

Supplementary material

Table S1. The number of fires; number of houses destroyed and damaged; and area burnt (ha) as per the Fire Investigation Unit (FIU) of the NSW Rural Fire Service (RFS) determined ignition source during the NSW 2019-20 fire season. Debris burning may include burning off (legal and illegal), pile burning and containment burning operations.

FIU ignition cause	Number of fires	Number of houses destroyed	Number of houses damaged	Area burnt (ha)
Debris burning	10	79	62	419,466
Equipment use	2	11	3	18,925
Lightning	30	1367	408	3,141,349
Power lines	2	1	4	3,034
Shredded tyre	1	47	13	50,921
Suspicious	4	5	2	30,628
Undetermined / no data	909	843	411	1,850,892

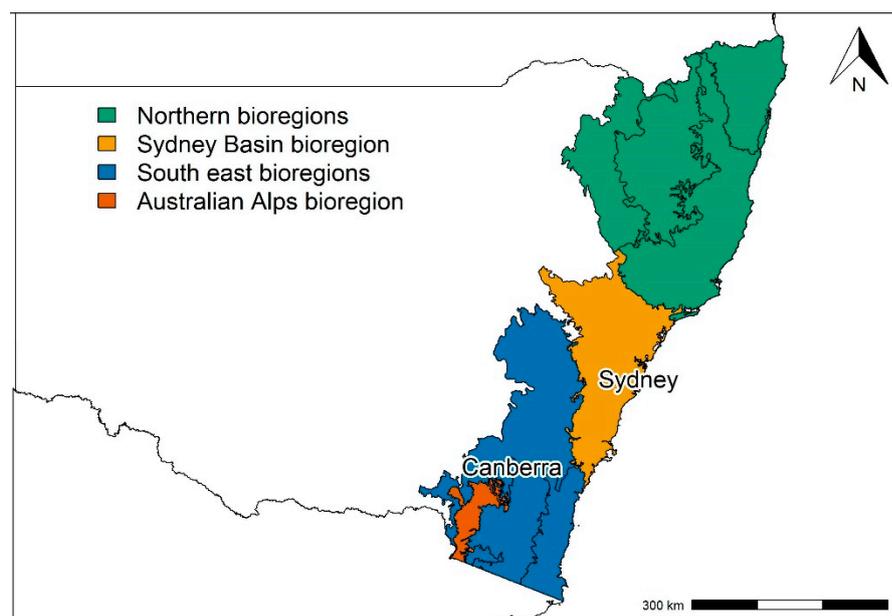


Figure S1. Fire affected NSW bioregions. These bioregions were grouped into four regions for analyses of fuel loads, fuel dryness and fire weather. Data for the Sydney Basin bioregion is presented within the manuscript, and data for the other bioregions presented here.

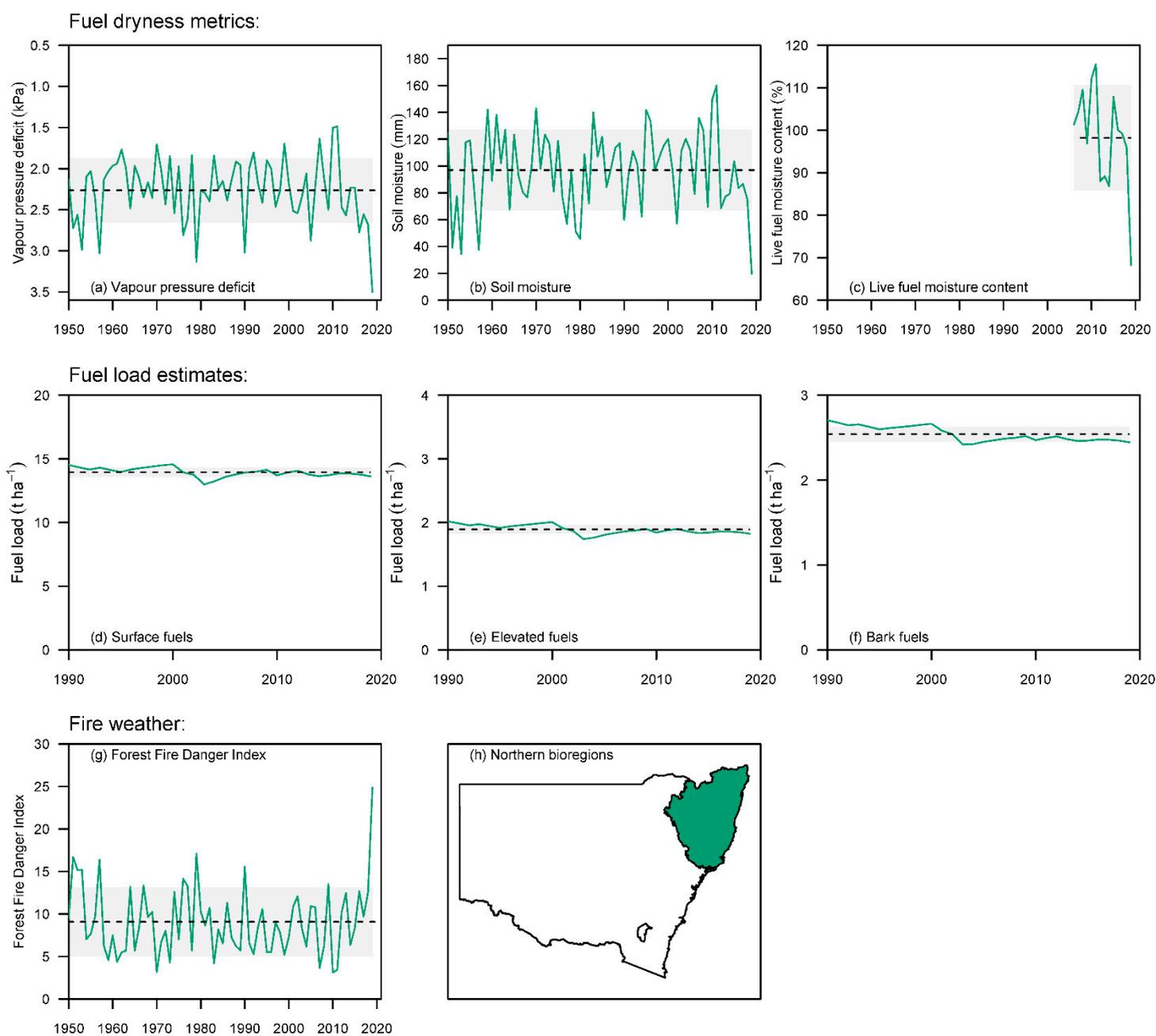


Figure. S2. Historical estimates of fuel dryness, fuel loads and fire weather for the Northern bioregions (shown in panel h): (a) vapour pressure deficit, which characterises atmospheric dryness and is a strong determinant of the moisture content of dead fuels¹; (b) (b) root-zone soil moisture content (0.1–1 m depth), which influences the moisture content of live fuels; (c) remotely sensed live fuel moisture content; (d) surface fuel loads; (e) elevated fuel loads; (f) bark fuel loads; (g) Forest Fire Danger Index (FFDI). All figures show mean monthly values for a specific month: vapour pressure deficit and FFDI for December (the period of the largest fires in 2019-20), soil moisture and live fuel moisture for November (i.e. immediately preceding the peak) and fuel load for July (i.e. the start of the fire season). Dashed lines represent averages, and shading represents ± 1 SD of average values.

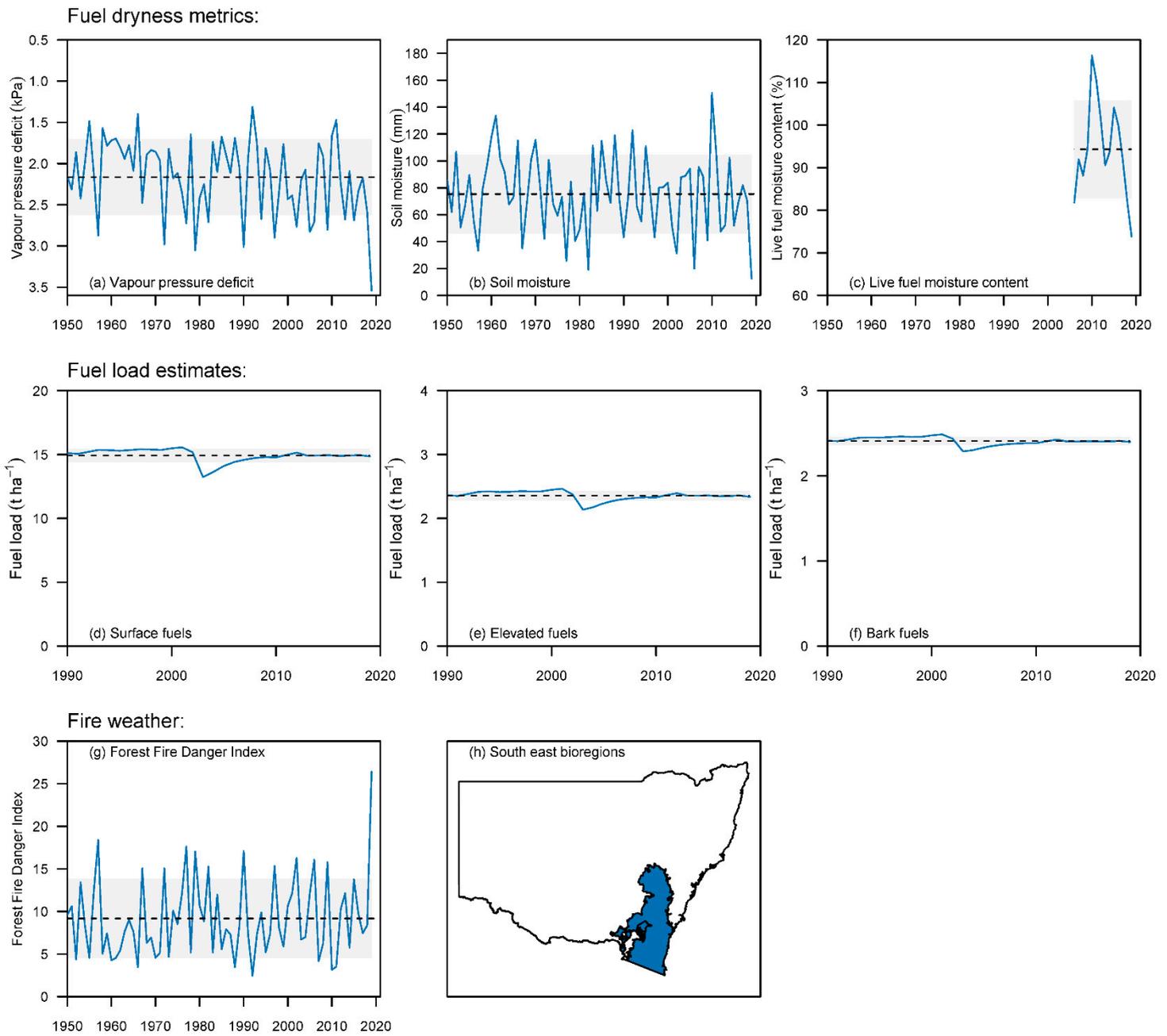


Figure S3. Historical estimates of fuel dryness, fuel loads and fire weather for the South east bioregions (shown in panel h). Descriptions for each panel are the same as for Fig. S2.

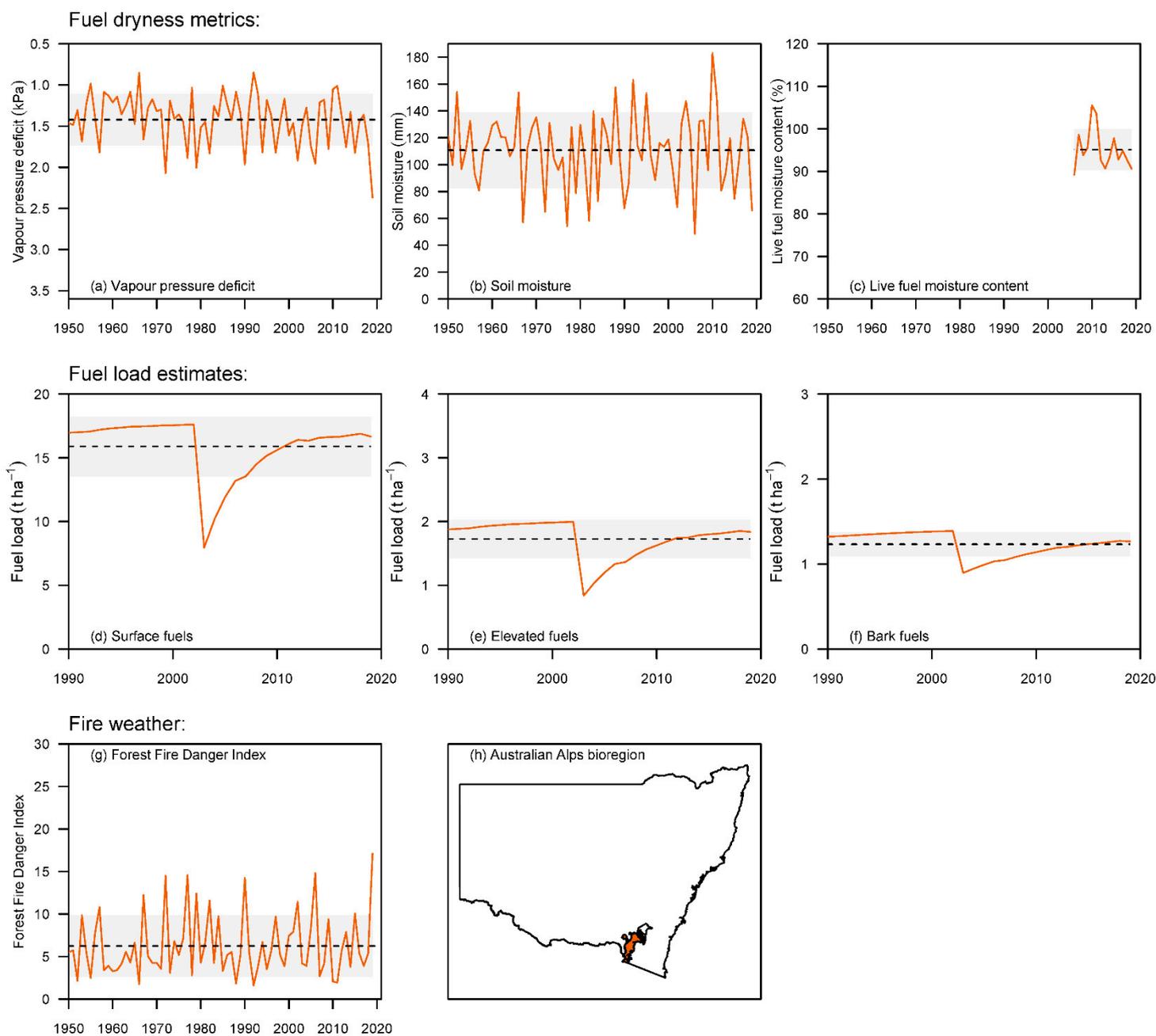


Figure S4. Historical estimates of fuel dryness, fuel loads and fire weather for the Australian Alps bioregion (shown in panel h). Descriptions for each panel are the same as for Fig. S2.

Table S2: Percentages of NSW vegetation formations extensively burnt in the 2019-20 Black Summer fires. Seven out of 24 formations (listed in descending order according to proportion of distribution burnt) had greater than 20% of their total distribution burnt.

Vegetation Formation	Moderate severity	High severity	Extreme severity	Pooled Mod-Ext Severity	Total fire affected
1. Heathlands	6.4	15.0	24.8	46.2	53.7
2. Wet Sclerophyll Forests (Grassy sub-formation)	12.3	17.0	3.4	32.7	51.2
3. Wet Sclerophyll Forests (Shrubby sub-formation)	12.1	14.2	4.4	30.8	48.8
4. Rainforests	6.6	5.7	1.6	13.9	37.3
5. Dry Sclerophyll Forests (Shrub/grass sub-formation)	8.5	11.6	1.6	21.6	30.8
6. Dry Sclerophyll Forests (Shrubby sub-formation)	7.7	11.6	2.8	22.1	29.0
7. Alpine Complex	1.2	3.2	13.6	18.0	21.0

Table S3. Annual expenses related to fire and emergency management in New South Wales (NSW) and Victoria. Shown are the expenses for the NSW Rural Fire Service (RFS) which is the lead agency for bushfires in NSW, and incorporates the volunteer fire service; the Victorian Country Fire Authority (CFA), which is Victoria’s volunteer fire service, and Victoria’s Department of Environment, Land, Water and Planning (DELWP), which incorporates Forest Fire Management Victoria, who are the lead agency for bushfire management on public land. Not shown are expenses related to fire management by the NSW National Parks and Wildlife Service, who manage bushfires on public land in conjunction with RFS, which was not available. All data was sourced from publicly available annual reports available on the respective agency websites.

Financial year	New South Wales	Victoria	
	Rural Fire Service ¹	Country Fire Authority ²	Department of Environment, Land, Water and Planning, fire and emergency management ³
2019-20	\$869,534,000	\$737,300,000	\$742,831,000
2018-19	\$552,750,000	\$644,400,000	\$566,166,000
2017-18	\$370,504,000	\$591,000,000	\$444,828,000
2016-17	\$357,679,000	\$582,200,000	\$401,823,000
2015-16	\$326,590,000	\$575,300,000	\$396,499,000
2014-15	\$311,185,000	\$500,400,000	\$347,803,000
2013-14	\$412,051,000	\$500,300,000	\$382,307,000
2012-13	\$374,110,000	\$457,000,000	Not available
2011-12	\$286,771,000	\$460,100,000	Not available
2010-11	\$307,470,000	\$396,800,000	Not available
2009-10	\$316,080,000	\$378,000,000	Not available

¹<https://www.rfs.nsw.gov.au/resources/publications/annual-reports>

²<https://www.cfa.vic.gov.au/about/annual-report>

³<https://www.delwp.vic.gov.au/our-department/annual-report>

References

- 1 Resco de Dios, V. *et al.* A semi-mechanistic model for predicting the moisture content of fine litter. *Agric. For. Meteorol.* **203**, 64-73 (2015).