Sarcoptic mange in Australian wildlife

Fact Sheet

October 2025

Key points

- Sarcoptic mange is a parasitic skin disease of mammals, including wildlife, domestic animals and humans, caused by the mite *Sarcoptes scabiei*.
- Sarcoptic mange can cause serious, chronic skin disease and debilitating systemic illness in wildlife. Occasional population level impacts are reported globally, including in Australia.
- Sarcoptic mange has been documented in several native Australian mammal species, with the bare-nosed wombat (*Vombatus ursinus*) the most significantly affected.
- Management of individual sarcoptic mange cases involves either treatment or euthanasia.
- Population management of sarcoptic mange in free-living wildlife is challenging.

Aetiology

Sarcoptic mange, (known as 'scabies' in humans), is a zoonotic, ectoparasitic skin disease caused by infection with *Sarcoptes scabiei* (Family *Sarcoptidae*) [1, 2]. *Sarcoptes scabiei* is an obligate parasitic mite that, upon infection of a host, burrows into the stratum corneum (deeper layers of the skin) where it feeds on host cells and tissue fluid [3].

One Health implications

Wildlife and the environment: sarcoptic mange in wildlife can result in significant, chronic, systemic disease, associated with significant debilitation and death. It some cases it can result in local population declines, particularly in isolated, small, naïve or otherwise susceptible host populations [1]. Cascading ecosystem effects as a result of sarcoptic mange outbreaks may include disruptions in food webs and vegetation [4]. The *in situ* treatment of sarcoptic mange-affected wild animals may have unintended negative impacts on the environment or other species (see Sarcoptic mange treatment in wombats – Environmental Risk Assessment).

Domestic animals: spillover from domestic animals is one of the most likely routes of *S. scabiei* introduction into new wildlife species and geographic regions[5-7]. Dogs in Aboriginal communities in the north of Australia are commonly reported with *S. scabiei* infections, with implications for transmission to wildlife and humans [8].

Humans: disease caused by *S. scabiei* in humans ('scabies') is most often self-limiting [9]. Wildlife are unlikely to play a significant role in the occurrence and spread of human scabies. In some Aboriginal communities and aged care facilities in Australia, scabies is a significant public health issue [10, 11].

Natural hosts

Sarcoptes scabiei mites infect a wide range of mammal species, with reports in over 150 mammalian species (30 families from 10 orders) worldwide [12, 13]. Orders with the most species affected include Perissodactyla, Artiodactyla and Diprotodontia [14]. Sarcoptic mange is also reported in Carnivora, Hyracoidea, Insectivora, Lagomorpha, Pinnipedia, Primates and Rodentia. Introduced wildlife species, in particular the European red fox (*Vulpes vulpes*), may play a role as a reservoir and occasional source of *S. scabiei* infection in native Australian mammals [15].

World distribution

Sarcoptic mange has been documented in wild mammals from every continent except Antarctica [16-20]. Sarcoptic mange is classed as an emerging epidemic disease in wildlife due to increases in host and geographic range [12, 13].

Occurrence in Australia

Sarcoptes scabiei was likely not present in Australia prior to colonisation and is thought to have been introduced multiple times in the last 200 years in association with Europeans and their domestic dogs [19, 21].

Sarcoptic mange was first described in bare-nosed wombats (*Vombatus ursinus*) and introduced European red foxes from NSW in 1937 [22] and has been reported in native (Table 1) and introduced wildlife across Australia.

Table 1: Australian native mammals in which sarcoptic mange has been recorded

Common name	Taxonomic name	Reference
Bare-nosed wombat	*Vombatus ursinus*	Hartley and English 2005 [23], Skerratt 2005 [24]
Southern hairy-nosed wombat	*Lasiorhinus latifrons*	Obendorf 1983 [25]
Koala	*Phascolarctos cinereus*	Obendorf 1983 [25]
Agile wallaby	*Macropus agilis*	McLelland and Youl 2005 [26]
Swamp wallaby	*Wallabia bicolor*	Holz et al. 2011 [27]
Bennett's wallaby	*Notamacropus rufogriseus*	Russell et al. 2024 [28]
Southern brown bandicoot	*Isoodon obesulus*	Wicks et al. 2007 [29]
Quenda	*I. fusciventer*	Botten et al. 2022 [15]
Dingo	*Canis lupus dingo*	Thomson et al. 1992 [30]
Long-nosed potoroo	*Potorous tridactylus*	Botten et al. 2022 [15]
Common brushtail possum	*Trichosurus vulpecula*	Botten et al. 2022 [15]
Common ringtail possum	*Pseudocheirus peregrinus*	Botten et al. 2022 [15]
Tasmanian devil	*Sarcophilus harrisii*	Russell et al. 2024 [28]

Introduced mammals in which sarcoptic mange has been recorded include European red fox, pig (*Sus scrofa*), horse (*Equus caballus*), and dromedary camel (*Camelus dromedarius*) [1, 2, 31].

The occurrence and impacts of sarcoptic mange in Australian native mammals are highly variable between host species and populations, ranging from isolated reports of affected individuals [28] to disease outbreaks [32], sometimes with population-level effects [33].

Sarcoptic mange is most commonly reported in bare-nosed wombats and disease is endemic (regularly occurring) throughout the species' range, with sporadic outbreaks occasionally causing localised population declines or extirpation (localised extinctions) [24, 33, 34]. Sarcoptic mange outbreaks have also occurred in koala (*Phascolarctos cinereus)* and quenda (*Isoodon fusciventer*), and the disease may be becoming regionally endemic in these species [15, 35, 36].

In general, information regarding the occurrence, current species range, and geographic distribution of sarcoptic mange is limited for Australian native wildlife (see *Surveillance and management*).

Epidemiology

The life cycle of *Sarcoptes scabiei* is completed on the host; involves five stages (adults, eggs, larvae, protonymph and tritonymph); and takes two to three weeks to complete. All life stages can also survive in the environment, including adults for up to 19 days in suitable conditions [37].

Sarcoptic mange epidemiology in wildlife is complex and can vary widely between populations and species [1, 14]. Factors that influence epidemiology include:

- *Sarcoptes scabiei* is a multi-host pathogen that can undergo direct or indirect transmission
- numerous host and environmental factors can impact transmission
- the effects of *S. scabiei* infection, including on host behaviour, reproduction, immune response and mortality rates, can vary between individuals, populations and species
- differences in these host-level effects can, in turn, influence transmission, disease occurrence and persistence.

The epidemiology of sarcoptic mange in most Australian wildlife species requires further clarification and is best understood in bare-nosed wombats. Disease is endemic throughout the bare-nosed wombat's geographic range. Environmental transmission, driven by survival of mites in wombat burrows [38] and burrow-switching behaviours of wombats [39], is thought to be the main route of infection [40]. Environmental conditions play a key role in determining mite survival off-host. The drivers of disease outbreaks that have occasionally been documented in this species remain unclear, however, the ability of mites to survive in wombat burrows appears to be an important factor. Environmental degradation (such as land use change) and climate change can influence sarcoptic mange epidemiology.

Outbreaks of sarcoptic mange have also been described in southern hairy-nosed wombats, koala, and quenda. Seasonality, for example mating and birthing periods, may play a role in mange epidemiology in koalas [35]. Adult male quenda were significantly more likely to be admitted into care with sarcoptic mange than females [15].

Clinical signs

Clinical signs of sarcoptic mange in wildlife can vary significantly between individuals, populations and species and generally include progressive erythema (skin reddening), pruritic dermatitis (intense itching and skin inflammation), alopecia (hair loss) and hyper/parakeratosis (crusting of skin) [1, 2]. Signs typically develop within four weeks of infection, and may progress to skin fissuring, behavioural changes (such as increased diurnal activity in affected wombats), disturbance of sight and hearing, weight loss, reduced fertility, local or systemic bacterial infection, sepsis and death [41].

Two distinct disease presentations are recognised, known as alopecic ("ordinary") or parakeratotic ("crusted") mange, depending on the type of host immune response to *S. scabiei* infection. The alopecic form is associated with extensive hair loss but small numbers of mites, spontaneous recovery and low host mortality rates, whereas the parakeratotic form is associated with marked hyperkeratosis, large numbers of mites and host mortality rates of up to 100%.

Parakeratotic mange triggers a cascade of debilitation associated with severe welfare impacts, particularly in bare nosed wombats, but also in other impacted Australian species, such as koala and quenda [15, 35]. Intense itching, skin damage and hair loss cause discomfort, pain, heat loss and sensory disturbance, all of which can impact an animal's physical and psychological well-being. Normal activities such as foraging and sleeping are impeded, reducing the capacity to compensate for secondary protein loss and chronic immune system activation. Weight loss and increased susceptibility to secondary infections are common outcomes, and these further contribute to the development of systemic illness and physical suffering.

Diagnosis

A diagnosis of sarcoptic mange can be made via clinical observation, light microscopy on skin scrapes, PCR on skin swabs or skin scrapes, histological examination of skin biopsies and enzyme-linked immunosorbent assays on serum. Morphological or molecular identification of *S. scabiei* mites in the skin are required for definitive diagnosis. Variations in disease stage and clinical presentation may result in false negatives for all diagnostic methods, particularly in early infections or if few mites are present.

The need to capture animals to undertake testing adds challenges to diagnosis in wildlife. Clinical observation with systematic lesion scoring [42] is therefore often used for diagnosis *in situ* (see *Surveillance*) and, in bare-nosed wombats, appears to be sufficiently reliable [42].

Clinical pathology and pathology

Clinical and gross pathology findings can be highly variable with sarcoptic mange. Clinical pathology is usually non-specific, reflecting inflammatory (hypersensitivity reactions) and infectious processes (secondary bacterial infection), and chronic debilitation (non-regenerative anaemia) [43, 44].

Clinical pathology is often of limited use for informing clinical decisions as changes in haematological or serum biochemistry parameters can be variable, even in severe disease. Non-specific markers of inflammation, such as haptoglobin and serum protein electrophoresis, may be more useful for decision-making in bare-nosed wombats [45].

Histopathology of sarcoptic mange typically includes skin abnormalities (epidermal hyperplasia; hyper/parakeratosis), and systemic changes associated with secondary disease [44, 46, 47].

Differential diagnosis

Differential diagnoses include other causes of pruritic dermatitis and alopecia, including other ectoparasitic infections, atopy, bacterial or fungal dermatitis, and photosensitivity (for example due to ingestion of plant toxins).

Treatment

There is no globally accepted standard treatment regimen for sarcoptic mange in wildlife [48]. The drugs most frequently used include macrocytic lactones (moxidectin, ivermectin) and isooxazoline class ectoparasiticides (fluralaner). Dose rates, administration frequencies and efficacy vary widely between studies, individual animals and species. A systematic review of the treatment of sarcoptic mange in wildlife is available [48].

Comprehensive safety, pharmacokinetic and efficacy data is lacking for treatment options in Australian wildlife. There is uncertainty regarding the most effective protocols for use *in situ*, as well as concerns for animal health and environmental safety [49-51]. Treatments should only be administered by a suitably experienced veterinarian or in compliance with the Australian Pesticides and Veterinary Medicines Authority.

Treatment of sarcoptic mange in captive and free-living wildlife should include: [41, 50, 52]

- wherever possible, confirmation of diagnosis (morphological or molecular identification of *S. scabiei*) prior to starting treatment
- a pre-treatment assessment by a suitably experienced veterinarian, including evaluation of disease severity (for example, using systematic lesion scoring – see *Diagnosis*) and general health
- euthanasia if disease is advanced or prognosis for recovery is poor. There is published guidance on euthanasia criteria for mange-affected wombats, which could be used to guide decision-making in other wildlife species [45].

Additional considerations for the treatment of free-living animals *in situ* include:

- ensuring accurate delivery of minimum effective doses to target animals only [49]
- ensuring appropriate administration methods to minimise environmental contamination (via spillage or run-off) [53, 54]
- post-treatment monitoring to allow early detection of non-responsive cases and guide additional treatment or euthanasia, as appropriate.

A desktop environmental risk assessment evaluated the potential environmental impacts associated with anti-parasitic treatment of sarcoptic mange in free-ranging wombats and helps to guide further research, inform local risk assessments and promote the development of treatment recommendations for specific situations [51].

Further information on specific treatment regimens for mange in wombats and koalas is available: www.nespthreatenedspecies.edu.au/media/aayh54vj/1-4-4-guidelines-for-treatment-of-australian-wildlife-with-sarcoptic-mange-report-part-1-treatment-guidelines_v6.pdf.

The Department of Natural Resources and Environment Tasmania has guidelines on wombat mange management: https://nre.tas.gov.au/Documents/Wombat%20Mange%20Assessment%20Fact%20Sheet.pdf.

Prevention and control

There are no feasible methods to prevent sarcoptic mange in free-living wildlife.

Individual-level disease control methods involve anti-parasitical treatment or euthanasia, as appropriate. Population-level disease control has been attempted in free-living bare-nosed wombats at the sub-population level but numerous host, treatment and environmental factors make this process extremely challenging, with limited success reported to date [33, 53, 55].

Research

Further research is required in the following areas:

- surveillance and monitoring to establish sarcoptic mange distribution, prevalence and population-scale impacts on Australian wildlife
- improved understanding of transmission dynamics, including identification of reservoir hosts
- improved understanding of drivers of disease at individual and population levels, including host, pathogen and environmental factors
- improved understanding of host immunological responses
- improved understanding of the genetic differences of *S. scabiei* between host species and how this may affect sarcoptic mange epidemiology
- comprehensive host species-specific safety, pharmacokinetic and efficacy data to support the development of safe and effective treatment regimens.

Surveillance and management

Sarcoptic mange is not a nationally notifiable animal disease.

Cases detected during general surveillance, in particular reports in new species or geographic areas, are occasionally captured by national surveillance systems. Wildlife Health Australia administers Australia's general wildlife health surveillance system, in partnership with government and non-government agencies. Wildlife health data is collected into a national database, the electronic Wildlife Health Information System (eWHIS). Information is reported by a variety of sources including government agencies, zoo-based wildlife hospitals, sentinel veterinary clinics, universities, wildlife rehabilitators, and a range of other organisations and individuals. Targeted surveillance data is also collected by WHA. See the WHA website for more information https://wildlifehealthaustralia.com.au/Our-Work/Surveillance and https://wildlifehealthaustralia.com.au/Our-Work/Surveillance/eWHIS-Wildlife-Health-Information-System.

Ad hoc and systematic surveillance is conducted by wildlife and land managers, wildlife carers and advocacy groups, researchers, farmers, naturalists and biologists:

- WomSAT (wombat survey and analysis tools) is a community-driven program that documents wombat sightings, burrow locations, and sarcoptic mange status. Community members can document wombat and burrow sightings through the WomSAT website (https://womsat.org.au/womsat/default.aspx), or via the mobile phone app.
- The Tasmanian Department of Natural Resources and Environment has a Wombat Working Group which aims to assess the status of wombat populations, and distribution and severity of sarcoptic mange across the state [56], as well as providing advice to the community on treatment of wombats.
- The ACT government has a wombat sarcoptic mange working group involving researchers and community members, with a surveillance app https://survey123.arcgis.com/share/9bf75df45ef7499ba4a38305b3373d29.

We are interested in hearing from anyone with information on this condition in Australian wildlife, including laboratory reports, historical datasets or survey results that could be added to the National Wildlife Health Information System. Negative data are also valuable. If you can help, please contact us at admin@wildlifehealthaustralia.com.au.

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Wildlife Health Australia recognises the Traditional Custodians of Country throughout Australia. We respectfully acknowledge Aboriginal and Torres Strait Islander peoples' continuing connection to land, sea, wildlife and community. We pay our respects to them and their cultures, and to their Elders past and present.

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