

Invasive Ant Risk Assessment



Ranking of high-risk species

Harris R.

Initial risk assessment

Initially, a risk assessment scorecard was developed (see Preliminary invasive ant risk assessment), 75 taxa were scored, and a detailed pest risk assessment was conducted for the eight highest ranking species. The ranking of the top eight, the scores for several pest species already in New Zealand, and the score for *Solenopsis invicta* (a high-risk species that had already been assessed before this project) are presented in Table 1. The assessment scored a number of general characteristics of each taxon, its distribution in relation to New Zealand, and potential impacts in New Zealand based on international studies. Species with internationally documented impacts but low likelihood of establishment due to New Zealand's comparatively cold climate, scored relatively highly in this assessment (e.g., *Wasmannia auropunctata* and *Anoplolepis gracilipes*).

Detailed pest risk assessments – likelihood and consequences analysis

As part of the pest risk assessments, the threat each ant posed to New Zealand was considered in terms of: likelihood of entry; likelihood of establishment; likelihood of spread; and the detrimental consequences of its presence in New Zealand. For each category the risk was scored as low (=1), medium (=2) or high risk (=3). These levels of risk are defined in Appendix 1. An overall risk was derived from the sum of the scores for entry, establishment, spread, and detrimental consequences. If two species have the same score, the ant with the greatest consequence is ranked ahead of the other(s).

The scores are compared with two species already established in New Zealand, *Linepithema humile* (a relatively wide-spread and abundant pest) and *Pheidole megacephala* (restricted in distribution and not currently considered a significant pest), and also with *Solenopsis invicta*, which is widely recognized as a significant threat to New Zealand and other countries in Oceania.

The ranking of species is presented in Table 2. The ranking is unweighted, and assumes all risk assessment criteria (entry, establishment, spread, and detrimental consequences) are of equal importance. Because this assessment is partly subjective, relative ranking is of greater importance than the precise rank scores of the species. Several key points can be drawn from this assessment of relative risk:

- none of the species assessed is currently considered to pose a greater risk to New Zealand than *Solenopsis invicta*. *S. invicta* has a similar score to *Linepithema humile*, which is already established in New Zealand and is a significant pest. Unlike *S. invicta*, *L. humile* does not have medical consequences associated with its presence, but *S. invicta* is likely to have a more restricted distribution and it is uncertain where it will establish and become abundant.
- if *S. richteri* and *Lasius neglectus* are detected regularly at the New Zealand border in the future, these species would rank as high as *S. invicta* and *L. humile*. *Solenopsis richteri* and *L. neglectus* have restricted international distributions and have not yet been detected entering New Zealand.
- for *S. geminata*, *W. auropunctata*, and *A. gracilipes* the potential detrimental consequences of establishment are high, but the likelihood of their establishing widely in New Zealand is low (due to climate limitations). Even if establishment does occur in some locations, the consequences are probably overstated. Impacts have been documented in

tropical locations where they are super abundant. They are unlikely to be as abundant in New Zealand, and will not have such severe impacts. The potential for detrimental consequences of *S. geminata*, *W. auropunctata*, and *A. gracilipes* mirrors that of *Ph. megacephala*, which, although established in New Zealand for many years, has a highly restricted distribution and consequently has not yet displayed the detrimental impacts documented from tropical climates.

- for *Monomorium destructor* and *Tapinoma melanocephalum*, the likelihood of arrival is high, but suitable habitat is limited, and potential detrimental consequences of establishment are likely to be entirely restricted to some heated buildings.
- *Paratrechina longicornis* has a high risk of entry and establishment. It remains uncertain if northern New Zealand is climatically suitable, and it is surprising this ant has not already established. However, the consequences of establishment are minor (especially compared with the potential impacts of other species already established in New Zealand (e.g., *L. humile*, *Ph. megacephala*, and *Doleromyrma darwiniana*).
- consideration of the implications of climate change is beyond the scope of this project, but would likely increase the area of New Zealand potentially suitable for establishment of all species under consideration.

Table 1: Summary of scores for eight top-ranking species assessed using “ant risk assessment scorecard”.

Genus	Species	Biological traits inferring invasiveness	Invasive history	Pathways	Establishment success	Traits considered				Total	Percent of max score
						Difficulty in containment	Likely pest status to humans in NZ	Potential impact on native environment			
High-risk species											
<i>Solenopsis</i>	<i>geminata</i>	0.67	1.00	1.00	0.42	0.75	0.86	0.63	5.32	75.9	
<i>Wasmannia</i>	<i>auropunctata</i>	1.00	1.00	0.78	0.25	0.50	0.57	1.00	5.10	72.9	
<i>Anoplolepis</i>	<i>gracilipes</i>	1.00	1.00	1.00	0.33	0.25	0.36	1.00	4.94	70.6	
<i>Lasius</i>	<i>neglectus</i>	1.00	1.00	0.44	0.58	0.25	0.71	0.63	4.62	66.0	
<i>Paratrechina</i>	<i>longicornis</i>	1.00	1.00	0.94	0.58	0.00	0.57	0.38	4.47	63.9	
<i>Solenopsis</i>	<i>richteri</i>	1.00	0.50	0.39	0.42	0.50	0.57	0.88	4.25	60.7	
<i>Monomorium</i>	<i>destructor</i>	0.50	1.00	0.83	0.17	1.00	0.57	0.00	4.07	58.2	
<i>Tapinoma</i>	<i>melanocephalum</i>	0.83	1.00	0.89	0.42	0.50	0.36	0.00	4.00	57.1	
Species scored for comparison											
<i>Solenopsis</i>	<i>invicta</i>	1.00	1.00	0.72	0.67	0.50	0.71	0.88	5.48	78.3	
<i>Linepithema</i>	<i>humile</i>	1.00	1.00	0.94	0.75	0.00	0.57	1.00	5.27	75.2	
<i>Monomorium</i>	<i>pharaonis</i>	1.00	1.00	0.83	0.50	1.00	0.50	0.13	4.96	70.8	
<i>Pheidole</i>	<i>megacephala</i>	1.00	1.00	0.94	0.50	0.00	0.43	0.88	4.75	67.8	
<i>Technomyrmex</i>	<i>albipes</i>	0.50	1.00	1.00	0.75	0.00	0.50	0.13	3.88	55.4	

Table 2: Relative ranking of the overall risk of the eight top-ranking invasive ant species for which detailed pest risk assessments were conducted and three other invasive ant species (two of which are already established in New Zealand). High risk of entry, establishment, spread, or detrimental consequences is highlighted.

Species	Entry	Establishment	Spread	Consequence	Total score	Rank
<i>Solenopsis invicta</i> (for comparison)	3	3	2.5	3	11.5	1
<i>Linepithema humile</i> (for comparison)	3	3	3	2.5	11.5	2
<i>Lasius neglectus</i>	1	2.5	3	2.5	9	3
<i>Paratrechina longicornis</i>	3	3	2	1	9	4
<i>S. richteri</i>	1	2	2.5	3	8.5	5
<i>Pheidole megacephala</i> (for comparison)	3	2	1	2	8	6
<i>Tapinoma melanocephalum</i>	3	2	2	1	8	7
<i>S. geminata</i>	3	1	1	2.5	7.5	8=
<i>Anoplolepis gracilipes</i>	3	1	1	2.5	7.5	8=
<i>Monomorium destructor</i>	2.5	2	1.5	1.5	7.5	10
<i>Wasmannia auropunctata</i>	2	1	1	2.5	6.5	11

Appendix 1: Definitions of low medium and high risk for entry, establishment, spread, and detrimental consequences.

Likelihood of entry

Low: Not intercepted at New Zealand (or Australian) border, limited pathways for the ant to spread to New Zealand, and pathways unlikely to increase significantly in the next 5 years.

Medium: Low levels of interception at the New Zealand border (< 2 interception of reproductive and/or < 5 interceptions of workers in last 5 years), moderate pathways for the ant to spread to New Zealand, and pathways may increase significantly in the next 5 years.

High: Frequent interceptions at the New Zealand border (> 1 interception of reproductive and/or > 5 interceptions of workers in last 5 years), and many pathways for the ant to spread to New Zealand.

Likelihood of establishment

Low: Tropical species with no indication that significant areas of New Zealand would be climatically suitable for establishment.

Medium: Tropical species with no indication that significant areas of New Zealand would be climatically suitable for establishment outdoors, but capable of survival indoors; or

subtropical/temperate species with at least some indication of climate suitability, but some limitations to establishment chances (e.g., propogules arriving in winter).

High: Subtropical/temperate species with significant areas of New Zealand suitable for establishment and there being few biological/seasonal barriers.

Likelihood of spread

Low: Sub-optimal climate severely restricting development of established colonies to the point of production of new reproductives and limited availability of suitable habitat to spread into.

Medium: Sub-optimal climate restricting development of established colonies to production of new reproductives, but suitable habitat available to spread into.

High: Climate unlikely to restrict development of established colonies to reproductive status and availability of suitable habitat to spread into.

Consequences

Low: Limited detrimental impacts in any environment (natural or urban).

Medium: Detrimental impacts at high density, but unlikely to become so.

High: Detrimental impacts at high density and likely to become so over a significant area of New Zealand. For species that have medical consequences associated with their sting even a moderate density could cause significant impacts.