

Impacts and management of feral horses in the Australian Alps

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I am an alpine ecologist that has worked in mountain ecosystems in Tasmania, Victoria, Kosciuszko and Namadgi National Parks over the past 40 years. I have worked on the impacts of recreational horse riding on mountain ecosystems in Tasmania (Whinam & Comfort 1996, Whinam et al. 1994) and on the ecology of *Sphagnum* peatlands globally (e.g. McDougall et al. in press, Whinam & Hope 2005, Hope et al. 2005, Whinam et al. 2003). I was a member of the Steering Committee that developed the National Recovery Plan for the endangered Alpine *Sphagnum* Bogs and Associated Fens (2015).

The ecosystems of the Australian Alps are under pressure from an increasing number of threats including climate change, increased frequency and intensity of bushfires, feral animals (horses, deer, pigs, foxes), weeds and tourism pressures. These pressures often combine to have catastrophic impacts on fragile ecosystems and threatened ecosystems and species, already feeling the effects of climate change. In the National Recovery Plan for the endangered Alpine *Sphagnum* Bogs and Associated Fens (2015), climate change was identified as the most insidious threat to this community. Warming temperatures and changing moisture patterns have affected the distribution and health of this ecological community. Evapotranspiration in the warmest month has been identified as the limiting factor for the distribution of *Sphagnum* peatlands in Australia (Whinam et al. 2001), highlighting the sensitivity of this community to climate change.

As noted in the National Recovery Plan, *Sphagnum* is easily crushed and broken up by the trampling and wallowing of horses' hooves, which is pronounced around watercourses where animals are liable to congregate on a regular basis. Trampling impacts tend to be long lasting at the edges of pools and streams. Once *Sphagnum* cover is lost, alpine soils and peats are very susceptible to desiccation, incision, soil erosion and channel formation – all of which are detrimental to the bogs and associated fens. For these reasons, the highest priority relating to feral species identified in the National Recovery Plan was to prevent the establishment of new populations and to manage, contain or control existing populations of feral horses.

After the 2003 fires in Kosciuszko and Namadgi National Parks, we observed the burnt and exposed peats of *Sphagnum* peatlands being churned over and destabilised by pigs and horses. As documented in the National Recovery Plan, there was significant damage to watercourses by feral horses. The fire-damaged peatlands and fens are acutely sensitive to further damage by trampling, which alters the hydrology of the ecosystem and causes water to drain away from these water dependent ecosystems. Since the National Recovery Plan was published in 2015, significant areas of *Sphagnum* peatlands have been burnt (some for a second time) and the numbers of feral horses have increased and expanded. This cumulative damage to the ecosystem in turn makes it more vulnerable to other threats such as use of water resources, weeds and disease and future fires.

To facilitate recovery of *Sphagnum* moss after the 2003 bushfires, minor interventions using shade cloth, slow-release fertiliser and the transplant of *Sphagnum* moss 'plugs' were trialled in Kosciuszko and Namadgi National Parks and more recently in

Victoria and Tasmania, with some success. For these interventions to be successful, the peatlands being treated must be kept free of hooved animals, which could impede or destroy the restoration works.

Several threatened flora and fauna species occur in *Sphagnum* peatlands. Of particular note are the corroboree frogs, which use *Sphagnum* moss on the edges of ponds as breeding habitat – an area particularly sensitive to horse trampling.

Our research showed that non-woody herbaceous weed species are able to readily germinate from horse manure in Tasmania, thereby adding to the pressures on alpine ecosystems.

Sphagnum peatlands play an important role in maintaining water in alpine catchments, slowly filtering and releasing water into the catchment. Horse damage to the peatlands and the associated streams and pools can destroy the delicate hydrologic balance of this water dependent ecosystem, with consequences for ecosystems adjacent to, or downstream from, the peatlands. Once the moss beds lose cohesion after being broken up by trampling, *Sphagnum* can be lost from the site through physical displacement. Growth rates of *Sphagnum* moss in alpine areas are very slow, in the order of 2-5 cm per year. Radiocarbon dating of *Sphagnum* peats indicates that peat accumulation is also extremely slow, in the order of 2-8 cm per century. Thus, while destruction can occur very quickly, recovery – where it is possible – is very slow.

Urgent action is required to significantly reduce the number of feral horses in the Australian Alps if we are to retain this highly restricted and fragile ecosystem, which provides habitat for a suite of species, plays an important hydrologic role in catchments and stores carbon. *Sphagnum* peatlands are under unprecedented pressure from a range of threats and it is necessary to tackle those that can be actioned to provide some resilience to the current and future impacts of climate change. Targeted culling of feral horses in areas near *Sphagnum* peatlands, pools and watercourses should be prioritised. Our work shows that maintaining the integrity of existing *Sphagnum* peatlands is preferable and easier than restoration after major perturbations.

Selected relevant bibliography

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