



FLORA & FAUNA  
GUARANTEE

NOMINATION NO. 792  
PTP

## FLORA AND FAUNA GUARANTEE - SCIENTIFIC ADVISORY COMMITTEE

### FINAL RECOMMENDATION ON A NOMINATION FOR LISTING

#### Loss of biodiversity in native ant populations and potential ecosystem integrity following invasion by Argentine Ants (*Linepithema humile*) (Potentially Threatening Process)

Date of receipt of the nomination: 21 August 2007  
Date of preliminary recommendation: 11 December 2007  
Date of final recommendation: 19 March 2008

File No.: FF/54/0660

**Validity:** The nomination is for a valid item

**Prescribed Information:** The prescribed information was provided.

**Name of the Nominator** is adequately provided.

**Name and Description of the process:**

In the opinion of the SAC the process is adequately defined and described.

The nominated process is defined as the 'Loss of biodiversity in native ant populations and potential ecosystem integrity following invasion by Argentine Ants (*Linepithema humile*)'

The Argentine Ant *Linepithema humile* is one of the most widespread and invasive ant species in the world. The species is listed in the 'top 100 world's worst invaders' by the IUCN Invasive Species Specialist Group. Impacts of the species include exclusion and competition with native ant species, changed habitat structure and resource availability and altered ecosystem processes. The primary threatening process results from the establishment of unicolonial nests leading to large co-operative populations. The aggressive nature and ability to recruit high numbers compared to indigenous ants is also a feature of the species. It also has a broad foraging and generalist feeding habit enabling it to take advantage of recently disturbed sites associated with human activity. *Linepithema humile* is one of six 'tramp ant' species in Australia, the others being: the Yellow Crazy Ant *Anoplolepis gracilipes*, the Red Imported Fire ant *Solenopsis invicta*, the Tropical Fire Ant *S. geminata*, the Big-headed Ant *Pheidole megacephala* and the Little Fire Ant *Wasmannia auropunctata*. The importance of these species has been stimulated production of a national Threat Abatement Plan under the federal Environment Protection and Biodiversity Conservation Act (Commonwealth of Australia 2006)

The Argentine Ant favours mesic habitats and is limited by temperatures above 40°C (Holway *et al.* 2002). It is distributed in Mediterranean climates globally. Within Australia it has been found in New South Wales, South Australia, Tasmania, Victoria and Western Australia. In Victoria it favours peri-urban environments.

Argentine Ants are native to Argentina and have spread worldwide in regions with Mediterranean climates. Some ant species, especially the Winter Ant *Prenolepis imparis*, are able to resist and impede the spread of Argentine ants, but once established Argentine ants alter community assemblage in native ant species.

While *L. humile* is associated with disturbed habitats throughout its introduced range, it can penetrate native habitats that have experienced little human disturbance. *L. humile* is a dominant ant and an aggressive competitor. Invasive ants have a great potential to alter ecosystem processes, including ant-mediated seed dispersal or plant pollination.

- There is evidence that a suite of flora and fauna and the habitat of a number of threatened animal species, are adversely affected by the nominated process.

The range of flora or fauna affected or potentially affected was adequately stated in the nomination.

Significance of the threat which the potentially threatening process poses or has the potential to pose was adequately stated in the nomination.

**Eligibility for listing as a potentially threatening process under the Flora and Fauna Guarantee**

The nominated item satisfies at least one criterion of the set of criteria prepared and maintained under Section 11 of the Flora and Fauna Guarantee Act 1988, and stated in Schedule 1 of the Flora and Fauna Guarantee Regulations 2001.

**Evidence that criteria are satisfied:**

**Criterion 5.1** *The potentially threatening process, in the absence of appropriate management, poses or has the potential to pose a significant threat to the survival of a range of flora or fauna.*

*Evidence:*

The displacement of native ants has the potential to significantly alter the distribution and abundance of a range of flora and fauna dependant upon their presence in part or wholly to enable dispersion and reproduction. Areas that

have been invaded by Argentine ants have lower biodiversity compared to comparable uninvaded areas (Holway and Suarez 2006). Many butterflies and ants have evolved symbiotic associations. Some Australian myrmecophilous butterflies (family Lycaenidae) form obligatory mutualisms with particular ant species. Many genera of flora depend on native ant associations for seed dispersal and herbivore defence. For example, the Australian genus *Adriana* (Euphorbiaceae), when excluded from native ants can show increased susceptibility to insect herbivores (Mackay and Whalen 1998a). Bond and Slingsby (1984) showed that invasion by *L. humile* would have a significant effect on the reproduction of the South African Common Pagoda plant (*Mimetes cucullatus*), a member of the Proteaceae. Seeds of this species are dispersed by native *Iridomyrmex* and *Anoplolepis* species, both of which are prominent in Australia, along with Proteaceae. In invaded areas, less than 1% of seedlings emerged, compared to over 35% in uninvaded areas. Argentine ants fed on the eliasomes, but did not move the seed far and failed to store them in nests below the surface. There is potential for similar impacts in Australia. Already threatened or endangered species such as *Grevillea infecunda* may be further threatened by *L. humile*. Insectivorous specialists such as the threatened White-browed Treecreeper (*Climacteris affinis*) are potentially affected. In Victoria *L. humile* may also have impacts on certain ground-nesting birds such as the Superb Lyrebird *Menura novaehollandiae*, Painted Button-quail *Turnix varia* and Richards Pipit *Anthus novaeseelandiae*, all of which are found in similar habitats to *L. humile*. In Australia, Argentine ants have been shown to have a negative effect on particular ant genera and functional groups (Walters 2006), by a range of interactions including predation, competition for resources, and changing mutualisms with Homoptera.

**Sub-criterion 5.1.1** *The potentially threatening process, in the absence of appropriate management, poses or has the potential to pose a significant threat to the survival of two or more taxa. Evidence:*

The rare bitter-bush (*Adriana quadripartita* glabrous form) occurs on roadsides near coastal and urban areas in southern Victoria, including the Mornington Peninsula where *L. humile* is known to be present (Rowles and O'Dowd 2007), and Ramsar listed wetlands. This plant is listed under the *Flora and Fauna Guarantee Act* and is dependant on native ants (as well as birds) for seed dispersal (Mackay and Whalen 1998b). It is naturally rare and opportunistic, taking advantage of recent disturbance, such as human-related development, similar to the habitats invaded by *L. humile* on the Mornington Peninsula.

The Eltham copper butterfly (*Paralucia pyrodiscus lucida*) (Lepidoptera: Lycaenidae) is also threatened by *L. humile*. It has remnant populations found in three locations in Victoria including; the Eltham-Greensborough area near Melbourne, Castlemaine in central Victoria, Kiata and Salisbury in the Western District. This butterfly is already under threat as a result of the increase in agricultural and urban development, that has caused serious reductions in suitable habitat. Genetic isolation has also been listed as a concern for the ongoing viability of this subspecies (Vaughan 1988). The life cycle of the butterfly involves a symbiotic relationship with ants of the genus *Notoncus* (Eastwood and Fraser 1999) and Sweet Bursaria (*Bursaria spinosa*). The relationship occurs at the larval stage and is obligatory; the Eltham copper butterfly is never found without the presence of *Notoncus* ants. The Argentine ant has been shown to negatively affect native ant community composition and populations (Holway *et al.* 2002; Walters 2006) at invaded sites. *Notoncus* are among those ants that may not persist in the presence of Argentine ants (Walters 2006).

The threatened Pink-tailed Worm Lizard *Aprasia parapulchella* relies on undisturbed soils with a good cover of native grasses and therefore is heavily impacted by agricultural practices. Its chief diet is ants and the species is often found cohabitating with native ants including *Iridomyrmex* (Jones 1999) a genus known to be affected by *L. humile* (Rowles and O'Dowd 2007). Therefore there is the potential for *L. humile* to threaten the already vulnerable Pink-tailed Worm Lizard.

**Sub-criterion 5.1.2** *The potentially threatening process, in the absence of appropriate management, poses or has the potential to pose a significant threat to the survival of a community. Evidence:*

*Linepithema humile* has the potential to negatively affect many communities which rely on native ants for seed dispersal. The threatened Coastal Moonah Woodland community on the Mornington Peninsula contains several flora species which rely on ants for seed dispersal, including *Acacia retinodes* (Bonney 2003), *Leptospermum laevigatum* and *Leucopogon parviflorus* (Berg 1975). The aggressiveness and super-colony nature of *Linepithema humile* contributes to their ability to out-compete native ants and destroy nesting sites thus preventing the effective dispersal of seeds. *L. humile* has been shown to be a poor disperser of seeds when observed in the same plant communities of Australian natives (Walters 2006), as well as overseas (Giliomee *et al.* 2004; Holway and Suarez 2006). This is further exacerbated by the preferential movement of some seeds associated with weedy floral species. In particular *Polygala myrtifolia*; a known environmental weed along the Mornington Peninsula has its seeds collected and dispersed by *L. humile* in preference to native seeds (Giliomee *et al.* 2004).

**Criterion 5.2** *The potentially threatening process poses or has the potential to pose a significant threat to the evolutionary development of a range of flora and fauna. Evidence:*

Myrmecochory has evolved in Australia to a much greater extent than anywhere else in the world with some 1500 species of vascular plants known to rely on ants for seed dispersal (Berg 1975). This mutualism is potentially threatened by *L. humile* as it can out-compete native ants for resources and displace them through aggression. Native ants also play other important community roles such as pollination and herbivory defence. The orchid *Leporella fimbriata* is one such example, being pollinated by the bulldog ant *Myrmecia urens* (Peakall *et al.* 1990).

Several native ants including *Camponotus* and *Crematogaster* defend and tend *Ogyris* caterpillars in return for a sugary secretion used for food (Eastwood and Fraser 1999). This myrmecophilous evolution is vital for the survival of the caterpillars; some of which are currently threatened including the Eltham Copper Butterfly *Paralucia pyrodiscus lucida*.

#### Advertisement for public comment

In accordance with the requirements of Section 14 of the **Flora and Fauna Guarantee Act 1988**, the preliminary recommendation was advertised for a period of at least 30 days.

The preliminary recommendation was advertised in:

'The Age' - on 16 January 2008

'The Weekly Times' - on 16 January 2008

*Government Gazette* - on 17 January 2008

Submissions closed on 29 February 2008.

#### Further evidence provided:

One submission was received on this item but no evidence was provided to warrant a review of the Scientific Advisory Committee's preliminary recommendation that the potentially threatening processes is eligible for listing.

#### Documentation

The published information and research data provided to the SAC have been assessed. Based on the available information, the SAC believes that the data presented are not the subject of scientific dispute and the inferences drawn are reasonable and well supported.

#### Final Recommendation of the Scientific Advisory Committee

The Scientific Advisory Committee concludes that on the evidence available the nominated item is eligible for listing in accordance with Section 11 of the Act because primary criteria 5.1 and 5.2 and sub-criteria 5.1.1 and 5.1.2 have been satisfied.

The Scientific Advisory Committee makes a final recommendation that the nominated item be added to the **Flora and Fauna Guarantee Act 1988**.

#### Selected references:

- Berg, R. (1975) Myrmecochorous plants in Australia and their dispersal by ants. *Australian Journal of Botany* **23**: 475-508.
- Bond, W. & Slingsby, P. (1984) Collapse of an Ant-Plant Mutualism the Argentine Ant *Iridomyrmex humilis* and Myrmecochorous Proteaceae. *Ecology* **65**: 1031-7.
- Bonney, N. (2003) *What seed is that?*, Tantanoola, South Australia.
- Commonwealth of Australia (2006) *Threat Abatement Plan to reduce the impacts of Tramp Ants in biodiversity in Australia and its territories*. Department of Environment & Heritage, Canberra. (see web link below).
- Eastwood, R. R. & Fraser, A. (1999) Associations between lycaenid butterflies and ants in Australia. *Australian Journal of Ecology* **24**: 503.
- Gilomee, J., Witt, A. & Geertsema, H. (2004) The impact of an invasive ant, *Linepithema humile* (Mayr) (Hymenoptera: Formicidae), on the dispersal of the eliasomes-bearing seeds of six plant species. *African Entomology* **12**: 223-30.
- Holway, D. A., Lach, L., Suarez, A. V., Tsutsui, N. D. & Case, T. J. (2002) The Causes and Consequences of Ant Invasions. *Annual Review of Ecology and Systematics* **33**: 181-233.
- Holway, D. A. & Suarez, A. V. (2006) Homogenization of ant communities in mediterranean California: The effects of urbanization and invasion. *Biological Conservation* **127**: 319-26.
- Jones, S. (1999) Conservation of the pink-tailed legless lizard, *Aprasia parapulchella*. In: *Unpublished PhD Thesis, Applied Ecology Research Group*. University of Canberra, Canberra.
- Mackay, D. A. & Whalen, M. A. (1998) Australian Euphorbs: Final Report for the Australian Flora Foundation Inc. School of Biological Sciences, Flinders University, Adelaide.
- Peakall, R., Angus, C. & Beattie, A. (1990) The significance of ant and plant traits for ant pollination in *Leporella fimbriata*. *Oecologia* **84**: 457-60.
- Rowles, A. D. & O'Dowd, D. J. (2007) Interference competition by Argentine ants displaces native ants: implications for biotic resistance to invasion. *Biological Invasions* **9**: 73-85.
- Vaughan, P. (1988) Management plan for the Eltham Copper Butterfly. *Arthur Rylah Institute for Environmental Research Technical Report Series No. 79*. Department of Conservation, Forests and Lands, Victoria.
- Walters, A. C. (2006) Invasion of Argentine ants (Hymenoptera: Formicidae) in South Australia: Impacts on community composition and abundance of invertebrates in urban parklands. *Austral Ecology* **31**: 567-76.

**Relevant websites:**

Australian Ants Online - <http://www.ento.csiro.au/science/ants/dolichoderinae/linepithema/linepithema.htm>

IUCN SSC Invasive Species Specialist Group - <http://www.issg.org/features.html>

Pest and Diseases Image Library - <http://www.padil.gov.au/viewPestDiagnosticImages.aspx?id=615>

Threat Abatement Plan to reduce the impacts of Tramp Ants on biodiversity in Australia and its territories –

<http://www.environment.gov.au/biodiversity/threatened/publications/tap/trampants/pubs/tramp-ants.pdf>

**Endorsement by the Convenor of the Scientific Advisory Committee**

**Date**



7/11/2008

Prof Tim New  
Convenor