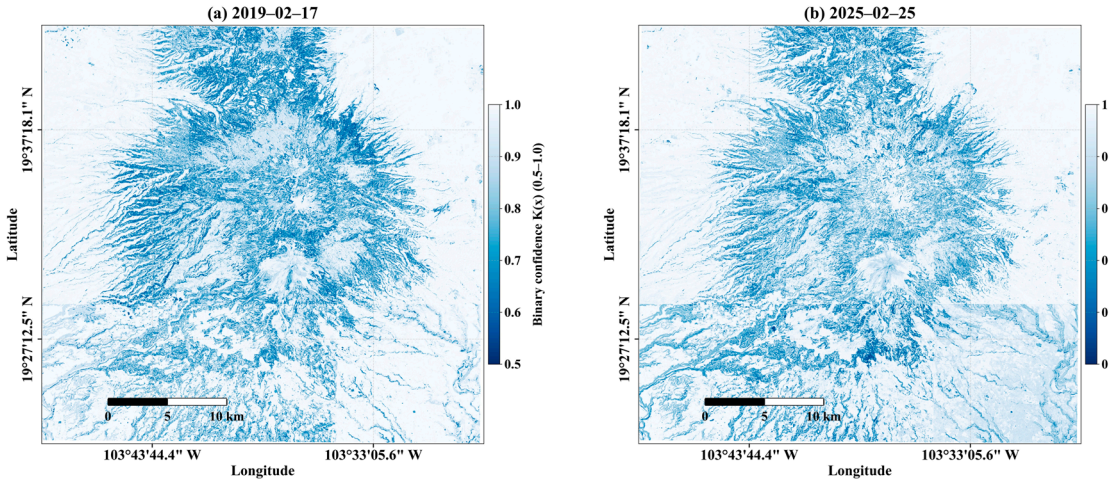
Assessment area	Date	Subset	Class	n (valid pixels)	Average	Standard Deviation	Minimum	Q1	Median	Q3	IQR	Maximum
1	17 February 2019	Training	F	569	0.53	0.06	0.26	0.50	0.53	0.56	0.06	0.64
			NF	1170	0.38	0.12	0.16	0.28	0.37	0.44	0.16	0.62
		Validation	F	324	0.51	0.06	0.32	0.48	0.52	0.55	0.08	0.63
			NF	1090	0.39	0.12	0.13	0.30	0.38	0.47	0.17	0.62
	13 April 2019	Training	F	569	0.51	0.05	0.19	0.49	0.52	0.55	0.06	0.62
			NF	1170	0.37	0.12	0.04	0.28	0.35	0.47	0.19	0.59
		Validation	F	324	0.51	0.04	0.35	0.49	0.52	0.54	0.05	0.61
			NF	1090	0.38	0.11	0.04	0.29	0.37	0.48	0.20	0.60
	25 February 2025	Training	F	1046	0.51	0.05	0.34	0.48	0.52	0.55	0.07	0.64
			NF	1436	0.41	0.09	0.16	0.36	0.42	0.48	0.12	0.60
		Validation	F	828	0.50	0.06	0.28	0.47	0.51	0.54	0.07	0.62
			NF	1466	0.41	0.08	0.16	0.37	0.42	0.47	0.10	0.59
	06 April 2025	Training	F	1046	0.50	0.05	0.34	0.47	0.51	0.54	0.07	0.63
			NF	1436	0.42	0.09	0.13	0.37	0.43	0.48	0.11	0.61
		Validation	F	828	0.49	0.06	0.26	0.46	0.50	0.53	0.07	0.61
			NF	1466	0.41	0.08	0.13	0.37	0.42	0.47	0.10	0.59
2	17 February 2019	Training	F	882	0.54	0.05	0.38	0.51	0.54	0.57	0.06	0.67
			NF	720	0.36	0.07	0.18	0.31	0.35	0.41	0.10	0.57
		Validation	F	570	0.53	0.05	0.33	0.51	0.54	0.57	0.06	0.67
			NF	618	0.36	0.08	0.22	0.31	0.34	0.41	0.10	0.60
	13 April 2019	Training	F	882	0.56	0.04	0.37	0.54	0.56	0.58	0.04	0.63
			NF	720	0.34	0.06	0.17	0.30	0.32	0.38	0.08	0.52
		Validation	F	570	0.55	0.04	0.37	0.53	0.56	0.58	0.05	0.64
			NF	618	0.34	0.07	0.21	0.30	0.32	0.36	0.06	0.56
	25 February 2025	Training	F	2301	0.51	0.05	0.23	0.48	0.52	0.55	0.06	0.68
			NF	2219	0.44	0.08	0.13	0.39	0.45	0.49	0.10	0.61
		Validation	F	1959	0.51	0.05	0.30	0.48	0.52	0.55	0.07	0.66
			NF	2142	0.44	0.07	0.21	0.41	0.45	0.50	0.09	0.61
	06 April 2025	Training	F	2301	0.52	0.05	0.27	0.49	0.52	0.56	0.07	0.64
			NF	2219	0.44	0.08	0.12	0.39	0.45	0.50	0.11	0.64
		Validation	F	1959	0.52	0.05	0.29	0.49	0.53	0.55	0.07	0.63
			NF	2142	0.45	0.08	0.23	0.40	0.46	0.50	0.10	0.64
3	17 February 2019	Training	F	693	0.47	0.05	0.28	0.44	0.47	0.50	0.06	0.59
			NF	927	0.36	0.08	0.17	0.29	0.35	0.41	0.12	0.68
		Validation	F	522	0.47	0.05	0.29	0.44	0.48	0.51	0.07	0.59
			NF	639	0.35	0.07	0.18	0.30	0.35	0.40	0.10	0.59
	13 April 2019	Training	F	693	0.48	0.05	0.27	0.45	0.48	0.52	0.07	0.60
			NF	927	0.34	0.08	0.08	0.29	0.33	0.40	0.12	0.67
		Validation	F	522	0.49	0.05	0.32	0.46	0.49	0.52	0.07	0.62
			NF	639	0.34	0.07	0.13	0.29	0.33	0.39	0.09	0.56
	25 February 2025	Training	F	609	0.48	0.04	0.35	0.45	0.48	0.51	0.06	0.58
			NF	1130	0.41	0.10	0.16	0.33	0.40	0.50	0.17	0.60
		Validation	F	619	0.47	0.04	0.32	0.44	0.48	0.50	0.06	0.59
			NF	1206	0.41	0.10	0.18	0.33	0.41	0.50	0.16	0.59
	06 April 2025	Training	F	609	0.48	0.05	0.33	0.44	0.48	0.52	0.07	0.61
			NF	1130	0.40	0.10	0.20	0.31	0.39	0.49	0.18	0.61
		Validation	F	619	0.47	0.05	0.26	0.44	0.47	0.50	0.06	0.58
			NF	1206	0.40	0.09	0.19	0.33	0.40	0.48	0.15	0.59

Table S1. Descriptive statistics of RE-NBR values for training and validation samples by assessment area, date, subset, and class in the Nevado de Colima Adjacent Study Area (2019 and 2025). (Part 2)

Assessment area	Date	Subset	Class	n (valid pixels)	Average	Standard Deviation	Minimum	Q1	Median	Q3	IQR	Maximum
4	17 February 2019	Training	F	2489	0.49	0.05	0.32	0.46	0.49	0.53	0.07	0.66
			NF	1226	0.36	0.08	0.14	0.31	0.34	0.41	0.10	0.58
		Validation	F	1888	0.50	0.05	0.33	0.47	0.50	0.54	0.07	0.66
			NF	1089	0.35	0.08	0.13	0.29	0.33	0.39	0.10	0.62
	13 April 2019	Training	F	2489	0.51	0.05	0.28	0.49	0.52	0.55	0.06	0.63
			NF	1226	0.35	0.08	0.17	0.29	0.33	0.38	0.09	0.55
		Validation	F	1888	0.52	0.04	0.35	0.49	0.52	0.55	0.06	0.63
			NF	1089	0.34	0.08	0.09	0.28	0.33	0.38	0.10	0.56
	25 February 2025	Training	F	2460	0.49	0.05	0.29	0.45	0.48	0.52	0.06	0.64
			NF	1295	0.36	0.11	0.13	0.29	0.34	0.44	0.16	0.61
		Validation	F	2039	0.49	0.05	0.33	0.45	0.48	0.52	0.06	0.64
			NF	1086	0.35	0.10	0.10	0.27	0.33	0.43	0.16	0.61
	06 April 2025	Training	F	2460	0.48	0.06	0.27	0.45	0.49	0.52	0.07	0.62
			NF	1295	0.35	0.10	0.06	0.28	0.34	0.42	0.15	0.59
		Validation	F	2039	0.49	0.06	0.32	0.45	0.49	0.53	0.08	0.62
			NF	1086	0.34	0.09	0.15	0.27	0.32	0.40	0.13	0.58
5	17 February 2019	Training	F	9160	0.48	0.06	0.21	0.44	0.48	0.52	0.08	0.69
			NF	6304	0.38	0.08	0.14	0.32	0.37	0.43	0.11	0.63
		Validation	F	7657	0.48	0.06	0.20	0.44	0.48	0.52	0.08	0.67
			NF	5492	0.38	0.08	0.16	0.33	0.38	0.44	0.12	0.66
	13 April 2019	Training	F	9160	0.50	0.07	0.17	0.46	0.51	0.55	0.09	0.64
			NF	6309	0.38	0.07	0.16	0.33	0.38	0.43	0.11	0.63
		Validation	F	7657	0.50	0.06	0.18	0.46	0.51	0.54	0.08	0.63
			NF	5496	0.38	0.07	0.18	0.33	0.38	0.43	0.10	0.59
	25 February 2025	Training	F	8843	0.47	0.06	0.24	0.44	0.48	0.51	0.07	0.66
			NF	6014	0.38	0.08	0.13	0.32	0.38	0.44	0.12	0.61
		Validation	F	6820	0.47	0.06	0.19	0.44	0.48	0.51	0.07	0.67
			NF	5577	0.38	0.08	0.14	0.32	0.39	0.45	0.12	0.63
	06 April 2025	Training	F	8843	0.49	0.06	0.24	0.46	0.50	0.54	0.07	0.65
			NF	6014	0.38	0.07	0.17	0.32	0.38	0.43	0.11	0.59
		Validation	F	6820	0.49	0.06	0.22	0.46	0.50	0.53	0.07	0.63
			NF	5579	0.38	0.07	0.17	0.32	0.38	0.43	0.11	0.62
6	17 February 2019	Training	F	5899	0.47	0.05	0.18	0.44	0.48	0.51	0.07	0.64
			NF	3674	0.37	0.08	0.14	0.31	0.36	0.43	0.12	0.70
		Validation	F	4517	0.48	0.05	0.21	0.44	0.48	0.51	0.07	0.76
			NF	3003	0.38	0.08	0.10	0.31	0.37	0.44	0.12	0.59
	13 April 2019	Training	F	5899	0.50	0.05	0.25	0.47	0.51	0.54	0.06	0.63
			NF	3674	0.37	0.08	0.17	0.31	0.36	0.43	0.12	0.72
		Validation	F	4517	0.51	0.05	0.29	0.48	0.51	0.54	0.06	0.79
			NF	3003	0.38	0.08	0.12	0.32	0.37	0.43	0.12	0.60
	25 February 2025	Training	F	4819	0.47	0.05	0.31	0.44	0.48	0.51	0.06	0.62
			NF	3741	0.39	0.10	0.10	0.32	0.39	0.46	0.14	0.62
		Validation	F	4180	0.47	0.05	0.31	0.45	0.48	0.51	0.06	0.64
			NF	3408	0.38	0.10	0.08	0.31	0.38	0.46	0.15	0.61
	06 April 2025	Training	F	4819	0.48	0.05	0.26	0.45	0.48	0.52	0.07	0.62
			NF	3741	0.38	0.09	0.10	0.31	0.38	0.45	0.13	0.59
		Validation	F	4180	0.48	0.05	0.30	0.45	0.49	0.52	0.07	0.62
			NF	3408	0.38	0.09	0.12	0.32	0.37	0.45	0.13	0.58

Table S1. Descriptive statistics of RE-NBR values for training and validation samples by assessment area, date, subset, and class in the Nevado de Colima Adjacent Study Area (2019 and 2025). (Part 3)

Assessment area	Date	Subset	Class	n (valid pixels)	Average	Standard Deviation	Minimum	Q1	Median	Q3	IQR	Maximum
7	17 February 2019	Training	F	345	0.49	0.03	0.38	0.47	0.49	0.51	0.04	0.59
			NF	1593	0.37	0.11	0.11	0.28	0.34	0.47	0.19	0.61
		Validation	F	257	0.48	0.04	0.34	0.46	0.48	0.51	0.05	0.58
			NF	1077	0.37	0.12	0.08	0.27	0.34	0.48	0.21	0.62
	13 April 2019	Training	F	345	0.46	0.04	0.37	0.44	0.46	0.48	0.04	0.59
			NF	1593	0.36	0.10	0.07	0.30	0.35	0.42	0.12	0.60
		Validation	F	257	0.47	0.04	0.37	0.44	0.46	0.50	0.06	0.59
			NF	1077	0.36	0.10	0.01	0.30	0.35	0.42	0.12	0.61
	25 February 2025	Training	F	249	0.46	0.06	0.24	0.45	0.48	0.50	0.05	0.58
			NF	676	0.42	0.11	0.09	0.31	0.46	0.51	0.20	0.59
		Validation	F	207	0.46	0.07	0.23	0.46	0.48	0.49	0.04	0.58
			NF	378	0.41	0.10	0.22	0.32	0.43	0.51	0.19	0.58
	06 April 2025	Training	F	249	0.44	0.06	0.25	0.42	0.45	0.47	0.05	0.56
			NF	676	0.42	0.11	0.11	0.32	0.46	0.52	0.20	0.59
		Validation	F	207	0.43	0.05	0.25	0.42	0.44	0.46	0.04	0.57
			NF	378	0.41	0.10	0.23	0.32	0.42	0.51	0.19	0.57
8	17 February 2019	Training	F	4626	0.48	0.05	0.27	0.46	0.49	0.52	0.06	0.64
			NF	3842	0.40	0.07	0.09	0.35	0.41	0.45	0.10	0.63
		Validation	F	3815	0.48	0.05	0.26	0.46	0.49	0.52	0.06	0.60
			NF	3102	0.40	0.07	0.14	0.35	0.41	0.45	0.10	0.60
	13 April 2019	Training	F	4626	0.51	0.05	0.26	0.48	0.51	0.54	0.06	0.62
			NF	3842	0.39	0.08	0.09	0.33	0.38	0.45	0.12	0.59
		Validation	F	3815	0.51	0.05	0.26	0.48	0.51	0.54	0.06	0.62
			NF	3102	0.39	0.08	0.10	0.33	0.38	0.45	0.13	0.59
	25 February 2025	Training	F	3842	0.48	0.04	0.28	0.46	0.49	0.51	0.05	0.62
			NF	4163	0.43	0.08	0.09	0.38	0.44	0.49	0.11	0.61
		Validation	F	3255	0.49	0.04	0.27	0.46	0.49	0.51	0.05	0.59
			NF	3355	0.43	0.08	0.11	0.38	0.44	0.49	0.10	0.62
	06 April 2025	Training	F	3842	0.49	0.04	0.26	0.47	0.49	0.52	0.05	0.61
			NF	4163	0.42	0.09	0.16	0.35	0.43	0.49	0.14	0.62
		Validation	F	3255	0.49	0.04	0.23	0.47	0.50	0.52	0.05	0.59
			NF	3355	0.42	0.09	0.11	0.36	0.42	0.48	0.13	0.62
9	17 February 2019	Training	F	597	0.50	0.05	0.26	0.47	0.50	0.52	0.06	0.68
			NF	2549	0.41	0.10	0.04	0.34	0.43	0.49	0.15	0.63
		Validation	F	360	0.48	0.04	0.37	0.46	0.48	0.51	0.05	0.59
			NF	1981	0.42	0.10	0.04	0.34	0.44	0.49	0.15	0.59
	13 April 2019	Training	F	597	0.52	0.04	0.26	0.50	0.52	0.55	0.05	0.62
			NF	2549	0.41	0.10	0.03	0.32	0.42	0.49	0.18	0.63
		Validation	F	360	0.52	0.04	0.43	0.50	0.52	0.55	0.05	0.61
			NF	1981	0.42	0.11	0.01	0.32	0.45	0.51	0.18	0.60
	25 February 2025	Training	F	795	0.47	0.04	0.30	0.45	0.48	0.50	0.06	0.57
			NF	3475	0.45	0.09	0.10	0.39	0.47	0.52	0.12	0.76
		Validation	F	560	0.47	0.04	0.33	0.44	0.48	0.50	0.06	0.57
			NF	2825	0.45	0.09	0.13	0.39	0.48	0.52	0.13	0.75
	06 April 2025	Training	F	795	0.48	0.05	0.27	0.46	0.49	0.52	0.06	0.58
			NF	3475	0.45	0.09	0.06	0.40	0.46	0.53	0.13	0.75
		Validation	F	560	0.48	0.04	0.36	0.45	0.49	0.52	0.06	0.58
			NF	2825	0.45	0.10	0.06	0.40	0.47	0.53	0.13	0.78



2019–02–17 — Binary confidence summary by AA (quantiles + thresholds)

AA	n_valid	P10	P50	P90	IQR	%K<0.70	%K<0.80	%K<0.90	%K≥0.95
1	1,505,338	0.7500	0.9832	1.0000	0.0927	7.61	12.60	20.52	59.18
2	1,525,319	0.6262	0.9882	0.9995	0.1401	14.58	21.04	28.65	65.26
3	1,508,191	0.8441	0.9938	1.0000	0.0211	4.60	8.05	13.32	81.25
4	1,522,033	0.6714	0.9738	0.9990	0.1620	12.28	21.27	32.99	58.24
5	1,540,912	0.5974	0.8860	0.9885	0.2270	20.66	33.33	53.40	31.78
6	1,522,717	0.5779	0.8610	0.9839	0.2585	26.15	40.03	58.51	25.06
7	1,500,408	0.9120	0.9980	1.0000	0.0248	2.53	5.04	9.27	84.33
8	1,520,578	0.6739	0.9902	0.9998	0.1063	11.46	17.34	25.90	66.81
9	1,503,221	0.9013	0.9994	1.0000	0.0086	5.04	7.52	9.95	87.08

2025–02–25 — Binary confidence summary by AA (quantiles + thresholds)

AA	n_valid	P10	P50	P90	IQR	%K<0.70	%K<0.80	%K<0.90	%K≥0
1	1,505,341	0.7319	0.9772	0.9994	0.1747	8.25	21.54	35.01	58.
2	1,525,352	0.7168	0.9880	0.9990	0.0681	9.15	14.70	21.74	71.
3	1,508,191	0.9023	0.9964	0.9996	0.0099	4.22	6.28	9.87	86.
4	1,522,036	0.6413	0.9588	0.9953	0.1494	13.87	21.62	33.37	53.
5	1,540,934	0.6420	0.9418	0.9958	0.1775	14.65	24.18	39.38	47.
6	1,522,717	0.5872	0.9091	0.9985	0.2671	22.44	34.04	48.41	41.
7	1,500,557	0.8268	0.9361	0.9904	0.0747	2.08	5.92	24.88	41.
8	1,520,578	0.7391	0.9906	0.9994	0.0648	8.09	13.53	21.30	72.
9	1,503,228	0.9134	0.9980	1.0000	0.0092	3.55	6.02	9.32	86.

2019–04–13 — Binary confidence summary by AA (quantiles + thresholds)

AA	n_valid	P10	P50	P90	IQR	%K<0.70	%K<0.80	%K<0.90	%K≥0.95
1	1,505,339	0.8410	0.9901	0.9999	0.0714	5.04	8.20	14.87	64.26
2	1,525,388	0.8041	0.9973	1.0000	0.0190	6.98	9.89	12.53	83.05
3	1,508,148	0.9204	0.9963	0.9999	0.0104	3.35	5.32	8.85	87.28
4	1,522,034	0.6837	0.9836	0.9983	0.1171	10.91	17.76	27.52	64.21
5	1,540,984	0.6351	0.9135	0.9974	0.2039	15.71	28.14	46.71	39.96
6	1,522,702	0.6363	0.8971	0.9958	0.2062	16.39	30.17	50.69	35.02
7	1,500,533	0.9192	0.9972	1.0000	0.0173	2.46	4.14	7.28	82.82
8	1,520,551	0.7420	0.9948	0.9998	0.0527	7.98	13.01	19.69	74.37
9	1,503,141	0.9550	0.9992	1.0000	0.0071	2.51	4.32	6.67	90.43

2025–04–06 — Binary confidence summary by AA (quantiles + thresholds)

AA	n_valid	P10	P50	P90	IQR	%K<0.70	%K<0.80	%K<0.90	%K≥0
1	1,505,343	0.7727	0.9780	0.9990	0.1770	6.03	18.69	35.54	58.
2	1,525,391	0.8166	0.9839	0.9985	0.0302	5.64	9.31	14.98	79.
3	1,508,182	0.9052	0.9902	0.9988	0.0295	4.14	6.40	9.67	84.
4	1,522,035	0.6360	0.9468	0.9938	0.1508	14.53	22.16	34.31	48.
5	1,540,985	0.6623	0.9478	0.9972	0.1595	12.68	21.33	36.77	49.
6	1,522,695	0.5988	0.9293	0.9990	0.2530	20.50	31.94	45.31	46.
7	1,500,538	0.8011	0.9197	0.9894	0.0684	2.66	9.85	33.62	26.
8	1,520,585	0.7833	0.9860	0.9988	0.0458	6.66	10.78	16.81	75.
9	1,503,156	0.9327	0.9962	0.9998	0.0143	2.29	3.96	7.29	88.

Spatial domain and area accounting: EPSG:32613 (WGS 84 / UTM Zone 13N). Visualisation: EPSG:4326 (WGS 84; DMS ticks).
Inputs: Random Forest (RF) confidence rasters expressed as binary confidence K(x)=max(p, 1−p),
with values ranging from 0.5 to 1.0, derived from Sentinel-2 MSI L2A RE-NBR index.
Tables report confidence summary statistics by Assessment Areas (AAs; 01–09) computed from per-AA confidence rasters in EPSG:32613 when available.
RF settings: 100 trees; maximum depth = 20; minimum samples per leaf = 15; minimum samples to split a node = 20;
class weights (forest = 0.3; non-forest = 0.7); 33% features per split; out-of-bag validation.
Predictors: B4, B8, B12, slope, and the RE-NBR index.
Data processing and visualisation: the authors.

Figure S1. Pixel-wise forest cover classification confidence maps for the Nevado de Colima Adjacent Study Area, generated using the enriched Random Forest configuration based on the RE-NBR index, with B4, B8, B12, and slope included as auxiliary predictors.

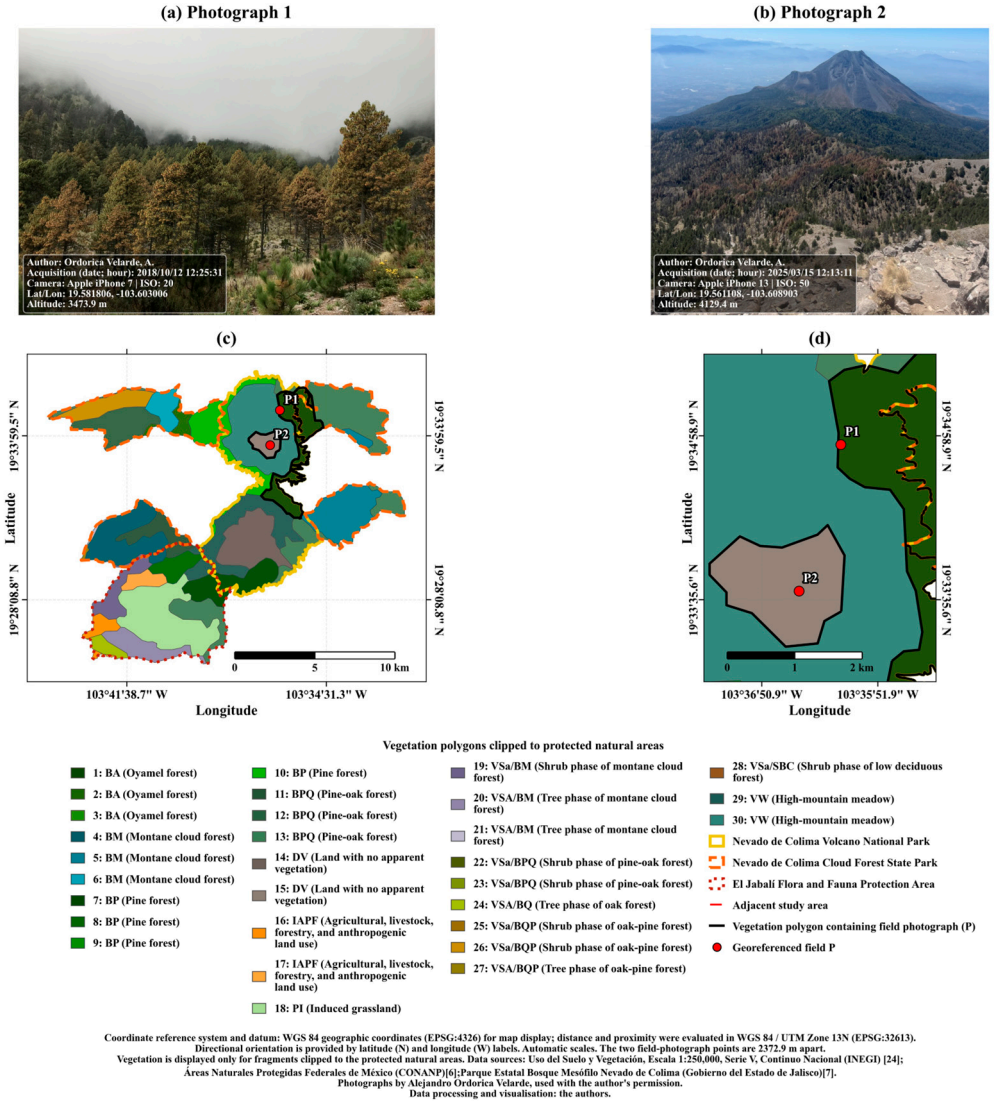


Figure S2. Field-photograph and vegetation context of high-elevation forest areas containing *Pinus hartwegii* Lindl. populations in the Nevado de Colima. (a) October 2018 field photograph, representing landscape conditions close to the initial reference year, 2019. (b) March 2025 field photograph, representing the final reference year, 2025. Both photographs show forest settings within the high-elevation belt where *P. hartwegii* populations occur and are locally predominant. (c) Vegetation polygons clipped to the protected natural areas considered in the study. (d) Local zoom showing the georeferenced field-photograph points and their corresponding vegetation polygons.