Notice of Preliminary Determination

The NSW Threatened Species Scientific Committee (NSW TSSC) has made a Preliminary Determination proposing that the "Habitat degradation and loss by Feral Horses, *Equus caballus*" be listed as a Key threatening process in Schedule 4 of the *Biodiversity Conservation Act 2016*.

How to make a submission

The NSW TSSC welcomes public involvement in the assessment process and places preliminary determinations on public exhibition on the NSW TSSC pages on the Office of Environment and Heritage (OEH) website. This public exhibition provides an opportunity for the public to comment on this preliminary determination as well as provide any additional information that is relevant to the assessment of the threatening process.

Submissions regarding this Preliminary Determination may be sent to:

Suzanne Chate
NSW Threatened Species Scientific Committee
PO Box 1967
Hurstville BC 1481.

Submissions close 22nd June 2018.

What happens next?

After considering any submissions received during the public exhibition period the Committee will make a Final Determination and a notice will be placed on the OEH website to announce the outcome of the assessment. If the Final Determination is to list a Key Threatening process (KTP), then it will be added to the list of KTPs in Schedule 4 when the Final Determination is published on the legislation website. www.legislation.nsw.gov.au.

Privacy information

The information you provide in your submission may be used by the NSW TSSC in the assessment to determine the conservation status and listing or delisting of threatened or extinct species, threatened populations and threatened or collapsed ecological communities or to assess key threatening processes.

The NSW TSSC may be asked to share information on key threatening processes with NSW Government agencies, the Commonwealth Government and other state and territory governments to collaborate on the assessment and management of key threatening processes.

If your submission contains information relevant to the assessment it may be provided to Commonwealth, State and Territory government agencies and scientific committees as part of this collaboration.

If you wish your identity and personal information in your submission to be treated as confidential you must:

- ***request your name be treated as confidential*** , and
- ***not include any of your personal information in the main text of the submission or attachments so that it can be easily removed.***

Established under the Biodiversity Conservation Act 2016
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Preliminary Determination

The NSW Threatened Species Scientific Committee, established by the under the *Biodiversity Conservation Act 2016* (the Act), has made a Preliminary Determination to support a proposal to list habitat degradation and loss by Feral Horses, *Equus caballus* Linnaeus 1758, as a Key Threatening Process in Schedule 4 of the Act. Listing of Key Threatening Processes is provided for by Part 4 of the Act.

The NSW Threatened Species Scientific Committee has found that:

1. Horses, *Equus caballus* Linnaeus 1758, arrived in Australia with the First Fleet in 1788 and were first recorded as escaping into the wild, or being abandoned, in 1804 (Csurhes *et al.* 2009). Feral horses (brumbies, wild horses) became established in significant numbers and variably sized populations now occur across about half of Australia (Berman 2008). The largest populations of feral horses in the world are found in Australia with an estimate of 300,000 individuals, mostly in central Australia (English 2002).

2. Feral horse populations in Australia have been founded from a variety of domestic breeds including draught horses, Arabian and Thoroughbred stock (Berman 2008). This, in addition to geographical isolation, natural selection and culling by land managers, has resulted in a variety of physical types ranging from the light 'racehorse' types to heavy 'clumper' types, and other small horses with short necks and large heads (Berman 2008).

3. In New South Wales (NSW), estimates in the year 2000 suggested there were up to 8,000 feral horses in the North Coast, Northern Tablelands, Hunter, Blue Mountains, Far South Coast and Snowy Mountains Regions (English 2002). More recent data indicates that 10,000 feral horses is a more likely estimate across NSW. Feral horses are well established and most abundant in the NSW (and contiguous Victorian) high country where they arrived in the 1820s with the first European explorers and settlers. They now occupy over 3,000 km^2 of the Australian Alps National Parks (NSW and Victoria) and their range is expanding (Dawson and Hone 2012). In 2014 detailed aerial surveys in the Australian Alps estimated horse numbers to be approximately 7,150 in NSW (6,150 individuals in Kosciuszko National Park, and another 1,000 individuals in Bago and Maragle State Forests) and 2,350 in the adjacent Victorian high country (Cairns and Robertson 2015). Feral horses are also present in at least another nine reserves in NSW. These reserves include: Oxley Wild Rivers National Park which is estimated to contain 800-1,000 horses (OEH 2012a; OEH *in litt*. 27 April 2017), an increase from the estimate of 200 horses in 2000 (English 2002); Blue Mountains National Park with an estimate of 60-70 horses in 2016 (OEH *in litt*. 27 April 2017); Guy Fawkes National Park estimated to contain over 1,000 horses (OEH 2012b, OEH *in litt*. 27 April 2017); Barrington Tops National Park with an estimate of 100 horses (OEH *in litt*. 27 April 2017). Smaller populations are recorded from Barakee National Park, Yuraygir National Park and surrounding state forests and private lands, Myall Lakes National Park, Yerranderie State Conservation Area, Wadbilliga National Park, the Pilliga region (50-100 horses) and the River Red Gum forests and riverine plains of the Murray River including the Murray Valley National Park (Berman 2008; OEH 2012c; OEH *in litt.* 27 April 2017). The highest recorded feral horse density of 2.74 individuals per square kilometre is in the northern sections of Kosciuszko National Park (Cairns and Robertson 2015). Feral horses in high densities also occur in other areas such as Dead Horse Gap to Tin Mines in the Pilot wilderness section of the Kosciusko National Park (Worboys and Pulsford 2013).

4. Feral horses are large-bodied mobile grazers with few natural predators or diseases and have a range of flexible physiological, behavioural and morphological attributes that have enabled them to thrive under a wide range of ecological conditions (Beever 2003, cited in Lenehan 2010). Horses are gregarious social animals that can form herds of more than 100 animals at watering and feeding points which consist of multiple social groups (Berman 2008). Harems usually move independently of other groups and typically consist of a dominant male and one to three mares and their offspring (Berman 2008). Young males (~2 years old) form bachelor groups before establishing a harem (Berman 2008).

5. Feral horse mares give birth in the summer months when food is most available. They can reproduce from 3 years of age (or 2 years at low densities with high food availability) and continue to breed until 15–18 years (Dawson and Hone 2012). They have a high reproductive potential with a maximum finite rate of increase of between 1.21 and 1.36 (Dawson and Hone 2012). In one study of stable to slightly increasing populations in the Australian Alps, annual fecundity ranged from 0.21 to 0.31 young per adult female, juvenile survival from 0.83 to 0.90 per annum and annual adult survival averaged 0.91 per annum (Dawson and Hone 2012). In the Victorian East Alps the annual population increase between 2003 and 2009 was estimated to be 22% (NERP 2014).

6. Feral horses generally prefer flat open grassy areas but will also move through steeper rocky terrain (Dobbie *et al.* 1993; OEH 2016). In NSW they prefer grassy river flat, forest and woodland habitats but in the Australian Alps they occupy a broader range of habitats (NSW NPWS 2001; DEC 2005; NSW NPWS 2006; DECC 2009; Lenehan 2010). Horses principally feed on fibrous grasses and sedges but also consume bark and roots and browse on buds, fruit and leaves, however, there have been no studies to specifically determine the diet of feral horses (Menkhorst 1995). Horses preferentially graze high-quality low-fibre plants on floodplains and riparian habitats and concentrate around watering points, especially during drought. Emergent and sub-emergent plants in swampy areas are targeted as a food source (Menkhorst 1995, James *et al.* 1999; Wild and Poll 2012, cited in Robertson *et al.* 2015). Horses need regular access to water and will dig in stream beds to access water causing erosion and disturbance (Menkhorst and Knight 2001).

7. Feral horses negatively impact native species and ecological communities in a variety of ways. Habitat damage in streams, wetlands and adjacent riparian systems occurs through selective grazing, trampling, track creation, pugging (soil compaction), wallowing, dust bathing leading to stream bank slumping and destruction, stream course disturbance and incision and sphagnum bog and wetland destruction (Berman 2008; Hunter *et al.* 2009*;* Prober and Thiele 2007, cited in Robertson *et al.* 2015; Tolsma 2009; Warboys and Pulsford 2013; Robertson *et al.* 2015; OEH 2016). Feral horses also alter the structure and composition of vegetation through ringbarking of trees and overgrazing, spreading weeds, trampling and rubbing of plants, removal of terminal buds and changing the infiltration and nutrient cycling capacity of soil through compaction, disturbance and erosion (Schott 2005; Lenehan 2010). Changes to vegetation resulting from feral horse activity cause decreasing vegetation cover and reductions in the complexity of vegetation structure (Green and Osborne 2003; NSW NPWS 2006; NSW NPWS 2007; Ansong and Pickering 2013; Doherty *et al.* 2015; OEH 2016; Robertson *et al.* 2015).

8. In alpine and sub-alpine areas plants are slow-growing and recover slowly from disturbance (Montague-Drake 2005 cited in OEH 2016), and species often occur in restricted geographic areas. Soils are fragile and disturbance caused by horses is novel to the Australian environment given no native analogues occur. Given the densities of feral horses across the alpine and subalpine zones negative impacts on a range of alpine plant species, such as the anemone buttercup *Ranunculus anemoneus,* are expected (Doherty *et al.* 2015). Sphagnum bogs at Ginini Flats, which are the principal known habitat for the endangered Northern Corroboree Frog *Pseudophryne pengilleyi*, have an estimated growth rate of 3.2–3.5cm/100 years and are extremely sensitive to disturbance and trampling (Macdonald 2009; Hope *et al.* 2012). Fauna species sensitive to disturbance, decreased water quality or availability, habitat loss or degradation are also likely to be impacted by horses. These species include the listed Alpine Water Skink *Eulamprus kosciuskoi*, Alpine Spiny Crayfish *Euastacus crassus,* Alpine She-oak Skink *Cyclodomorphus praealtus*, Southern Corroboree Frog *Pseudophryne corroboree*, Northern Corroboree Frog *Pseudophryne pengilleyi* (Hunter *et al*. 2009) and Alpine Tree Frog *Litoria verreauxii alpina* (Robertson *et al.* 2015).

9. Grazing by horses reduces overall plant biomass and leads to a more open vegetation structure with higher exotic plant species richness and a reduction in the abundance of some native species, causing degradation of habitat for native fauna (K. Green *in litt*. 3 September 2015; Lenehan 2010). Alpine adapted animals, such as the Mountain Pygmy-Possum *Burramys parvus* and Broad-toothed Rat *Mastacomys fuscus*, require subnivean spaces (cavities under the snow formed by buried shrub canopies, branches, rocks and other objects) as winter foraging and refuge sites (K Green *in litt.* 3 September 2015). Grazing of tussocks and trampling causes expansion of inter-tussock spaces, reduces plant biomass (reducing food and shelter availability for Broad-toothed Rat), changes the size, shape and availability of subnivean spaces, increases predation risk and, in severe cases, completely removes habitat (Beever 2013; K Green *in litt.* 3 September 2015). Detectability of Broad-toothed Rat is decreased in horse impacted areas when compared with unimpacted control sites (K Green *in litt.* 3 September 2015; OEH 2016). Feral horse impacts have also been reported to have increased in the last ten years in the Barrington Tops region (OEH 2012d) which is within the habitat of the Broad-toothed Rat. Climate change is leading to the uphill movement of the snowline, changes to snow permanence, snow area and depth along with altered precipitation regimes and are projected to continue under future climate scenarios (CSIRO & BOM 2015). These climate change impacts are likely to increase the area of habitat available to feral horses in winter, increasing the carrying capacity for horses and consequently compounding the impact of other climate change related threats (e.g. more frequent fire, altered snow regimes) on small mammal populations in the alpine zone (Hughes 2003).

10. Feral horses impact a wide range of ecological communities across the Australian Alpine region of NSW, a declared UNESCO Biosphere Reserve. These communities include treeless alpine and sub-alpine communities and woodlands of the lower slopes such as the White Cypress Pine – White Box woodlands (Bishwokarma *et al.* 2014; Doherty *et al.* 2015). They are also causing ecological damage in Oxley Wild Rivers, Cunnawarra and Barrington Tops National Parks which are World Heritage listed (Gondwana Rainforests of Australia), the UNESCO World Heritage Listed Greater Blue Mountains Area which includes eight protected areas and Guy Fawkes River National Park, a biodiversity hotspot (NSW NPWS 2001; DEC 2005; NSW NPWS 2006; DECC 2009; OEH 2012e). The impact of feral horses on soils and vegetation threaten the World Heritage Listed Dry Rainforest, Macleay Gorges and the Kunderang Wilderness areas (OEH 2012b).

11. Degradation and loss of habitats caused by feral Horses (*Equus caballus*) is listed as a Potentially Threatening Process under the Victorian *Flora and Fauna Guarantee Act 1988*.

12. The following Endangered Ecological Communities listed under the either the under the *NSW Biodiversity Conservation Act* 2016 (BC Act) or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) are adversely affected by feral horses

Endangered Ecological Community (EPBC Act)
Alpine Sphagnum Bogs and Associated Fens
Critically Endangered Ecological Community (BC Act)
Windswept Feldmark in the Australian Alps Bioregion
Endangered Ecological Community (BC Act)
Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney basin, South East Corner, South Eastern Highlands and Australian Alps Bioregions
Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions.
Vulnerable Ecological Communities (BC Act)
Blue Mountains Swamps in the Sydney Basin Bioregion

13. Plant species, occurring within the distribution of feral horses, which are likely to be adversely affected by feral horses:

The following threatened plant species occur within the current range of feral horses in Kosciuszko National Park and the neighbouring Bago State Forest:

Species	BC Act*	EPBC Act+
Caladenia montana	Vulnerable	
Calotis glandulosa	Vulnerable	
Calotis pubescens	Endangered	
Carex archeri	Endangered	
Carex raleighii	Endangered	
Discaria nitaria	Vulnerable	
Diuris ochroma	Endangered	Vulnerable
Glycine latrobeana	Critically Endangered	
Pomaderris pallida	Vulnerable	Vulnerable
Prasophyllum bagoense	Critically Endangered	
Prasophyllum innubum	Critically Endangered	Critically Endangered
Prasophyllum keltonii	Critically Endangered	
Prasophyllum retroflexum	Vulnerable	
Pterostylus alpina	Vulnerable	
Pterostylis foliata	Vulnerable	
Pterostylis oreophila	Endangered	Critically Endangered
Ranunculus anemoneus	Vulnerable	Vulnerable
Rutidosis leiolepis	Vulnerable	Vulnerable
Rytidosperma pumilum	Vulnerable	
Rytidosperma vickeryae	Endangered	
Thelmitra alpicola	Vulnerable	

Thelymitra atronitida	Critically Endangered	
Xerochrysum palustre		Vulnerable

*Biodiversity Conservation Act 2016
+ Environment Protection and Biodiversity Conservation Act 1999

14. Threatened fauna potentially adversely affected by feral horses through habitat destruction:

Speices	BC Act*	EPBC Act+
Northern Corroboree Frog *Pseudophryne pengilleyi*	Critically Endangered	
Southern Corroboree Frog *Pseudophryne corroborree*	Critically Endangered	Critically Endangered
Guthega Skink *Liopholis guthega*	Endangered	
Alpine She-oak Skink *Cyclodomorphus praealtus*	Endangered	
Alpine Spiny Crayfish *Eaustacus crassus*		Endangered
Mountain Pygmy Possum *Burramys parvus*	Endangered	
Broad-toothed Rat *Mastacomys fuscus*	Vulnerable	
Lathams Snipe *Gallinago hardwickii*		Marine and Migratory

*Biodiversity Conservation Act 2016
+ Environment Protection and Biodiversity Conservation Act 1999

15. Habitat degradation and loss by feral horses (brumbies, wild horses) is eligible to be listed as a Key Threatening Process as, in the opinion of the NSW Threatened Species Scientific Committee:
(a) it adversely affects threatened species or ecological communities, or
(b) it could cause species or ecological communities that are not threatened to become threatened.

Dr Marco Duretto
Chairperson
NSW Threatened Species Scientific Committee

Exhibition period: 27/04/18 – 22/06/18

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