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Impact of the 2019-20 Fires on the Greater Blue Mountains World Heritage Area – Version 2

Report to Blue Mountains Conservation Society

Peter Smith
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1. Introduction

The year 2019 was Australia's hottest and driest on record (Abram *et al.* 2021) and culminated in the catastrophic 'Black Summer' bushfires of spring and summer 2019-20. More than 23% of the temperate forests of south-eastern Australia were burnt in this one fire season, making the scale of the fires unprecedented both for Australia and globally (Boer *et al.* 2020). One of the worst affected areas was the Greater Blue Mountains World Heritage Area, which encompasses over one million hectares of native bushland in the ranges west of Sydney. It is an area of international significance because of its exceptional floral and faunal biodiversity.

This report documents the extent and severity of the 2019-20 fires in the World Heritage Area based on a QGIS analysis of spatial data from the NSW Government's Fire Extent and Severity Mapping (FESM) project (<https://datasets.seed.nsw.gov.au/dataset/fire-extent-and-severity-mapping-fesm>). FESM is a collaborative project between NSW Department of Planning, Industry and Environment and NSW Rural Fire Service. It is a semi-automated approach to mapping fire extent and severity through a machine learning framework based on Sentinel 2 satellite imagery (Department of Planning, Industry and Environment 2020).

An earlier version of the report (Smith 2020) was based on FESM Version 2 (19-3-2020) mapping. However, the FESM mapping has since been updated and the current FESM Version 3 (18-12-2020) is substantially different. The estimated proportion of the World Heritage Area burnt in the fires has increased from 65% (Version 2) to 79% (Version 3). It has thus been necessary to update the earlier report. Fire severity classes used in the FESM mapping are described in Table 1 and illustrated in Photos 1-4.

Table 1. FESM fire severity classification
(canopy scorch is when the leaves are killed by the heat of the fire but not consumed)

Severity class	Description	% foliage fire affected
Unburnt	Canopy and understorey both unburnt	0% canopy and understorey burnt
Low	Burnt understorey with unburnt canopy	>10% burnt understorey >90% green canopy
Moderate	Partial canopy scorch	20-90% canopy scorched
High	Complete canopy scorch (with or without partial canopy consumption)	>90% canopy scorched <50% canopy consumed
Extreme	Complete canopy consumption	>50% canopy biomass consumed



Photo 1. Extreme severity fire, Bell (complete canopy consumption)



Photo 2. High severity fire, Mt Tomah (complete canopy scorch)

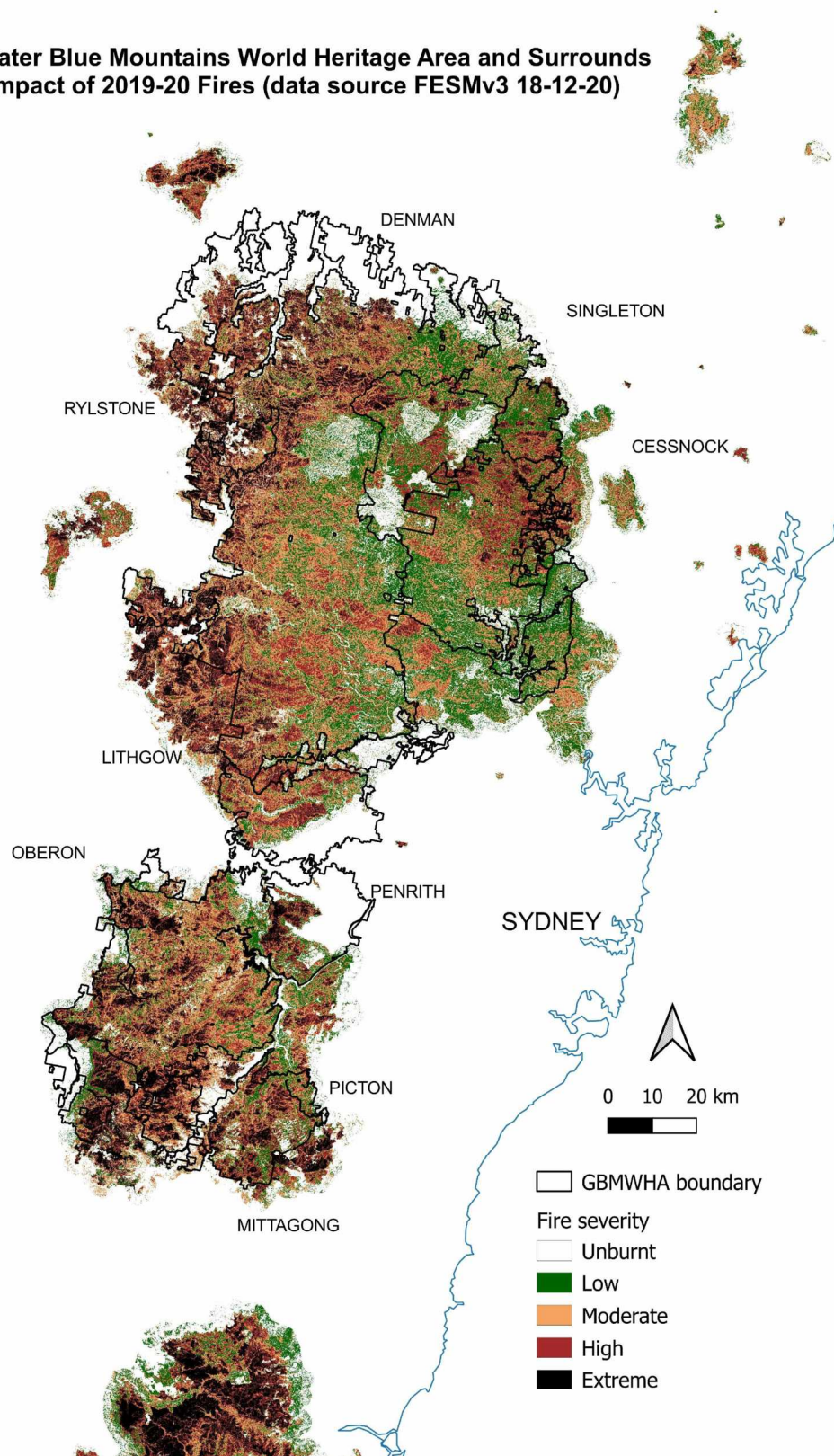


Photo 3. Moderate severity fire, Narrow Neck Plateau (partial canopy scorch)

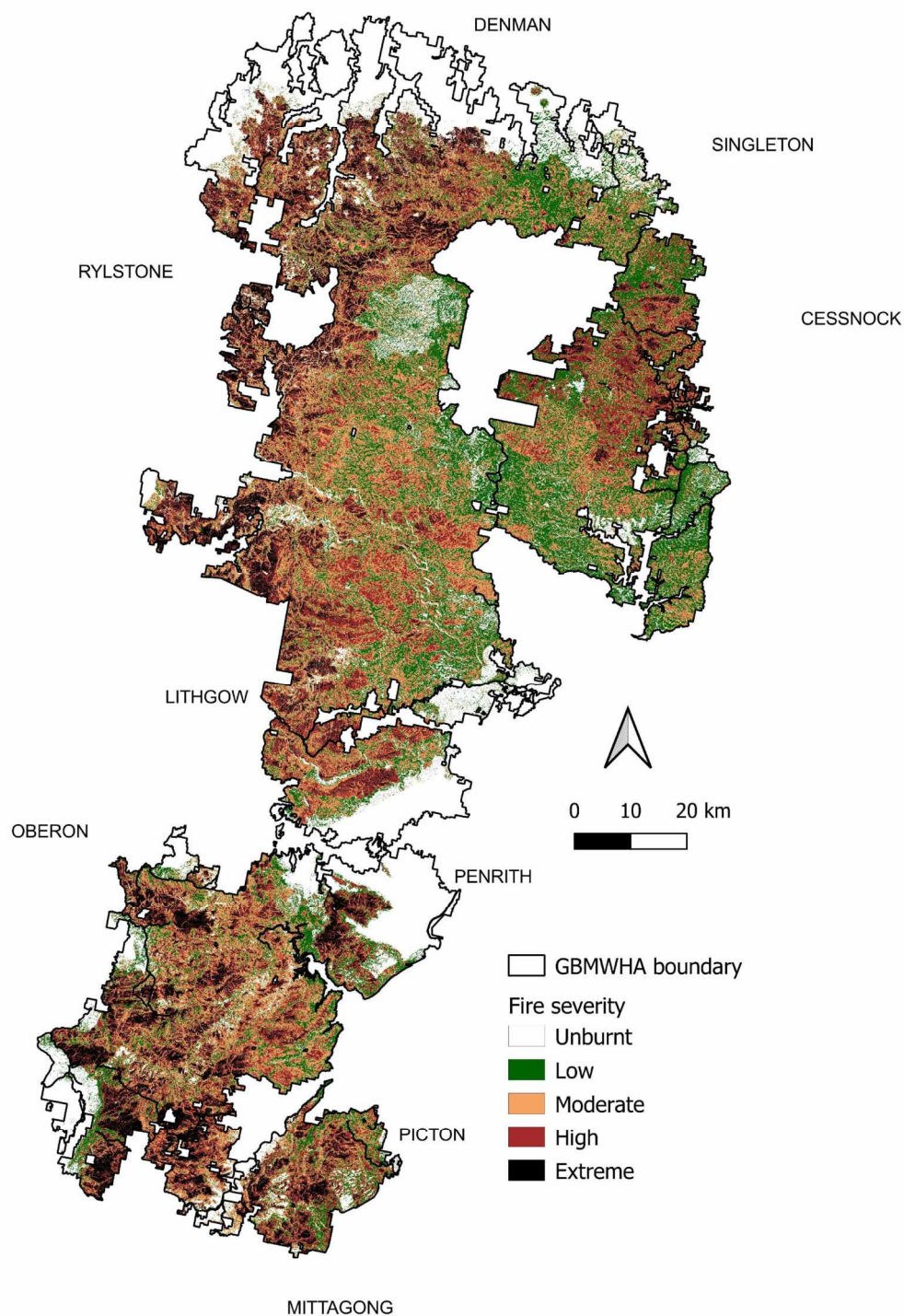


Photo 4. Low severity fire, Evans Lookout (understorey burnt, canopy unburnt)

Greater Blue Mountains World Heritage Area and Surrounds Impact of 2019-20 Fires (data source FESMv3 18-12-20)



**Greater Blue Mountains World Heritage Area
Impact of 2019-20 Fires (data source FESMv3 18-12-20)**



2. Impact on Native Vegetation

Table 2. Impact of the 2019-20 fires on the Greater Blue Mountains World Heritage Area (1,080,588 ha)

Fire severity	Area (ha)	Percentage of GBMWhA
Low	234,230	22
Moderate	309,488	28
High	194,343	18
Extreme	117,249	11
Total burnt	855,310	79
Unburnt	225,278	21

Figure 1. Severity of the 2019-20 fires in the Greater Blue Mountains World Heritage Area

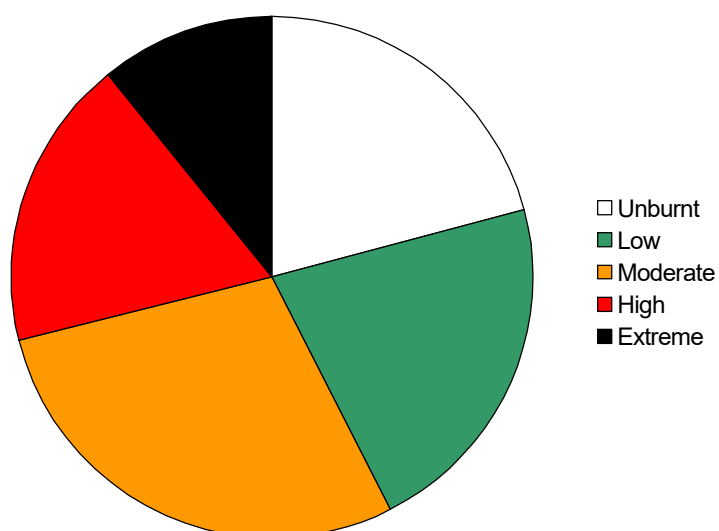
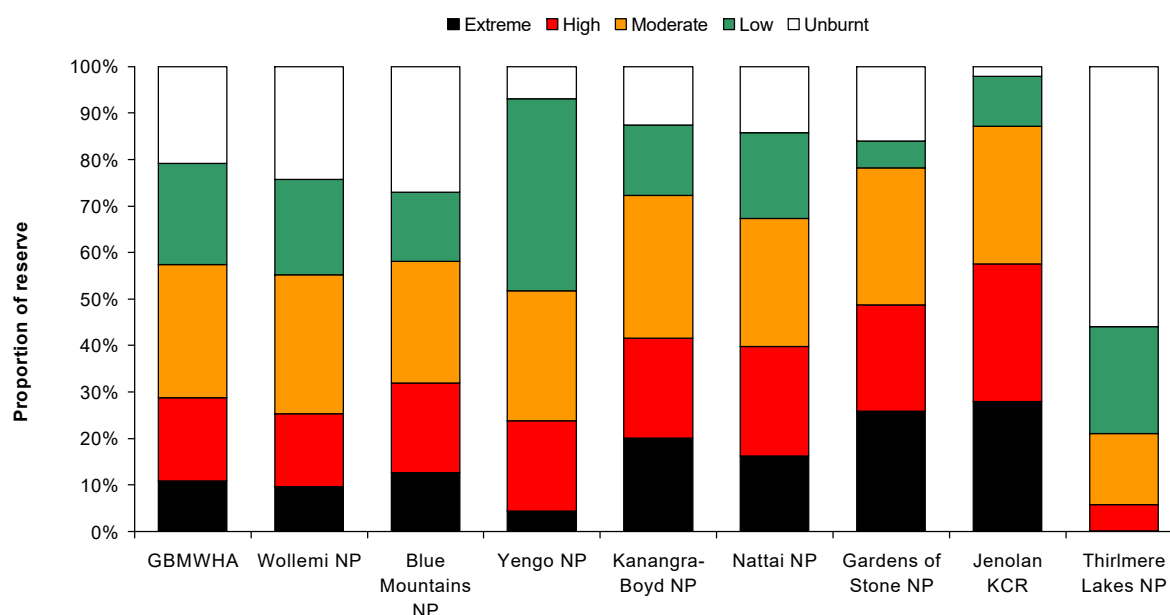


Table 3. Impact of the 2019-20 fires on individual GBMWhA reserves

GBMWhA Reserve	Area (ha)	Burnt (ha)	% burnt
Wollemi NP	502,600	380,826	76
Blue Mountains NP	269,200	196,381	73
Yengo NP	167,600	155,927	93
Kanangra-Boyd NP	71,600	62,646	87
Nattai NP	50,660	43,467	86
Gardens of Stone NP	15,120	12,693	84
Jenolan KCR	3,146	3,078	98
Thirlmere Lakes NP	662	292	44
Total GBMWhA	1,080,588	855,310	79

Figure 2. Severity of the 2019-20 fires in each Greater Blue Mountains World Heritage Area reserve



3. Impact on Native Fauna

Estimates of the numbers of native animals impacted by the fires were obtained using estimates of fauna densities in NSW by Johnson *et al.* (2007). The majority of the animals impacted are likely to have died as a result of the drought, the fires and the shortage of food, water and shelter after the fires.

Table 4. Native fauna impacted by the 2019-20 fires in the Greater Blue Mountains World Heritage Area (855,310 ha burnt)

Fauna group	Density per ha	Number impacted by 2019-20 fires
Mammals (excluding bats)	17.5	15.0 million
Birds	20.7	17.7 million
Reptiles	129.05	110.4 million
Total	167.25	143.1 million

4. Impact on Each Reserve

Table 5. Impact of the 2019-20 fires on Wollemi National Park (502,600 ha)

Fire severity	Area (ha)	Percentage of Wollemi NP
Low	103,262	20
Moderate	150,756	30
High	78,413	16
Extreme	48,395	10
Total burnt	380,826	76
Unburnt	121,774	24

Table 6. Impact of the 2019-20 fires on Blue Mountains National Park (269,200 ha)

Fire severity	Area (ha)	Percentage of Blue Mountains NP
Low	40,203	15
Moderate	70,397	26
High	51,692	19
Extreme	34,089	13
Total burnt	196,381	73
Unburnt	72,819	27

Table 7. Impact of the 2019-20 fires on Yengo National Park (167,600 ha)

Fire severity	Area (ha)	Percentage of Yengo NP
Low	69,189	41
Moderate	46,850	28
High	32,529	20
Extreme	7,359	4
Total burnt	155,927	93
Unburnt	11,673	7

Table 8. Impact of the 2019-20 fires on Kanangra-Boyd National Park (71,600 ha)

Fire severity	Area (ha)	Percentage of Kanangra-Boyd NP
Low	10,884	15
Moderate	21,997	31
High	15,412	21
Extreme	14,353	20
Total burnt	62,646	87
Unburnt	8,954	13

Table 9. Impact of the 2019-20 fires on Nattai National Park (50,660 ha)

Fire severity	Area (ha)	Percentage of Nattai NP
Low	9,326	18
Moderate	14,018	28
High	11,863	24
Extreme	8,260	16
Total burnt	43,467	86
Unburnt	7,193	14

Table 10. Impact of the 2019-20 fires on Gardens of Stone National Park (15,120 ha)

Fire severity	Area (ha)	Percentage of Gardens of Stone NP
Low	884	6
Moderate	4,437	29
High	3,462	23
Extreme	3,910	26
Total burnt	12,693	84
Unburnt	2,427	16

Table 11. Impact of the 2019-20 fires on Jenolan Karst Conservation Reserve (3,146 ha)

Fire severity	Area (ha)	Percentage of Jenolan KCR
Low	334	10
Moderate	934	30
High	932	30
Extreme	878	28
Total burnt	3,078	98
Unburnt	68	2

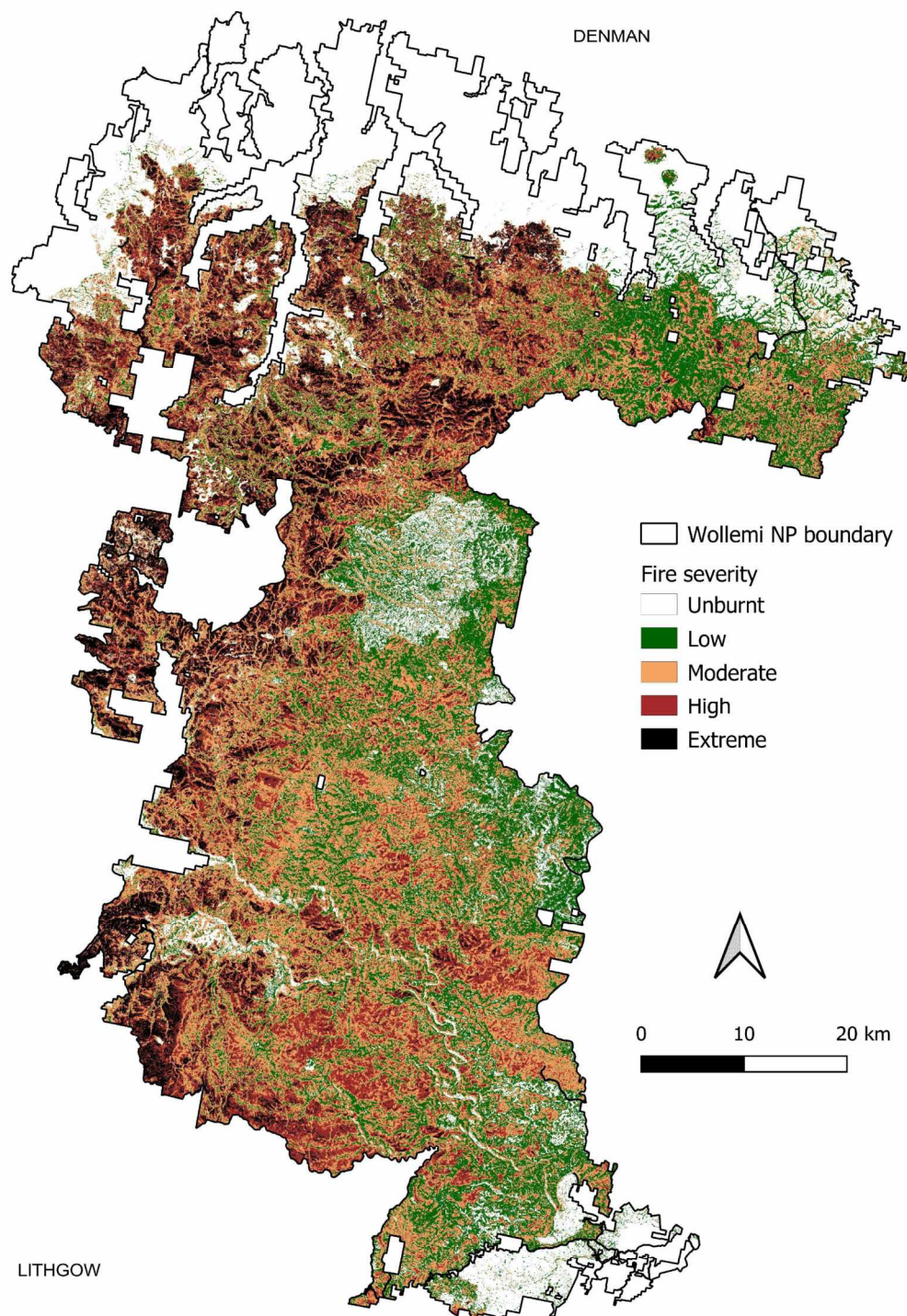
Table 12. Impact of the 2019-20 fires on Thirlmere Lakes National Park (662 ha)

Fire severity	Area (ha)	Percentage of Thirlmere Lakes NP
Low	152	23
Moderate	102	15
High	37	6
Extreme	1	0.1
Total burnt	292	44
Unburnt	370	56

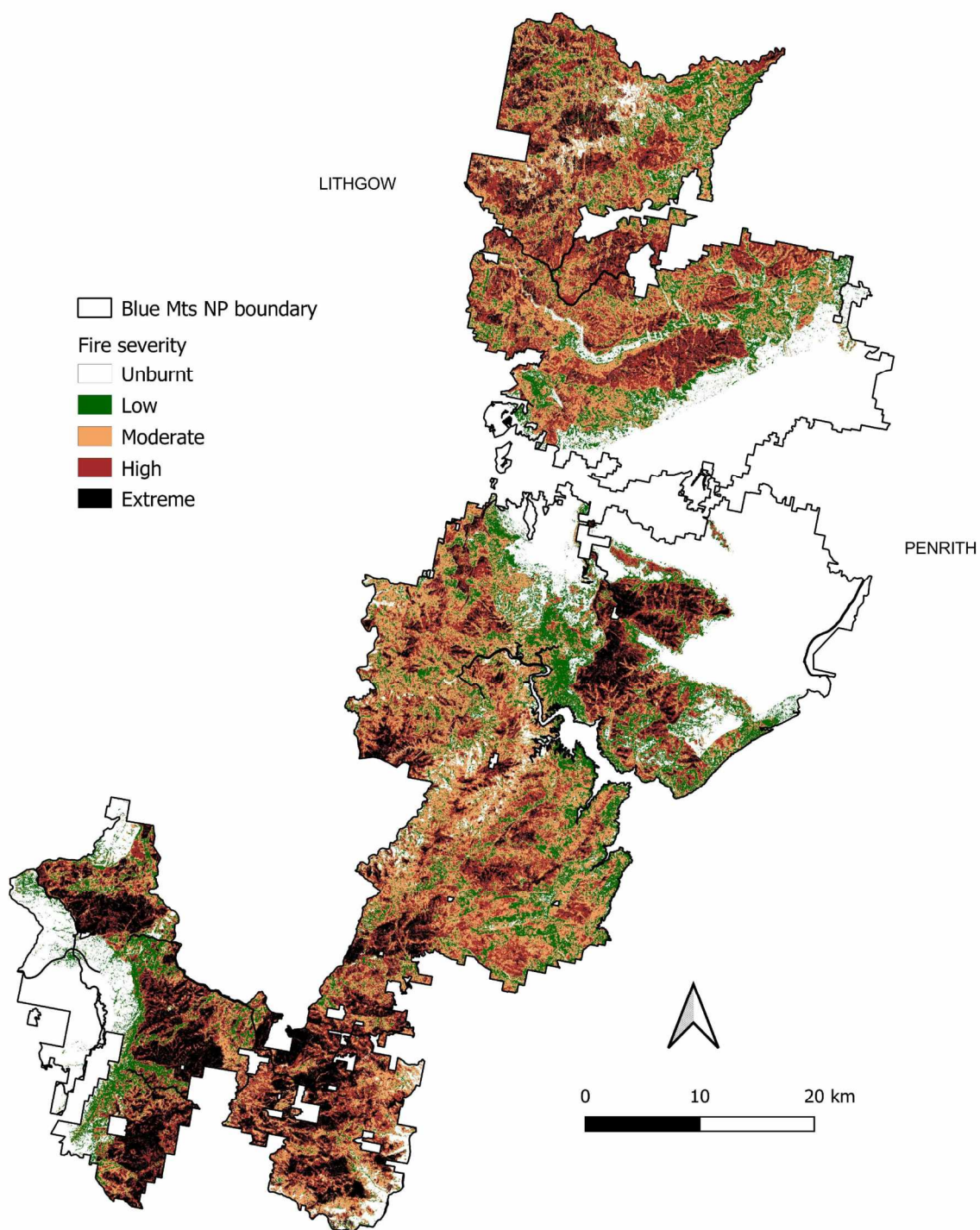
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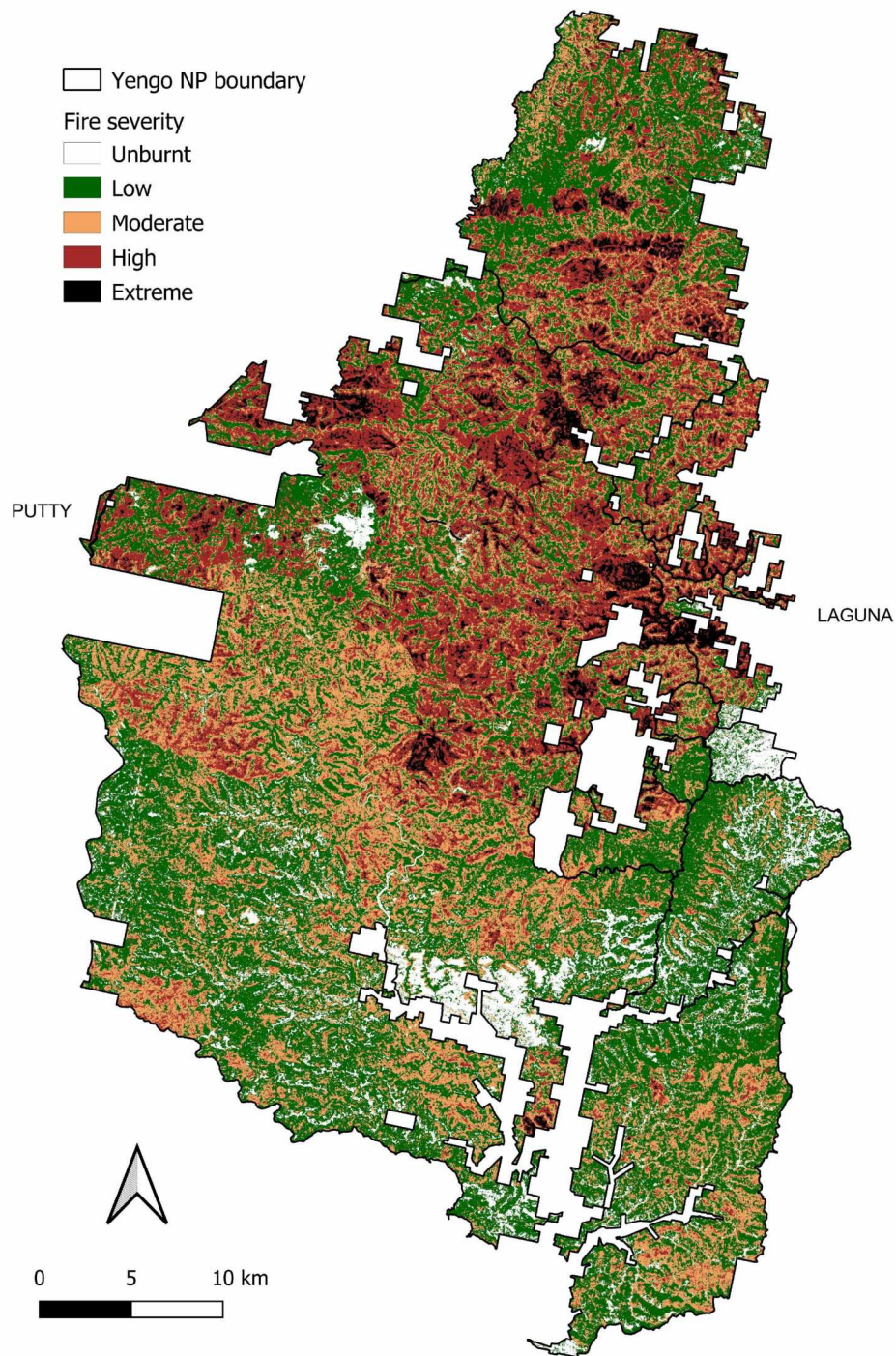
Wollemi National Park
Impact of 2019-20 Fires (data source FESMv3 18-12-20)



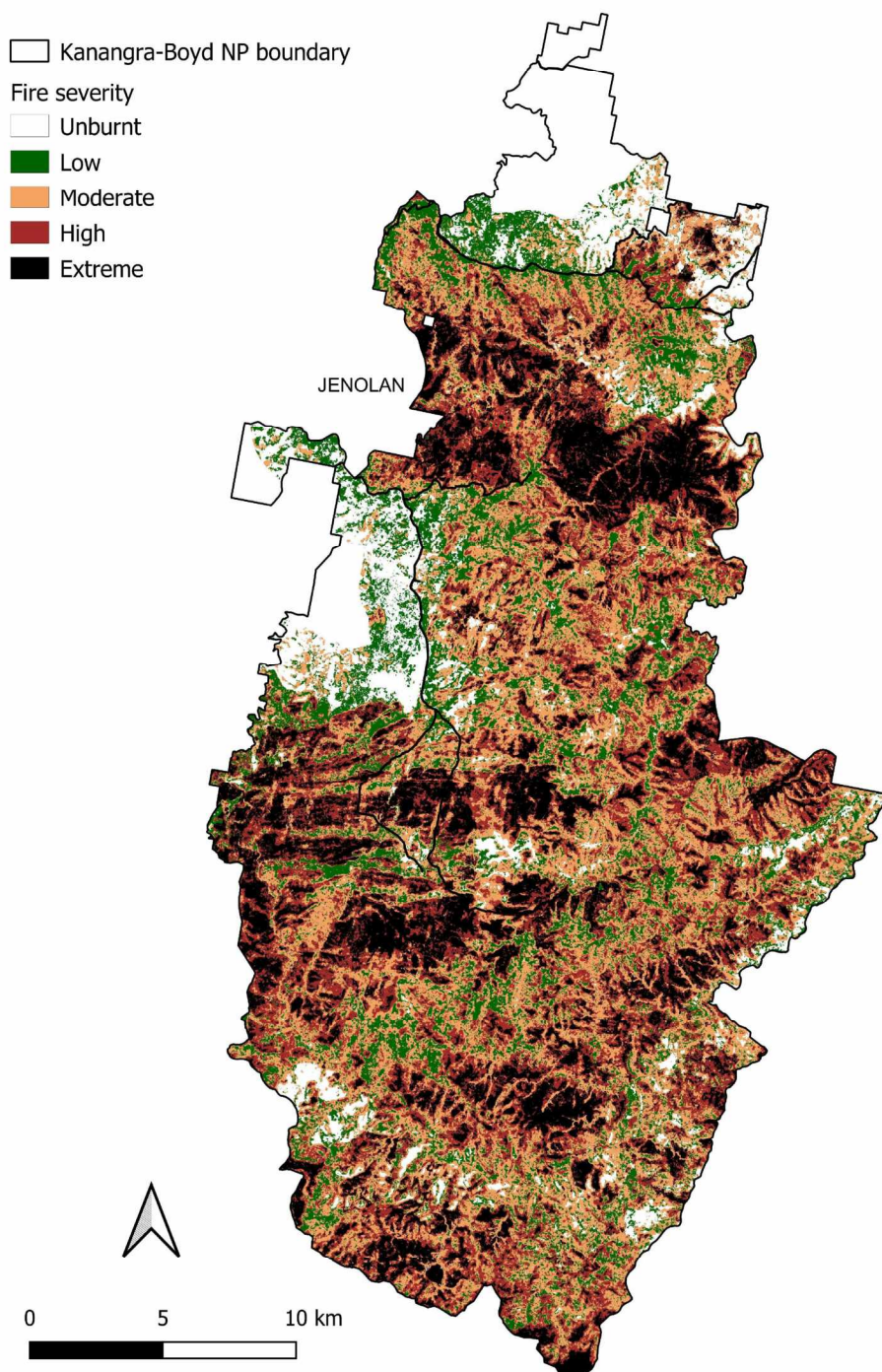
Blue Mountains National Park
Impact of 2019-20 Fires (data source FESMv3 18-12-20)



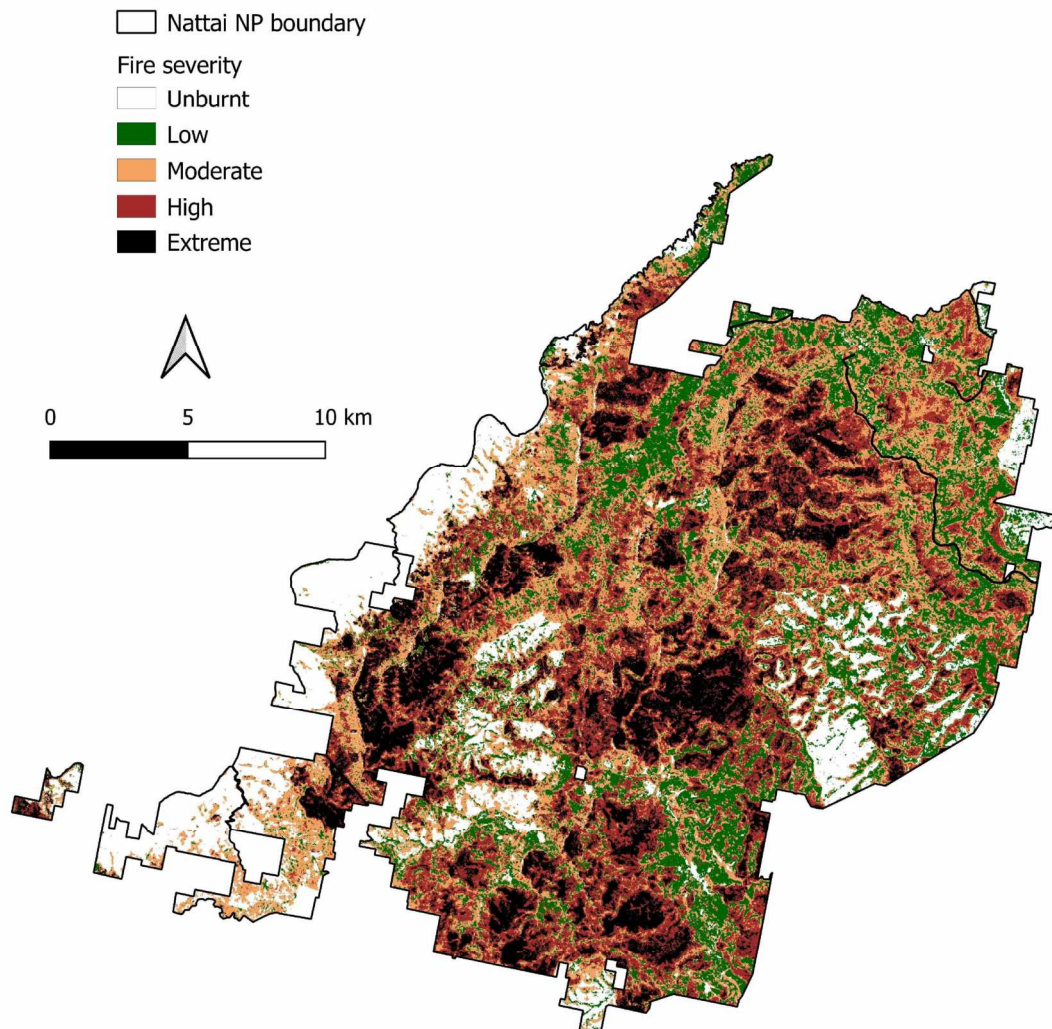
Yengo National Park
Impact of 2019-20 Fires (data source FESMv3 18-12-20)



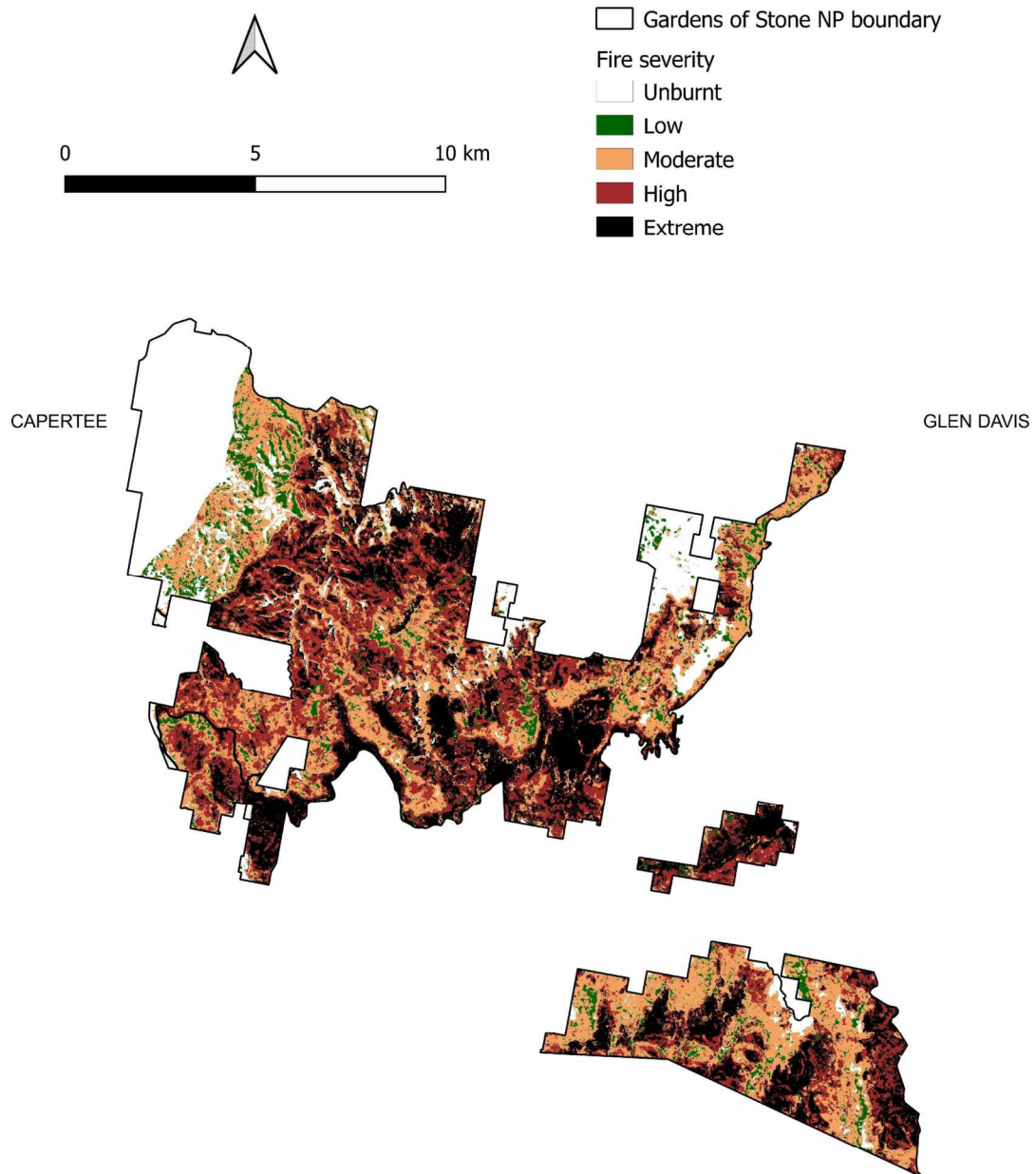
Kanangra-Boyd National Park
Impact of 2019-20 Fires (data source FESMv3 18-12-20)



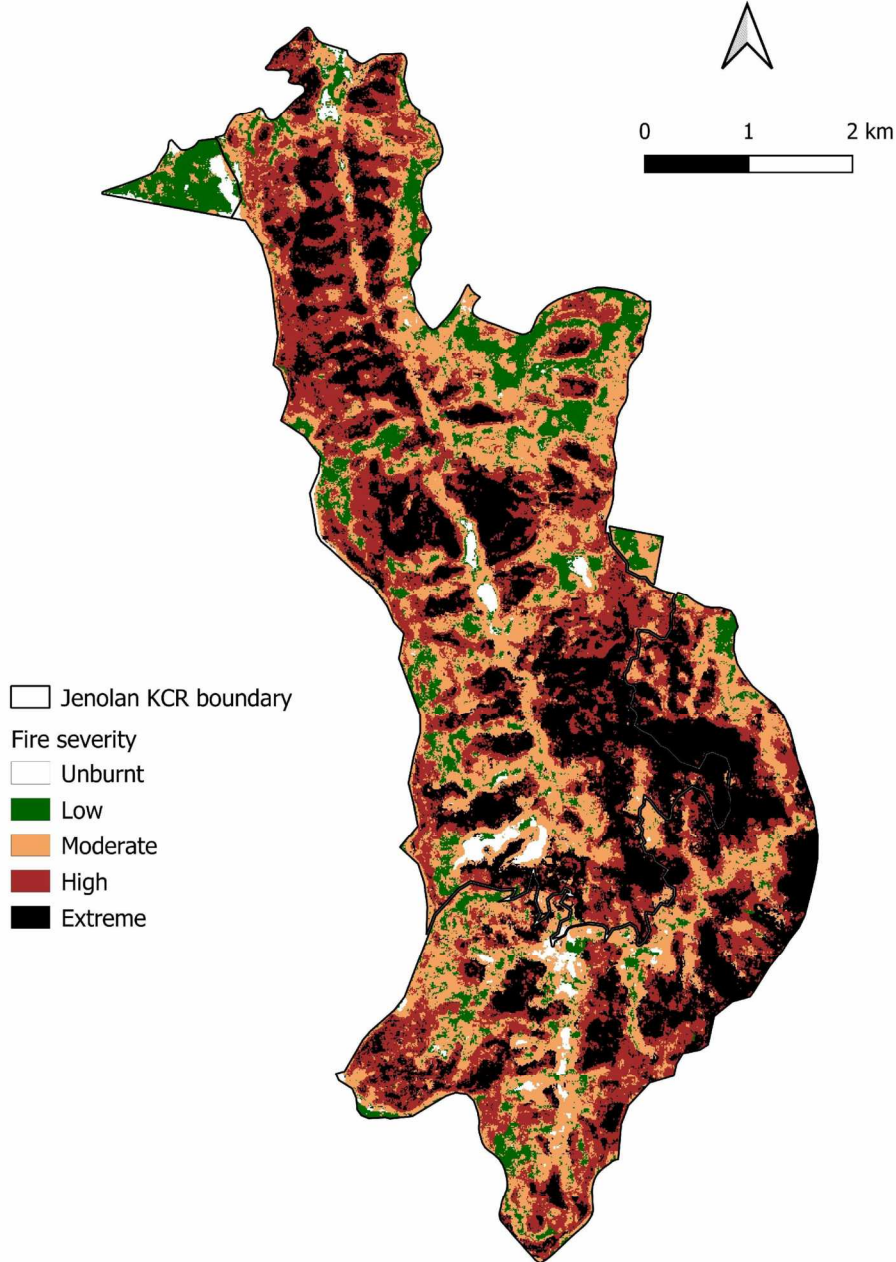
Nattai National Park
Impact of 2019-20 Fires (data source FESMv3 18-12-20)



Gardens of Stone National Park
Impact of 2019-20 Fires (data source FESMv3 18-12-20)



Jenolan Karst Conservation Reserve
Impact of 2019-20 Fires (data source FESMv3 18-12-20)



Thirlmere Lakes National Park
Impact of 2019-20 Fires (data source FESMv3 18-12-20)

□ Thirlmere Lakes NP boundary

Fire severity

□ Unburnt

■ Low

■ Moderate

■ High

■ Extreme

