

# Impacts of the 2019–2020 Bushfires on New South Wales Biodiversity: A Rapid Assessment of Distribution Data for Selected Invertebrate Taxa

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**ABSTRACT.** We analyse expert-confirmed occurrence records from the collection of the Australian Museum of altogether 733 species of invertebrates that exhibit a wide range of life history strategies, dispersal abilities and ecological adaptations (dung beetles, spiny freshwater crayfishes, drosophilid flies, land snails, mygalomorph and archaeid spiders). For 29 species (two dung beetles, four species of spiny freshwater crayfishes, four drosophilid flies, 11 land snails, five mygalomorph and three archaeid spiders), all known occurrences are within the extent of the 2019–2020 bushfires. In addition, the ranges of another 46 species had at least half of their known occurrences completely contained within the fire zone. Given these figures, the conservation status of many NSW species may require revision to recognize the higher level of threat, and active conservation actions will need to be taken to ensure the survival of these and other species.

## Introduction

The bushfires that impacted vast areas of eastern Australia from October 2019 to February 2020 were extensive and severe. In New South Wales (NSW) approximately 5.3 million hectares were burnt (7% of the state), including 2.7 million hectares of the state's National Parks (NSW State Government, Department of Planning, Industry and Environment [DPIE], 2020), affecting World Heritage areas such as the Greater Blue Mountains Area and the Gondwana Rainforests of Australia. Fifty-seven national parks and reserves had more than 99% of their area impacted by fire. The most affected ecosystems were rainforests (35% of their state-wide extent), wet sclerophyll forests (41%) and heathlands (53%) (DPIE, 2020). Gondwanan rainforest is not a fire-adapted habitat, with tree-destroying fires only likely to occur at intervals of over 1000 years (Turner, 1984), making this habitat type and the species relying on it extremely vulnerable to fire damage. This habitat type is also likely to recover slowly.

The sheer scale of burnt areas has raised conservation concerns for many species that occur within the impact zone of these fires. Much emphasis has been put on the effects of the bushfires on iconic species such as the koala—*Phascolarctos cinereus* (Goldfuss, 1817)—of which an estimated 6382 individuals (or 15% of NSW's koala population) may have perished in these fires (Lane *et al.*, 2020). Seventy vertebrate species have also been identified as of particular conservation concern since more than 30% of their known distributions were burnt (Ward *et al.*, 2020). Although equally relevant, the conservation impact on lesser-known species is generally poorly understood. We consider any animal species that has a comparatively narrow distribution in eastern Australia and has limited mobility in any of its life stages to be of particular concern.

Almost 1000 plant and animal species are formally listed as threatened under the NSW Biodiversity Conservation Act (2016), and the vast majority of these (estimated 973 species; DPIE, 2020) have at least parts of their distribution within the burnt areas. However, the listed species form only a fraction

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