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IMPACTS TO WATER

FERAL HORSE IMPACTS AND WATER RESOURCES IN SOUTH EASTERN AUSTRALIA

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The Australian Alps national parks are a crucial source of water for South Eastern Australia. Water is fully or over-allocated for human consumption, resulting in the reallocation to improve the health of the Snowy River and the Murray–Darling Basin (MDB) rivers (Commonwealth of Australia, New South Wales and Victoria 2002; Prime Minister of Australia 2012). The value of the water from the Alps can be considered in terms of the critical ecosystem services they provide for Australia (Reid-Piko et al. 2010).

Supporting and Regulating

The small area of the Alps yields a lot of water. Winter low-pressure systems generate snow, which slowly melts in spring and summer. Combined with the water storage and release from alpine Sphagnum moss bogs, this ameliorates seasonal variations to sustain a higher volume and quality of base flow in the rivers. Climate change is projected to further diminish precipitation (CSIRO 2010). Smaller snow packs and sublimation of snow diminishes runoff (Hennessey et al. 2008). Enhancing natural water storage in the Alps, particularly by conserving the bogs (Worboys et al. 2011), could minimise these impacts.

The freshwater ecosystems in the Alps support threatened, endemic flora and fauna of Gondwana origin that is distinctive at a global scale, such as stonefly species (Williams et al. 2014).

Cultural

Five Indigenous nations are custodians of the rivers of the Snowy Mountains region, including Kosciuszko National Park. Their cultural values are linked to the seasonal timing, volume and quality of the river flows—for example, in sustaining populations of native fish species (Connolly and Williams 2014). The rivers rising from the Alps are extensively used for recreation, and tourism provides vital employment and diversification for regional communities, projected to be $7.7 billion per year in non-use value (Morrison and Pickering 2012; CSIRO 2012).

Provisioning

MDB waters support the domestic and commercial needs of over 3 million Australians. The Alps yield on average approximately 9,600 GL of water per year, which is about 29% of the total average surface water yield of the MDB from just 1% of its area of 1 million square km (Figure 9) (Worboys et al. 2011). The value of the 3,980 GL of water flowing from the Victorian Alpine National Park catchments has been estimated as at least $4 billion (Worboys et al. 2011). The Snowy Mountains Hydroelectric Scheme was constructed to generate energy from water in the catchments of the Snowy River and the Murray River. The national electricity market relies in large part on the Snowy Hydro to store energy and provide grid stability with increasing supply from intermittent solar and wind generators (SHL 2018). The Snowy 2.0 pumped storage proposal would increase the generating capacity of the scheme by 50% (SHL 2017).

Water from the Alps supports around a quarter of the MDB's annual average irrigated production of $5.5 billion (MDBA 2010). The water is of national economic importance. Major regional urban areas rely on Murray River waters for domestic consumption, including Albury-Wodonga and (in part) Adelaide. Recreational fishing is important for tourism, with indigenous fish depending on particular water flows, clarity and temperature. Commercial fisheries in the lower lakes of the Murray River and nearshore marine depend on freshwater flows (Zampatti et al. 2010; Auricht et al. 2018).

Horse Impacts

Feral horses, deer and pigs degrade the alpine catchments and water resources. Horses are especially egregious because of their mobility and they impact on the highest altitude drainage lines that are most significant for water yields (Robertson et al. 2015). Feral horse trampling and selective grazing opens gaps in the vegetation that exposes soil to frost heave and erosion (Nimmo and Miller 2007) and also streams to erosion. Sphagnum moss is especially vulnerable to trampling, opening channels through the otherwise raised bogs that speed water flows and dry out the peat, making bogs vulnerable to fire (Williams et al. 2014; Wahren et al. 1994). Loss of bogs diminishes the water-holding capacity of the environment, reducing base flows and increasing pulses of runoff. Horse faeces and dung piles add to the nutrient pollution of alpine streams. More intense and higher energy storms associated with climate change will help accelerate this erosion and diminish water quality (Pittock 2003). Further research is required to ascertain the impacts of these changes in catchment hydrology on water yields. Many aquatic animals in the Alps rely on rocky or cobbled stream substrates to breed, which can be covered by sediment (Boulton et al. 2014). These aquatic species also live within very specific water temperature ranges, and temperatures could be increased by the seasonal diminution of base flows (Pratchett et al. 2011).

Implications

Feral horses in the Australian Alps national park catchments have key negative impacts in addition to biodiversity loss. Degraded wetlands, incised streams and lower water tables allow catchments to shed water quickly rather than a steady, longer term discharge. Erosion and flooding may be further exacerbated by high energy, high water volume storm events of the future. Hydropower generators lose storage to sedimentation and costs increase from wear on equipment. Water is a limited resource in South Eastern Australia, and may be diminished further with climate change. Retaining and restoring water catchments in the Alps is critical for supplying water for Australia's economic future as well as the protection of its high mountain environments. Feral horses degrade these catchments—especially

the bogs—changing water-flow regimes and diminishing water quality. Removal of thousands of feral horses in the Alps, and especially Kosciuszko, that are damaging these critical water catchments is required.

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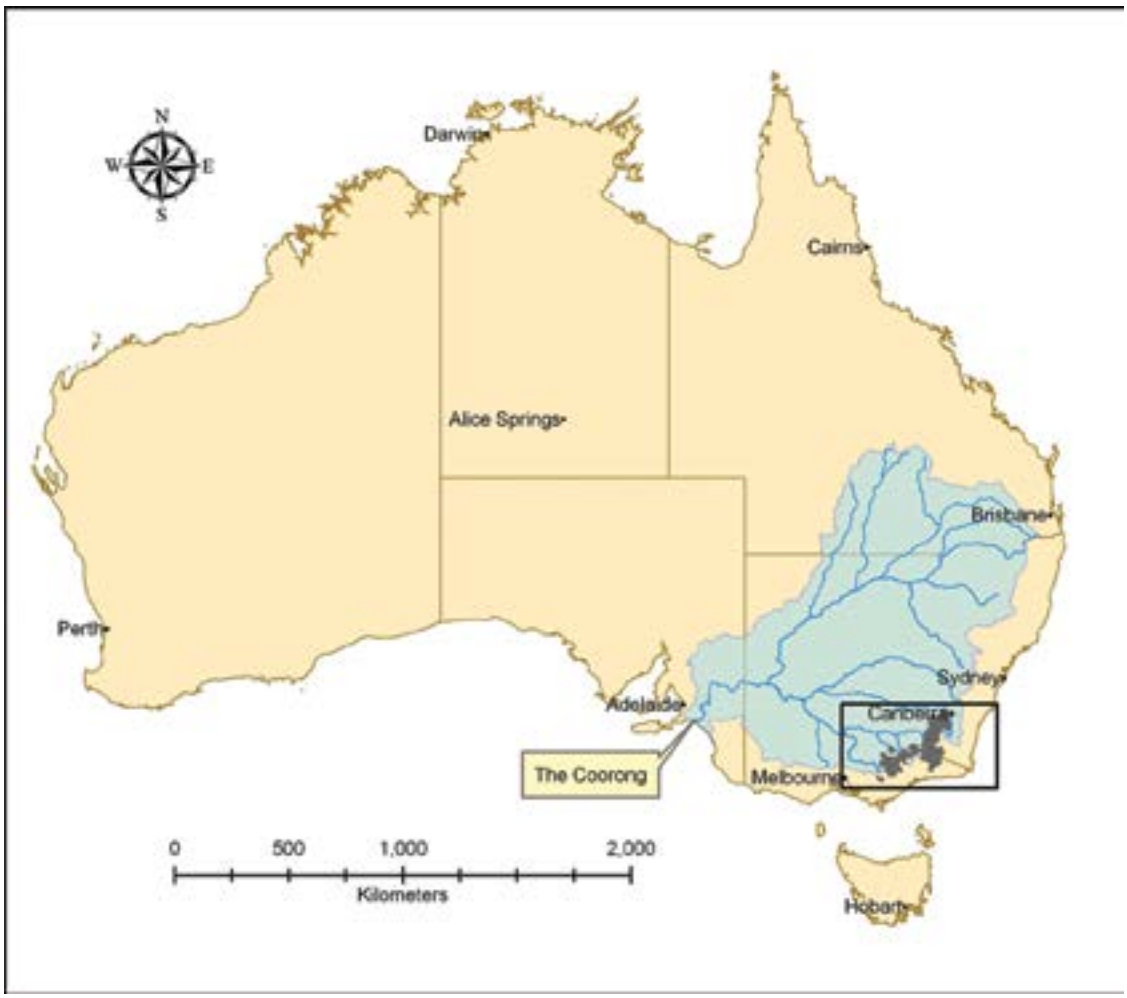

Figure 9. The Murray–Darling Basin (blue) with the Australian Alps national parks (grey).
Source: Doug Mills in Worboys et al. (2011).