Supplementary Material

Table S1 Sentinel 1 fire severity cross validation models a. with texture indices, b. without texture indices.

a. with textures	Balanced Accuracy					Overall
Study Fires	**Unburnt**	**Low**	**Moderate**	**High**	**Extreme**	
Sir Bertram	0.550	0.500	0.498	0.499	0.525	0.173
Holsworthy	0.699	0.467	0.499	0.582	0.515	0.337
MtCanobolas	0.507	0.499	0.500	0.501	0.500	0.527
SirIvan	0.786	0.513	0.526	0.506	0.688	0.366
WhiteCedars	0.729	0.499	0.501	0.501	0.833	0.431
Tathra	0.553	0.494	0.488	0.499	0.566	0.142
Wollemi	0.550	0.506	0.498	0.495	0.502	0.100
Pilliga	0.884	0.479	0.468	0.487	0.623	0.457
average	0.657	0.494	0.497	0.509	0.594	0.317

b. without textures	Balanced Accuracy					Overall
Study Fires	**Unburnt**	**Low**	**Moderate**	**High**	**Extreme**	
Sir Bertram	0.624	0.548	0.501	0.511	0.560	0.197
Holsworthy	0.633	0.541	0.509	0.483	0.663	0.262
MtCanobolas	0.647	0.530	0.506	0.528	0.504	0.449
SirIvan	0.551	0.522	0.508	0.489	0.612	0.268
WhiteCedars	0.617	0.546	0.507	0.577	0.635	0.300
Tathra	0.728	0.556	0.518	0.501	0.580	0.294
Wollemi	0.575	0.520	0.504	0.507	0.520	0.246
Pilliga	0.621	0.513	0.503	0.501	0.560	0.278
average	0.624	0.534	0.507	0.512	0.579	0.287

Table S2 Sentinel 1 fire-severity target-trained models, a. with texture indices, b. without texture indices.

Class stats – target-trained with textures						
a.	Balanced Accuracy					Overall
	Unburnt	**Low**	**Moderate**	**High**	**Extreme**	
Sir Bertram	0.972	0.910	0.873	0.901	0.916	0.854
Holsworthy	0.984	0.907	0.875	0.901	0.919	0.857
MtCanobolas	0.937	0.908	0.874	0.899	0.921	0.854
SirIvan	0.929	0.898	0.869	0.902	0.921	0.847
WhiteCedars	0.949	0.886	0.840	0.903	0.922	0.841
Tathra	0.979	0.912	0.877	0.900	0.920	0.858
Wollemi	0.812	0.914	0.876	0.898	0.920	0.850
Pilliga	0.992	0.909	0.876	0.902	0.919	0.858
average	0.944	0.905	0.870	0.901	0.920	0.852
Class stats - target-trained without textures						
	Balanced Accuracy					Overall
b.	**Unburnt**	**Low**	**Moderate**	**High**	**Extreme**	
Sir Bertram	0.666	0.679	0.646	0.667	0.713	0.527
Holsworthy	0.701	0.674	0.641	0.668	0.717	0.523
MtCanobolas	0.682	0.679	0.645	0.667	0.716	0.524
SirIvan	0.601	0.678	0.645	0.674	0.717	0.511
WhiteCedars	0.712	0.671	0.641	0.670	0.720	0.506
Tathra	0.836	0.682	0.650	0.670	0.715	0.538
Wollemi	0.600	0.680	0.648	0.665	0.716	0.525
Pilliga	0.720	0.680	0.645	0.665	0.714	0.528
average	0.690	0.678	0.645	0.668	0.716	0.523

Table S3 Sentinel 2 fire severity cross validation models, a. with texture indices, b. without texture indices.

Class stats – cross-validation optics with textures						
	Balanced Accuracy					**Overall**
a.	**Unburnt**	**Low**	**Moderate**	**High**	**Extreme**	
Sir Bertram	0.997	0.893	0.693	0.901	0.971	0.846
Holsworthy	0.998	0.855	0.560	0.820	0.953	0.744
MtCanobolas	0.737	0.505	0.542	0.665	0.942	0.647
SirIvan	0.977	0.713	0.759	0.743	0.950	0.802
WhiteCedars	0.973	0.910	0.847	0.859	0.935	0.789
Tathra	0.982	0.942	0.754	0.823	0.963	0.821
Wollemi	0.882	0.524	0.762	0.875	0.950	0.621
Pilliga	0.999	0.945	0.697	0.524	0.707	0.622
average	0.943	0.786	0.702	0.776	0.921	0.737
Class stats – cross-validation without textures						
	Balanced Accuracy					**Overall**
b.	**Unburnt**	**Low**	**Moderate**	**High**	**Extreme**	
Sir Bertram	0.910	0.806	0.524	0.806	0.985	0.774
Holsworthy	0.830	0.768	0.521	0.819	0.947	0.638
MtCanobolas	0.921	0.675	0.661	0.787	0.900	0.745
SirIvan	0.899	0.690	0.623	0.757	0.935	0.744
WhiteCedars	0.951	0.879	0.610	0.896	0.930	0.791
Tathra	0.553	0.494	0.488	0.499	0.566	0.142
Wollemi	0.898	0.875	0.661	0.834	0.922	0.760
Pilliga	0.973	0.769	0.705	0.682	0.810	0.715
average	0.867	0.744	0.599	0.760	0.874	0.664

Table S4 Sentinel 2 fire severity target-trained models, a. with texture indices, b. without texture indices.

Class stats - trained optics with textures						
	Balanced Accuracy					**Overall**
	Unburnt	**Low**	**Moderate**	**High**	**Extreme**	
Sir Bertram	0.999	0.983	0.936	0.963	0.987	0.958
Holsworthy	1.000	0.983	0.935	0.964	0.986	0.959
MtCanobolas	0.992	0.981	0.934	0.964	0.986	0.957
SirIvan	0.991	0.981	0.934	0.963	0.987	0.957
WhiteCedars	0.999	0.982	0.933	0.964	0.988	0.962
Tathra	0.993	0.965	0.896	0.945	0.982	0.930
Wollemi	0.999	0.983	0.933	0.963	0.987	0.957
Pilliga	1.000	0.983	0.934	0.963	0.986	0.957
average	0.99.7	0.98.0	0.929	0.96.1	0.986	0.954

Class stats - trained optics without textures						
	Balanced Accuracy					**Overall**
	Unburnt	**Low**	**Moderate**	**High**	**Extreme**	
Sir Bertram	0.949	0.904	0.756	0.884	0.966	0.838
Holsworthy	0.898	0.888	0.758	0.888	0.965	0.832
MtCanobolas	0.912	0.907	0.755	0.885	0.966	0.838
SirIvan	0.914	0.906	0.754	0.887	0.966	0.837
WhiteCedars	0.965	0.893	0.755	0.891	0.969	0.848
Tathra	0.947	0.903	0.757	0.884	0.965	0.838
Wollemi	0.918	0.906	0.754	0.885	0.966	0.838
Pilliga	0.984	0.913	0.754	0.883	0.965	0.843
average	0.936	0.902	0.755	0.886	0.966	0.839

Table S5 Sentinel 1 fire extent cross-validation models a. with texture indices, b. without texture indices.

a. Class stats -cross-validation with textures			**b. Class stats – cross-validation without textures**		
	Balanced Accuracy			**Balanced Accuracy**	
	Unburnt	**Overall**		**Unburnt**	**Overall**
Sir Bertram	0.585	0.287	**Sir Bertram**	0.622	0.899
Holsworthy	0.737	0.616	**Holsworthy**	0.630	0.823
MtCanobolas	0.516	0.222	**MtCanobolas**	0.608	0.747
SirIvan	0.751	0.794	**SirIvan**	0.531	0.849
WhiteCedars	0.735	0.644	**WhiteCedars**	0.622	0.714
Tathra	0.595	0.285	**Tathra**	0.724	0.870
Wollemi	0.562	0.240	**Wollemi**	0.571	0.922
Pilliga	0.894	0.868	**Pilliga**	0.647	0.754
average	67.175	49.429	**average**	61.943	82.208

Table S6 Sentinel 2 fire extent cross-validation models a. with texture indices, b. without texture indices.

a. Class stats – cross-validation optics with textures			**b. Class stats – cross-validation without textures**		
	Balanced Accuracy			**Balanced Accuracy**	
	Unburnt	**Overall**		**Unburnt**	**Overall**
Sir Bertram	0.998	0.996	**Sir Bertram**	0.958	0.988
Holsworthy	0.999	0.999	**Holsworthy**	0.828	0.915
MtCanobolas	0.799	0.676	**MtCanobolas**	0.898	0.918
SirIvan	0.978	0.973	**SirIvan**	0.887	0.957
WhiteCedars	0.981	0.973	**WhiteCedars**	0.960	0.965
Tathra	na	na	**Tathra**	0.916	0.895
Wollemi	0.936	0.881	**Wollemi**	0.940	0.978
Pilliga	0.990	0.990	**Pilliga**	0.990	0.990
average	95.429	92.669	**average**	92.214	95.060

Table S7 Ranked Gini Index values for Sentinel 1 cross validation models

Sentinel 1 Indices	Sir Bertram	Holsworthy	Mt Canobolas	Sir Ivan	White Cedars	Tathra	Wollemi	Pilliga	Average
glcm_radarVH_mean_11	1	2	2	2	2	1	1	1	1.5
glcm_radarVH_var_11	2	1	1	3	1	2	2	2	1.8
glcm_radarVV_var_11	6	5	3	5	3	4	4	3	4.1
glcm_radarVV_mean_11	5	3	4	6	4	3	3	6	4.3
glcm_radarVH_var_7	3	7	7	7	5	6	5	5	5.6
glcm_radarVH_mean_7	4	8	6	8	6	5	6	4	5.9
VHbackscatter	10	4	5	1	10	10	7	9	7.0
glcm_radarVH_con_11	7	11	9	10	7	9	13	7	9.1
VVbackscatter	11	6	8	4	11	11	8	16	9.4
glcm_radarVV_var_7	17	10	10	9	8	7	10	10	10.1
glcm_radarVV_mean_7	16	9	11	11	9	8	9	11	10.5
glcm_radarVV_corr_11	8	13	18	12	17	12	12	8	12.5
glcm_radarVH_2mom_11	13	15	13	14	12	14	16	12	13.6
glcm_radarVH_corr_11	9	14	17	13	16	17	14	13	14.1
preminpostVH	14	17	14	19	14	13	11	14	14.5
glcm_radarVV_con_11	12	12	16	16	15	16	15	15	14.6
glcm_radarVH_hom_11	15	16	15	15	18	15	17	17	16.0
glcm_radarVH_dissim_11	18	18	12	17	13	18	18	19	16.6
glcm_radarVV_2mom_11	19	19	20	18	19	19	19	18	18.9
glcm_radarVV_hom_11	20	21	23	20	21	20	20	20	20.6
glcm_radarVV_dissim_11	21	20	21	21	22	21	21	21	21.0
preminpostVV	24	22	19	24	20	23	23	22	22.1
glcm_radarVV_corr_7	22	23	25	22	23	22	22	23	22.8
glcm_radarVH_corr_7	23	24	26	23	25	24	24	24	24.1
glcm_radarVH_con_7	25	25	22	25	24	25	25	25	24.5
glcm_radarVV_con_7	26	26	29	26	26	27	26	26	26.5
glcm_radarVH_hom_7	27	27	27	27	28	26	27	27	27.0
glcm_radarVH_2mom_7	29	30	24	30	27	29	30	30	28.6
glcm_radarVV_hom_7	28	28	30	29	30	28	28	28	28.6
glcm_radarVV_2mom_7	30	29	31	28	29	30	29	29	29.4
glcm_radarVH_dissim_7	31	31	28	31	31	31	31	31	30.6
glcm_radarVV_dissim_7	32	32	32	32	32	32	32	32	32.0
random	33	33	33	33	33	33	33	33	33.0

Table S8 Ranked Gini Index values for Sentinel 2 cross-validation models

Sentinel 2 indices	Sir Bertram	Holsworthy	Mt Canobolas	Sir Ivan	White Cedars	Tathra	Wollemi	Pilliga	average
RdNBR	1	1	1	1	1	1	1	3	1.3
mean_dNBR5	3	5	4	2	5	3	2	1	3.1
mean_dNBR7	2	4	5	3	4	2	3	2	3.1
mean_dFCBare7	4	2	2	4	2	6	5	4	3.6
mean_dFCBare5	5	3	3	5	3	5	4	5	4.1
SWIR_RdNBR2	6	6	7	7	9	4	6	7	6.5
dNBR	7	8	8	6	11	7	7	6	7.5
dFCBare	9	9	6	8	6	9	11	8	8.3
glcm_SWIR_dNBR2_var_7	10	12	11	9	7	NA	9	9	9.6
SWIR_dNBR2	8	10	9	12	14	8	8	12	10.1
glcm_SWIR_dNBR2_mean_7	11	11	12	11	8	NA	10	10	10.4
RdFCTotal	15	7	10	10	13	10	14	11	11.3
glcm_SWIR_dNBR2_var_5	12	13	13	13	10	NA	12	13	12.3
glcm_SWIR_dNBR2_mean_5	14	14	14	14	12	NA	13	14	13.6
var_dFCBare7	13	15	15	15	15	11	15	15	14.3
var_dNBR7	17	18	17	19	17	12	16	16	16.5
var_dFCBare5	16	16	20	16	16	14	18	18	16.8
var_dNBR5	18	19	18	20	18	13	17	17	17.5
glcm_SWIR_dNBR2_2mom_7	19	17	19	17	19	NA	19	19	18.4
glcm_SWIR_dNBR2_con_7	20	20	16	18	20	NA	20	20	19.1
glcm_SWIR_dNBR2_hom_7	21	21	22	22	21	NA	21	21	21.3
glcm_SWIR_dNBR2_dissim_7	22	22	21	21	22	NA	22	22	21.7
glcm_SWIR_dNBR2_corr_7	23	23	24	25	23	NA	23	23	23.4
glcm_SWIR_dNBR2_2mom_5	24	24	23	24	24	NA	24	24	23.9
glcm_SWIR_dNBR2_con_5	26	25	25	23	25	NA	25	25	24.9
glcm_SWIR_dNBR2_corr_5	25	27	28	28	26	NA	26	26	26.6
glcm_SWIR_dNBR2_hom_5	27	26	26	26	27	NA	27	27	26.6
random	28	28	29	29	28	15	29	28	26.8
glcm_SWIR_dNBR2_dissim_5	29	29	27	27	29	NA	28	29	28.3

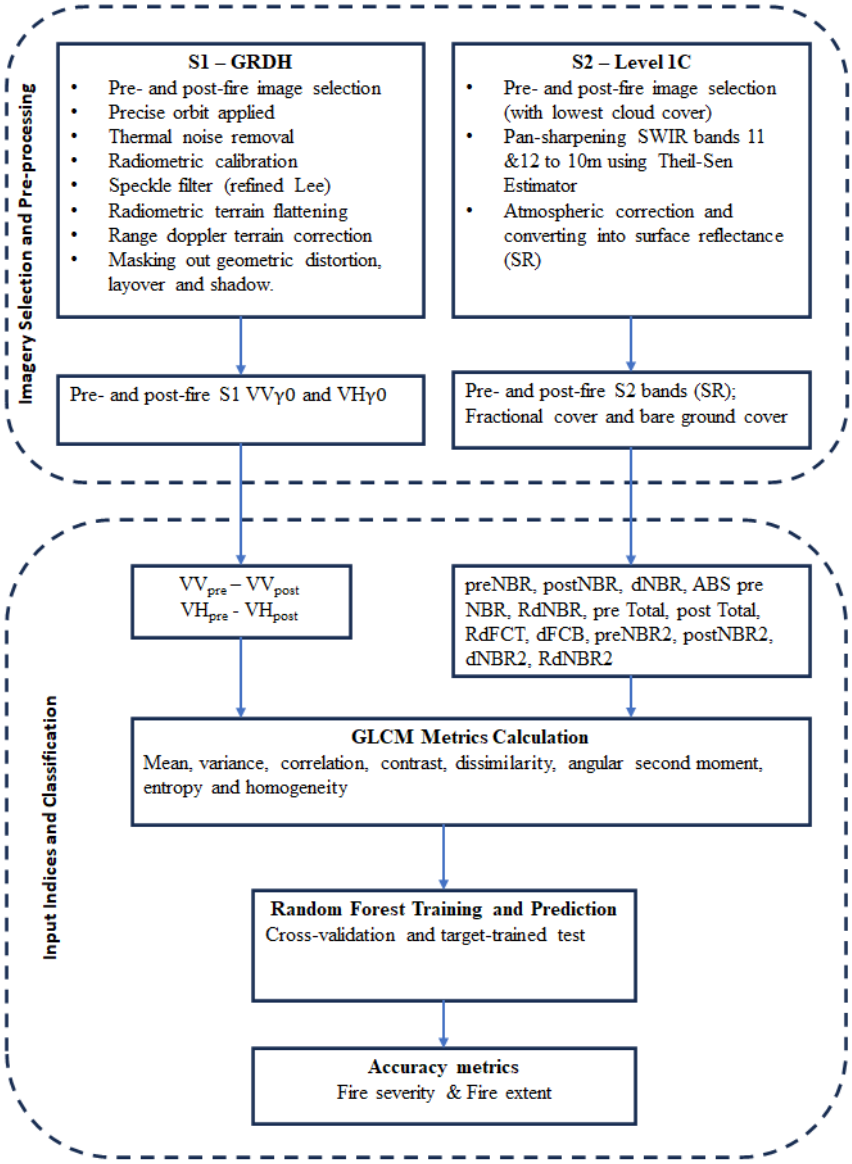

Figure S1. Method workflow.

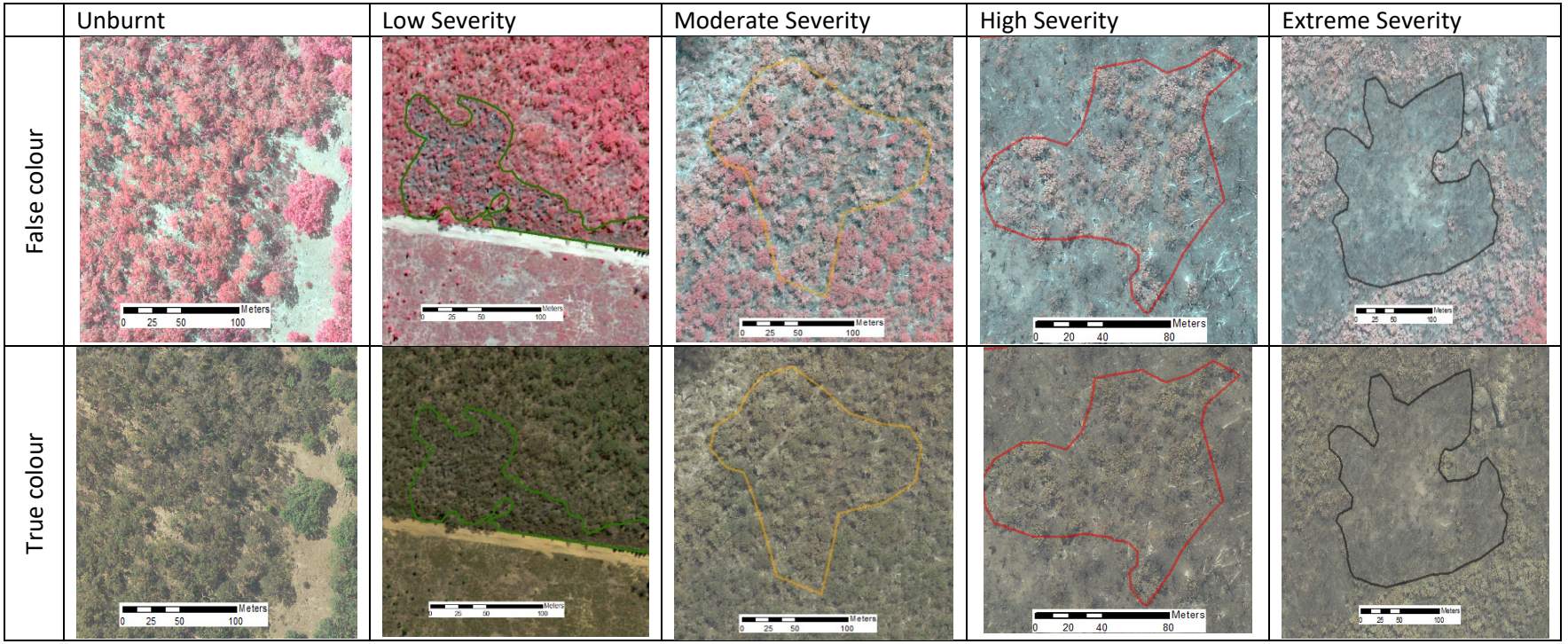

Figure S2. Example severity class training and validation data derived from high resolution aerial photography.