

Melbourne's Grassland Bullant



Initial report into the ecology & habitat of *Myrmecia nobilis*



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Melbourne's Grassland Bullant: Initial report into the ecology and habitat of *Myrmecia nobilis*

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The Victorian National Parks Association is an effective and influential nature conservation organisation. We've led

the creation, oversight and defence of Victoria's natural estate for over 70 years.

We work with local communities, government and scientists to advocate for evidence-based policy to safeguard wildlife, habitat and protected areas. We inspire connections with nature through citizen science, activities, action and education for all Victorians.

We are an independent, non-profit, non-government, and membership-based charity. We're an incorporated association with membership open to all like-minded people.

Our Vision: Victoria is a place with a diverse and healthy natural environment protected, respected and enjoyed by all.

Foreword

I was amazed when I first heard about the ant, *Myrmecia nobilis*. I had never imagined there would be a rare grassland specialist bullant, let alone one found only in the Melbourne region.

As the Grassy Plains Network began contacting entomologists and naturalists curious about the ant, our amazement only increased. The queen is flightless. The ants only live in small colonies of perhaps 20 individuals. And with our newfound knowledge came questions! What do they eat? How far do they forage? Where do they nest?

Soon we had an informal *Myrmecia nobilis* working group doing the citizen science.

Then our first poaching happened. At the time we only knew of five nests of this ant, in the local government areas of Hobsons Bay, Brimbank, Hume and Melton. Finding that one of those five nests had been dug up was a profound shock.

Subsequently we learnt ant collecting is surprisingly common, with poaching of wild ant colonies feeding a market for collectors. Our horror grew when we realised that by advertising the ant's rarity our citizen science activities had possibly contributed to the poaching.

What were we to do? Persevere in protecting the ant despite fears we were making matters worse? Or stop, and hope the ant survives without human help? A poacher we made contact with told us that the poaching site was well known. Thankfully, we hadn't caused the poaching, just uncovered it.

With poaching damaging wild populations, our quest to find out more about these ants and how we can help them only became more important.

Grant from Community Bank – Altona & Laverton

Our work entered a new phase when we were fortunate in receiving a small grant from the Community Bank – Altona & Laverton. They funded this project despite knowing that we had to keep the sites secret. They would be foregoing opportunities for signage and tours.

A note on this report

The exact locations of the sites discussed in this report have been generalised to their local government area to minimise the risk of poaching.

Thanks

We'd like to especially thank the Community Bank – Altona & Laverton. Thanks also to the members of the *Myrmecia nobilis* working group, without whose enthusiasm, knowledge and own investigations, this report would never have eventuated.

Adrian Marshall

**Facilitator, Grassy Plains
Network, Victorian National
Parks Association**



VNPA acknowledges the many First Peoples of the area now known as Victoria, honours their continuing connection to, and caring for, Country, and supports Traditional Owner joint-management of parks and public land and waters for conservation of natural and cultural heritage. Our office is located on traditional land of the Wurundjeri people of the Kulin Nation. We offer our respect to Elders past, present and future.

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Careful studies of social organisation within such a group, both in the field and in the artificial nest, can hardly fail to be rewarding.

Caryl P Haskins & Edna F Haskins, 1950



Myrmecia nobilis entering a nest (Ian Smith)

Glossary

claustral – A mode of colony founding in which a newly mated queen seals herself in a chamber and rears her first brood using only her internal nutrient reserves until the initial workers emerge.

ergatoid – An ergatoid is a permanently wingless, reproductive adult ant or termite that resembles a worker, despite being sexually functional.

myrmeciinae – The ant subfamily that includes the extant genera *Myrmecia* and *Nothomyrmecia*, as well as several fossil genera.

nuptial flight – The synchronised dispersal event in which winged reproductive ants (alates) leave their natal nests, mate in flight or shortly after landing, and the fertilised queens then disperse to establish new colonies.

semi-claustral – A colony-founding strategy in which a newly mated queen establishes a nest but must leave periodically to forage for food to rear her first brood, rather than relying entirely on internal energy reserves.

trophallaxis – The transfer of liquid food between colony members from an ant's crop (or 'social stomach').

Aims and methodology of this study

This preliminary investigation into the ecology and behaviour of *Myrmecia nobilis*, an apparent grassland specialist species of bullant, was commissioned by the Victorian National Parks Association. Additional aims were to aid identification of potential nest locations when searching for new populations, improve habitat for the species and identify threats.

An initial literature review and contact with the Australian National Insect Collection (CSIRO) and the Melbourne Museum Insect Collection was done to find out what existing information was available. The initial distribution of the species is only known from around 14 collected specimens. All but one of these specimens were collected prior to 1958, with four collected in the 1930s, two in the 1940s, six in the 1950s, and one in the 1970s.

These specimens were collected from Altona, Patho, Lara, Werribee Gorge, Hay, Werribee, Ferntree Gully, Altona and Coburg. The only notes for these specimens in the collection are limited to 'Volcanic soil. Open paddock. No trees. Small hole in ground.' Primary literature yielded few studies of the species, with all limited to taxonomic papers that do not cover ecology or behaviour.

Observational field work was undertaken at the Hobsons Bay site on 10 December 2025, 20 January 2026, and 22 January 2026. Site visits were also undertaken at the two Moorabool sites on 10 February 2026, and the Brimbank and Hume sites on 29 January 2026. The species was only sighted at the Hobsons Bay and Moorabool sites during these visits. During these visits, notes were taken about the floral, faunal and abiotic features of the sites and nests and used to consider what the sites had in common.

Due to the limited number of known sites this species is known from, this study will likely experience some level of sampling bias. In particular, this study is likely to be based on populations that are the easiest to see or at sites that are regularly managed, rather than being based on the species' true distribution. Although care has been taken to accommodate these facts, results and recommendations will be skewed towards known location features. In addition, aspects of the species behaviour that were not observable in the field have had to be inferred from other species in the genus. As such, this report should be regarded as an initial framework for the species to be built upon with further observations and studies.

Potential beneficial habitat features for the *Myrmecia nobilis*

Vegetation structure

Each of the visited sites appeared to share very similar vegetation structure. They were dominated by an open tussock structure with a ground cover of around 40% to 80%, which is to say there were visible areas of exposed soil (Figure 1). In areas where the ground cover approached 100%, the structure of the tussocks supported a network of exposed soil under the tussock canopy, rather than being dense grass across the soil surface as may be present in improved pasture.

Upon observing foraging efforts by *M. nobilis*, it was noted that they will typically approach a tussock at ground level, and forage under the leaf litter or push into the tussock base, before moving between the tussocks on the exposed soil.

Climbing up a tussock was less common, but occurred more frequently if an individual was agitated, hot, or particularly when both those conditions were met. In which case their movement becomes more reminiscent of *Myrmecia pilosula*. An individual was also observed moving to the top of a tussock to escape small *Iridomyrmex* ants that had overwhelmed it when feeding on a provided sugar solution.

From these observations, it is hypothesised the species may be a grass litter specialist, searching the base of tussocks for larger insects such as broad-nosed weevils. They were not observed to chase or undertake ambush predation. However, due to their preference of traversing under tussocks, tracking an individual through a grassland is exceedingly difficult and prolonged observation was not possible.

Although most of the sites were dominated by native tussocks, the eastern of the two Moorabool sites has been in recent years predominantly a monoculture of serrated tussock. At the time of visitation it had been treated and killed with Flupropanate. This suggests vegetation structure plays a larger role in the species habitat than the resources provided by native grasses themselves, or that the species can forage over long distances during periods of scarce resources. This long-distance foraging would explain how the ants are able to persist in grasslands that have experienced regular wide-ranging ecological burns.

The eastern Moorabool site would be an excellent site for future studies to monitor foraging behaviour, its open nature allowing the ability to track the species over longer distances.

Further research

- Monitor the eastern Moorabool site to gain further information on foraging behaviour.
- Opportunistically monitor any nest sites that are burnt to gain further information on foraging behaviour.

Suggested management

- Preserve and maintain grasslands to prevent the accumulation of biomass and grass species.



Figure 1a: Brimbank site



Figure 1b: Hobsons Bay site



Figure 1c: Western Moorabool site



Figure 1d: Hume site



Figure 1e: Eastern Moorabool site



Figure 1f: Location of municipalities

Figure 1: Vegetation structure at each site. Note the abundance of exposed soil in each location (All images: Ian Smith)

Soil

Myrmecia nobilis queens do not have the muscle energy reserves typically associated with ant wings in claustral species, which break down in the early period of colony formation. So, the construction of a nest and egg production would have a particularly high fitness cost to a founding colony. As such, soil compaction and density may play a role in the initial colony fitness due to the energy expenditure required to excavate a nest.

When examining the soil types of each of the sites with recently recorded species sightings, the Altona site with atypically high number of nests had alluvial-derived soils with much higher silt and sand concentrations than the other sites; the two Moorabool sites each with one known nest had a soft friable red clay soil; while the Brimbank and Hume sites had heavier darker cracking clay soils.

Most sites, which were surveyed during summer, were found to have a high hardness and were difficult to penetrate with a pointed metal object, with the exception of the friable red clays, which while firm were still penetrable. Data from iNaturalist indicates that most male *Myrmecia* observations peak in March, with 199 recordings out of 633 (31%), and 489 (77%) occurring from February to April. Another wingless ergatoid species, *Myrmecia tarsata*, has also been observed to undertake nuptial 'flights' in March. This suggests that *M. nobilis* nuptial flights may coincide with the 'Autumn break' rains, particularly when factoring *M. tarsata* queens have been observed to roam for weeks prior to undertaking nest construction, and therefore nest construction may occur during periods of softer soil. The full quote of the *Myrmecia tarsata* finding by Haskins & Haskins (1950) is provided here in full due to its potential similarity to *M. nobilis* nuptial behaviour.

The 'nuptial flight' of this species was observed at length near Pymble, N. S. W., where the species is abundant, in March of 1948. Great numbers of winged males and wingless females were produced from numerous relatively large formicaries. The males promptly took flight and disappeared. The females wandered away slowly. Judging from these observations, and from confirmatory statements of Father John McAreavey (*in litteris*), these young females must wander for some time in the open, possibly for a period of several weeks, during which they are found and fertilised by the active males. Subsequently they form bivouacs and proceed to the establishment of the colony in the typical general pattern of the [Myrmeciinae], as has been shown by McAreavey and as was confirmed in these studies with a number of young females taken wandering in the open.

Although this will need to be confirmed during March after heavy rains, it is anticipated the Altona site will exhibit much softer silty soils due to lower clay composition, and capillary action from a higher water table. It is hypothesised these softer soils will result in a lower fitness cost to nest construction and may be a contributing factor to the higher abundance of nests at the Hobsons Bay site.

A notable outlier however was the eastern Moorabool nest site, which exists on a highly compacted dirt car track. This nest appeared to exist on a previous soil crack (Figure 2), perhaps indicating that *M. nobilis* may in hard soils utilise clay soil cracks in a manner similar to other grassland species such

as the Striped Legless Lizard (*Delma impar*). If this behaviour occurs, it may be a contributing factor to why sightings have been infrequent, why the species appears to be concentrated in the western basalt plains, and why the nests are more visually prominent in the non-cracking soils of the Hobsons Bay site.

Other species of *Myrmecia* have been noted as founding a nest initially under rocks (Haskins & Haskins, 1950), however most sighted nests were not immediately adjacent to any rocky habitat, perhaps again indicating the utilisation of cracking clay as a habitat. This would, however, not explain the lack of rocks near nests on the non-cracking soils of the Hobsons Bay site. An observational study of a gravid female would be required to determine founding behaviour.

Further research

- Soil toughness and compaction should be tested in March after autumn break rains.
- If disturbance weeds and other land management issues can be managed, decompaction, subsoiling or imported sandier soil mounding could be experimented with to test for colonisation use.
- Determine nest founding behaviour through vivarium study.

Suggested management

- Avoid soil compaction from management vehicles.
- Allow deep-rooted plants to break-up soil through cut-down and regrowth cycling, as would be expected from regularly burnt sites or rotationally/seasonally grazed sites.

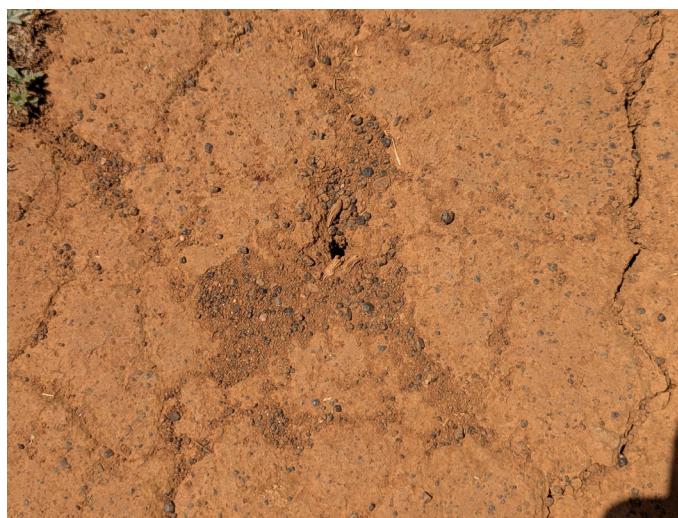


Figure 2: Eastern Moorabool nest site in compacted soil. Note the potential cracks in the soil which may have been utilised by the queen if they had been open during nest founding (*Ian Smith*)

Floral and honeydew resources

Each of the sites visited were predominantly grassland areas with few or no shrubs or trees in the near vicinity. Floral resources from herbaceous dicots were noted in the areas around nests, however these resources were widely scattered and ephemeral. Although honeydew was likely available in small amounts from grass feeding Hemiptera, no significant amounts were readily apparent at any of the sites.

Myrmecia adults predominantly consume liquid foods such as nectar and honeydew, with insect prey reserved for larvae within the nest. Adults also utilise exudates from larvae, allowing them to obtain nutrients from the insect prey they collected without directly consuming them. *Myrmecia* cannot communally share collected liquid resources through trophallaxis, nor do they lead others in their colony to nectar sources through actions such as pheromone trails like most 'higher' ants (Haskins & Haskins, 1950).

Given the low levels of liquid sugar food sources in the environments and the independent foraging of *Myrmecia*, it is hypothesised that *M. nobilis* are adapted to a low liquid carbohydrate ecological niche, which may in turn prevent competition from large higher ants like the Banded Sugar Ant (*Camponotus consobrinus*).

Interestingly, the managing contractor of the Hume site has not sighted *M. nobilis* in three years, but does note all recent ant recordings as being *C. consobrinus*. This site has also seen a significant increase in surrounding mature flowering street trees since their establishment in circa 2005. Any impact this has had is unknown but may be worth investigation, particularly as interface plantings are a common practice for local councils.

When supplied with artificial honeydew solution (7:10 sugar:water solution), *M. nobilis* would rapidly take up the solution, becoming quite placid and immobile for several minutes (this could be utilised in future tag and release studies). When providing a drop outside of the nest on a five-cent coin, two ants rapidly exited the nest to feed on the honeydew, indicating the ants were able to non-visually sense the solution. It was also attempted to examine if *M. nobilis* would utilise vertical habitat through providing honeydew upon a vertical branch, however in all experiments on the provision of honeydew, *M. nobilis* was quickly overwhelmed by large numbers of small *Iridomyrmex* sp. ants which will swarm and rapidly exhaust the food supply. This further suggests that adult *M. nobilis* are more opportunistic feeders of liquid sugars than being reliant on it, instead obtaining a significant proportion of their diet from larvae exudates, and supplemented by small, scattered nectar sources while foraging.

While many of the grassland sites did have a range of floral resources, such as *Calocephalus*, *Convolvulus*, *Carpobrotus*, *Dianella*, and *Wahlenbergia*, the eastern Moorabool site in recent years was predominantly a monoculture of serrated tussock. The site is currently reduced to dead serrated tussock due to herbicide treatment, while the western Moorabool site has 100% ecological burns every two to three years. These examples further indicate that abundant nectar resources are not critical for *M. nobilis*'s survival.

Although *M. nobilis* can biologically benefit from floral resources, caution would need to be taken as to whether this may create competition with other large ant species, such as *Camponotus consobrinus* and *Iridomyrmex purpureus*. Due to their ability to undertake trophallaxis and higher nest populations, they may be able to better utilise floral resources and outcompete *M. nobilis*. This may also explain the seeming negative correlation with *M. nobilis* and tree coverage, with all of the investigated sites hosting no, or few, nearby trees.

Further research

- Monthly floral abundance recorded to determine nectar availability during key activity periods.
- Survey of nearby areas of higher floral resources and populations of larger species of ants that undergo trophallaxis, such as *Camponotus*.
- Survey of Altona site for ant diversity and how it interacts with *M. nobilis* locations.
- Survey of what ant species utilise floral resources during peak flowering periods.

Suggested management

- Caution and monitoring are advised if considering introducing flowering plants that would create prolonged and more abundant periods of floral resources.
- Avoid the planting of flowering trees near nests.



Figure 3. *Myrmecia nobilis* enjoying a sugar solution (Ian Smith)

Thermal tolerance

All visited nests appeared to occur in areas with exposed soil, either between tussocks with limited pasture grass or annuals growing between, in a north sloping exposed rise from earth works (Hobsons Bay site), or in the middle of a dirt road (eastern Moorabool site).

These sites' nest situations are all exposed to high daytime temperatures and suggest that *M. nobilis* is a heat-tolerant species. During observation of the Hobsons Bay site *M. nobilis* populations, a thermal camera was used around the nests and foraging individuals. It was noted that foraging was common when ground temperature was up to approximately 60°C. Individuals were also seen outside of nests when ground temperatures were in the mid to high 60°C. However, no foragers were directly observed leaving or returning the observed nest during this time.

Other ant species nearby some of the *M. nobilis* nests further support this high temperature hypothesis, with a *I. purpureus*

complex species near the eastern Moorabool site, which forage up to 57°C surface temperature (Andrew et al., 2013), and a *Melophorus* sp. nest nearby the observed Hobsons Bay site nest, a genus which can forage in surface temperatures up to around 70°C (Schultheiss & Nooten, 2013). By comparison most ant species are active at surface temperatures between 10 and 45°C (Hölldobler & Wilson, 1990).

Although no surface temperature data could be found, *C. consobrinus* experiences maximal temperatures close to 50°C and as a crepuscular to nocturnal ant it would be expected to have a lower temperature range than diurnal species. The ant species *C. consobrinus* has been known to be antagonistic to *I. purpureus* (Gordon, 1988) and may take over its nests when shaded over (Ettershank, 1968). Therefore, the exposed hot conditions of the grasslands may protect *M. nobilis* from other key large ant competitors such as *C. consobrinus*.

Fire and site history

As a colony with a small number of workers, a rapidly moving fire could cause a short-term, but significant loss of fitness to a nest if multiple workers were captured in the fire. This concern however seems at least partly unfounded, as the Moorabool sites have historically been burnt through rail line management and accidental steam train fires, and the western Moorabool site has continued to have ecological burns every 2-3 years for the last 15 years. The Brimbank and Hume sites have also been managed with ecological fires since at least 2009. The Hobsons Bay site has historically received irregular patch burns through accident or arson, although this may interact with waterlogging, flooding and salinity resulting in similar effects on vegetation to more regular burns.

This mix of fire regimes appears to suggest the species is able to resist the impact of fire and may benefit from its occurrence. Regular fires may contribute to the species' habitat by maintaining the previously hypothesised preferred open tussock structure, while preventing dense non-tussock grasses and woody vegetation, maintaining grassland floral biodiversity and subsequent abundance of arthropod prey, and potential reduction in competitive cooler temperature preferring ants.

Although ecological burns appear to be neutral to beneficial on the long-term survival of *M. nobilis* nests, the short-term impacts on foraging and nest fecundity due to worker, leaf litter, and subsequent prey loss is unknown. In addition, as a semi-claustral species, there is a risk that fire could kill a foraging queen, particularly during the queen's initial dispersal from its birth nest. Research is needed into understanding when founding queens disperse, and for how long they are active before digging out a nest, in order to reduce the risk of queen death by ecological burns. Data on the genus from iNaturalist suggest male nuptial dispersals occur predominantly in March as this is when most community sightings of males occur. If rainfall and increased humidity is a trigger for dispersal, as is common in some ant species, this fire risk may be self-limiting if they disperse after heavy rain when ecological burns are less likely to take place, or if they do, are slower and cooler burns.

It should be noted that the impact of different fire intensities, timing and frequencies is currently unknown. Observations indicate that some nests were lost in areas recently burnt, however why these nests may have been lost while the western Moorabool site persists is unclear. Potentially, infrequent burns may have led to hotter burning fires that increased nest mortality, or the nest structures in the alluvial soils may be different to other sites, or perhaps by unfortunate chance the queen of the nest happened to be foraging at the time of the fire.

Further research

- Monitoring of burnt areas for newly established nests.
- The impact of hot versus cool burns, timing of the burns, and frequency.
- Changes in nest numbers in areas impacted by fire.
- Use of burnt areas and behaviour by the species after a burn.
- Discovery of nuptial dispersal timing and how long it takes for a nest to be founded to minimise mortality risk during ecological burns.

Suggested management

- The species appears resilient to fire, but the long-term impact of different fire regimes and intensities is unknown.
- Ecological burns that maintain open tussock structure could be helpful to the species, but monitoring and patch/mosaic burns may be considered to reduce risk.
- Burns should not occur after nuptial dispersal, however when this occurs is currently unknown.

Potential habitat threats to *Myrmecia nobilis*

Historical pasture and landscape changes

As most records of this species occur before the late 1950s with few recorded sightings after this time, it has been presumed the species had suffered a marked decline in range after this period. Although a causal link is not possible to be established, this does correspond with a major shift in pasture and grassland management and structure.

The 'golden' era of pasture improvement occurred from 1930–80 with a subsequent spread of pasture grass species; use of superphosphate and synthetic urea (Reed, 2014); the establishment of the Country Fire Authority; subsequent coordinated fire suppression methods in 1944; and the introduction of myxomatosis in 1950 reducing grazing pressure. This period also coincides with diesel trains replacing the more grassfire-causing steam trains (Wright, 2025) in areas where many grassland reserves now preside.

If we assume these factors are causal, this suggests the changes to Victorian grassy areas since the 1950s are associated with less open tussock grasslands, and with more high-density nitrogen/phosphate preferring grasses. This is the antithesis of the hypothesised habitat requirements discussed in the previous sections.

Further research

- Historical research on land use change and structure on previously known collection sites prior to 1958 could be useful in confirming the conclusions of this report.

Light pollution

The behaviour of *M. nobilis* males and nuptial flights is unrecorded, so it is unknown if males undertake any nocturnal flight, and to what degree they may exhibit phototropism. If males are nocturnally active, the fragmented nature of grassland reserves and the low population of males means this species would encounter a high fitness cost when dispersing due to artificial light between reserves disrupting navigation.

This however is purely speculative, as most *Myrmecia* species disperse during the day, and therefore light pollution is anticipated to be a low risk.

Further research

- Any observation of males and their behaviour would be highly informative.

Suggested management

- Avoiding lighting near reserves, or if not possible, use of lights of a warmer hue would be prudent, though this is still hypothetical.

Fragmentation

Fragmented habitat, as caused by urban areas and likely agricultural matrices for *M. nobilis*, selects for low dispersal in ants (Finand et al., 2023). This is to say that the more fragmented *M. nobilis*'s habitat is, the greater mortality would be expected for dispersing male flights. There is currently no information about *M. nobilis* males' dispersal, but it is possible that fragmentation is causing high mortality, particularly if their behaviour is to immediately leave the area upon nuptial flights.

Fragmentation is less of an immediate issue for dispersing ergatoid queens, although smaller areas of habitat may increase instances of intraspecific competition and aggression. In addition, as queens are wingless, increasing fragmentation means that once a species is lost from a reserve, recolonisation cannot occur. As other species of *Myrmecia* queens have been recorded as having lifespans of between 1.5 to 12.8 years, it is possible that an unfavourable change in habitat conditions for just 13 years or less would be sufficient to eradicate the species from a habitat fragment permanently.

Given grasslands' naturally dynamic nature, it is possible *M. nobilis* reproduction requires ecological conditions provided by a specific post-disturbance grassland stage, with an area's populations being ephemeral and reliant on immigration when conditions are met. If this were the case it may mean

the last sighting of *M. nobilis* at the relatively small Brimbank site may have been the last vestiges of a population, given its rapid fragmentation within the last possible maximum queen lifespan of 13 years.

Fortunately, the Hume site suggests this is not the case as it had been an isolated grassland fragment for over 21 years prior to the last sighting. This indicates either that reproduction has occurred at least once since fragmentation or that queens can travel a minimum of 100 m through suburban areas to colonise isolated pockets.

Further research

- If *M. nobilis* can tolerate relocation to suitable unpopulated patches, this should be undertaken by a qualified zoological organisation.
- Confirmation of extant populations at the Hume and Brimbank sites.

Suggested management

- Maintain grassland connectivity and habitat islands.

Monoculture

Although it was anticipated that more diverse grasslands would support higher flower and insect diversity, and therefore food sources for *M. nobilis*, the eastern Moorabool nest site exists in an area of near monoculture of treated *Nassella trichotoma* (Figure 4). This surprising result indicates either that *M. nobilis* can survive in areas of low biodiversity (and presumably low insect biomass), that the species is able to travel long distances to forage (Haskins & Haskins 1950 reported *Myrmecia gulosa* would undertake 'foraging expeditions over a half-mile [0.8 km] radius about the nests'), or that *N. trichotoma* provides suitable food resources to allow the species to persist.

As such it is unclear what role, if any, vegetative diversity plays on *M. nobilis* food resources.



Figure 4: Large areas around the nest at the eastern Moorabool site are seemingly devoid of most resources that would be expected of a vegetatively diverse landscape (Ian Smith)

Further research

- The role of floral diversity on *M. nobilis* abundance.
- Observation of *M. nobilis* foraging at the eastern Moorabool site to determine food source.

Suggested management

- No clear answer can be determined as to the role of plant diversity on *M. nobilis*, but it appears vegetative structure is more important than diversity.



Introduced grasses

Each of the locations with *M. nobilis* nests were dominated by, or had large areas of, open tussock vegetation structure with exposed soil visible. It was also observed that *M. nobilis*'s speed significantly reduced in dense grass (likely reducing dispersal and foraging distances), that the surface temperature of dense grass was much lower than around their nests, and their foraging behaviour appeared to preference searching in the litter around, and in the base of, grass tussocks.

As such, it is hypothesised that introduced pasture and lawn grasses that form dense stands, such as *Cynodon*, *Lolium*, *Phalaris* and *Dactylis*, impose a fitness cost on *M. nobilis* populations.

The presence of *M. nobilis* at the eastern Moorabool site suggests that invasive tussock grasses, such as Serrated Tussock (*Nassella trichotoma*), do not negatively influence the distribution of *M. nobilis* as much as an area's dominant vegetative structure.

Further research

- It would be valuable to utilise disturbance events to identify any *M. nobilis* nests that occur in dense areas of introduced grasses to confirm if these areas are hostile to the species, or simply observation bias.

Suggested management

- It is hypothesised that land management that prevents the proliferation of non-tussock pasture and lawn grasses would benefit *M. nobilis*.
- The control of invasive tussocks such as Serrated Tussock in regards to *M. nobilis* appears not to be a high priority, and if controlled should be followed by revegetation with native tussock species.

Trees and shade

As previously mentioned, it is hypothesised that *M. nobilis* may exist in an ecological niche of higher temperatures, exposed areas of soil, and low flower abundance.

Assuming this holds true, the presence of trees would reduce the suitability of habitat for *M. nobilis* potentially by reducing surface temperature, providing large supplies of honeydew, and creating a layer of leaf litter that would change the conditions of the otherwise exposed soil.

This in turn may change the level of competition faced by *M. nobilis* from other ant species.

Further research

- Ant surveys across areas with known *M. nobilis* would be useful in understanding the role of adjacent trees on ant diversity and species abundance.

Suggested management

- Any planting of trees and shrubs should be undertaken as far from grassland and nest areas as possible.
- Interface plantings should be reconsidered or designed to minimise height until research on ant species distribution can be undertaken.



Myrmecia nobilis (Ian Smith)

Hypothesised methods to improve habitat for *Myrmecia nobilis*

From observation of the species' known population sites and behaviour, it is hypothesised that modern methods of managing grasslands in a manner that controls biomass and maintains an open tussock grassland structure is appropriate for the preservation of the species.

Ecological burns would presumably be beneficial in achieving this long term, however the short-term impact of fire on foraging and nest fecundity is unknown, as is what timing is most likely to reduce the risk of foraging queen and founding queen kills. If they respond to rain this could mean avoiding ecological burns for several weeks after heavy March rains, although this is partially speculative. Patchy burns may be a method to reduce risk and create a greater habitat diversity, but again this is speculative.

Encroachment by trees and shrubs should be avoided as these may create cooler, more nectar-rich areas that

are behaviourally inaccessible to *M. nobilis* and increase competition with other species. Similarly, encroachment by introduced, dense, non-tussock grasses should be prevented (as well as additional nitrogen and phosphate which would enable this) as this also appears to negatively correlate with *M. nobilis* populations. Invasive tussock grass species may not impact *M. nobilis* populations so long as they do not impact the overall open tussock structure of a grassland.

Although unlikely to be possible in most areas, it would be remiss to not include the importance of preventing habitat fragmentation and establishing habitat corridors between grasslands. Failing this, long-term research into the viability of gravid female relocation to seed suitable habitats could be a possible safeguard for the species.

Recommendations on finding *Myrmecia nobilis*

From the observations and information compiled in this report, the following recommendations are suggested when searching for new *M. nobilis* populations:

- Areas of open tussock grassland with less than 80% ground cover (both living and dead).
- Areas of similar structure and adjacent to open tussock grassland historically (e.g. salt marsh).
- Former areas of open tussock grassland that have been replaced with *Nassella trichotoma*.
- Areas with a history of regular fire (e.g. rail grassland reserves).
- Areas with exposed surfaces that reach high summer temperatures.
- Areas of soil which are a high proportion of clay that is hard during summer but are soft and uncompacted after March rains.
- Cracking clays with fissures during summer.
- Areas not historically treated with nitrogen and superphosphate.
- Locations with *Iridomyrmex purpureus* (which have highly visible nests and were in close proximity in Moorabool) and particularly thermophilic *Melophorus* sp. ants.



Myrmecia nobilis foraging in an open area (Ian Smith)

Research limitations

This report extrapolates from a small number of identified nests over a short period of time. As such, any new nests in novel locations will likely require refining these results. In particular, the finding of any nests in areas of trees, dense non-tussock grasses, urban environments, or outside the western basalt plains, will require reassessment of the species' preferences and likely occurrence.

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Entrance to a *Myrmecia nobilis* nest (Ian Smith)

Appendix 1: Field notes

20 January 2026

- 11:00am: Return from foraging, no food
- 11:07am: Remove waste from nest, 40cm from nest
- Movement inside the nest past the entrance was observed to be regular
- 11:10am: Waste removal 10cm
- 11:14am: Return from foraging
- 11:15am: Waste removal
- Thermal camera observed ants are significantly cooler than the soil surface upon emergence from the nest
- Soil surface ~50°C
- Nest entrance ~40°C
- Air temperature 21°C
- 11:19am: Waste removal/ quick scout
- Lux 154,000
- 11:22am: Waste removal or quick scout
- A small native bee was observed laden with pollen, indicating floral resources are present in the area
- *Rhytidaponera* and *Iridomyrmex* observed, grasshopper plentiful
- Subterranean movement 1m 07s apart followed by 5 seconds and 10 seconds
- 11:42am: Robberfly spotted
- 11:45am: Soil temperature 56°C
- 11:47am: Quick scout or a worker returning (unclear)
- 11:48am: Waste removal
- 11:49am: Quick scout/return/waste removal (unclear)
- 11:50am: Individual observed climbing tussock in a manner similar to *Myrmecia pilosula*, before returning to the nest. It may have been spooked by small movements from the researcher
- 12:00pm: Nearby burrowing bee nest spotted
- 12:10pm: Individual noticed on researcher's arm, seemingly approached from behind. It was observed searching a tussock from base to tip, before jumping back down to ground level. It was followed until lost in dense grass more than >3m from the nest in 1-2mins
- 12:17pm: surface temperature 60°C
- Spider wasps present
- 12:38pm: Surface temperature 65-67°C
- 12:39pm: Researcher stung or bitten (pain similar to a flu injection, persisted for around 30 min) by a specimen that had seemingly not recently left the nest but was near to the nest
- The specimen was then followed; it entered into the researcher's camera case where it seemingly rested. It appeared alert while regularly raising and tapping a leg in an agitated or alert manner
- 12:48pm: It was then gently tipped and removed from the container and followed, where it travelled a short distance and climbed a tussock grass
- 1:00pm: Hung by 2 legs on the grass before dropping again
- 1:05pm: Travelled a short distance to a *Plantago lanceolata* plant
- 1:10pm: The *Plantago lanceolata* is ~40°C, surface temperature is ~60°C
- 1:14pm: The ant moves under a curled leaf in the shade, thermal camera suggests it is the coolest part of the immediate area. Leg tapping continues
- 1:16pm: The ant holds up some legs
- 1:59pm: Soil surface 68°C, 45°C on the leaf the ant is sheltering on
- 2:13pm: Soil surface ~64°C, ~45°C on the leaf the ant is sheltering on. Ant remaining still
- 2:55pm: 156000 lux. Soil surface ~65°C, ~40°C on the leaf the ant is sheltering on. Ant remaining still
- 3:15pm: Ant starting to move again
- 3:56pm: Soil surface ~63°C, ~40°C on the leaf the ant is sheltering on
- 4:05pm: Moved from leaf to flower stalk
- 4:07pm: Climbed down and crawled into tussock base
- 4:09pm: Soil surface ~61°C, ~42°C on the grass base
- 4:15pm: Ant showed no response to be crawled on by *Iridomyrmex* ant, closer inspection confirmed the specimen was unexpectedly dead. It was then collected and preserved in ethanol to be provided to the Melbourne Museum. It floated in ethanol suggested it dehydrated to death
- 4:25pm: Researcher returned to the originally monitored nest and tested response to entrance tapping. No ants investigated the disturbance, but subterranean movement continued
- 4:25pm: Waste removal x 2
- 4:35pm: Waste removal
- 5:00pm: Waste removal
- 5:03pm: Provided honeydew on coin next to nest
- 5:04pm: 2 ants rapidly emerge and start licking solution
- 5:08pm: Ants retreat back into nest
- 5:10pm: *Iridomyrmex* ants arrive at the remaining honeydew solution
- 5:11pm: *M. nobilis* sugar use
- 5:12pm: Retreat
- 5:14pm: *M. nobilis* sugar use
- 5:15pm: Retreat
- 5:24pm: *Iridomyrmex* retreat, food exhausted
- 5:41pm: 50°C surface temperature
- 6:04pm: Quick scout
- 6:07pm: Quick scout
- 6:08pm: Quick scout
- 6:09pm: Quick scout
- 6:12pm: Quick scout
- 6:19pm: ~40°C surface temperature
- 6:23pm: Quick scout
- 6:25pm: Quick scout

- 6:33pm: Waste removal x 2
- 6:34pm: Quick scout x 2
- 6:45pm: Waste removal and possible worker returning to nest (unclear)
- 6:46pm: Quick scout
- 7:30pm: Waste removal
- 7:34pm: Waste removal of a sclerite

22 January 2026

- 9:39am: Arrive
- 9:43: Left to forage under tussocks (Will forage on a tussock when hot and agitated)
- 9:45: Lost in tussock
- 9:50: Surface temp 30–35°C
- 9:52: Waste removal / quick scout
- 9:53: 11 x 2
- 9:55: Return from foraging
- 9:58: 'Light: 11,324 → 138,279 LUX (Average: 55,000)'
- 9:59: Waste removal
- 10:09: Quick scout
- 10:16: Forager left nest
- 10:21: Lost after about 3.5 m
- 10:28: Quick scout; foraging North + North East down slope
- 10:45: Returning forager?
- 10:46: Waste removal / quick scout
- 10:49: Waste removal / quick scout
- 10:51: Returning forager! confirmed
- 10:52: Return / quick scout?
- 10:53: Quick scout
- 11:00: Return / quick scout?
- 11:02: Confirm return; no prey
- 11:03: Confirm return; no prey
- 11:07: Short 30 cm forage? Spooked?
- 11:10: Short 30 cm forage? Spooked?
- 11:14: Forager left nest!
- 11:17: Lost in the grass; Soil temp low 40°C
- 11:35: Quick scout
- 11:36: Forager left nest!
- 11:46: Lost in tussock unburnt
- 11:55: Weevil-carrying forager; lost in tussock. Soil ~50°C / In tussock ~24°C
- 12:02pm: Confirmed return! (No prey); at 90 cm turned to head to nest rather than along gully
- 12:06: Forager return (no prey). low 50°C
- 12:17: Forager from East
- 12:24: Lost in tussock (W)
- 12:32: Forager East of nest; at 50 cm = rapid nest approach. 19°C Sunny / Soil 60°C
- 12:45: Forager offered sugar on branch; took lowest height but quickly overwhelmed by *Iridomyrmex* sp.
- 12:55: Return; forager(s) more climbing to grass tips
- 12:56: Return
- 12:59: Return with weevil
- 1:06: Soil 60°C / Grass 30°C; Ant found while returning from site tracked 5 m — not near nest
- 1:29: 50°C Soil / 19°C Air

Appendix 2: General observations

- Seems to track humans at times from 2–4 metres away. Observation of behaviour may influence behaviour.
- As per other ants, waste removed from the nest is placed at variable distances depending on pathogen risk, with organic matter placed more than 30 cm away, while small rocks or dirt placed next to the nest entrance.
- All recent sightings of the species occurred in the newer volcanic areas caused by the eruptions of Mt Cottrell.
- All areas in less than 650 mm annual rain shadow.
- From objects being removed from the nest, the nest is actively digging and maintaining larvae.
- An individual was observed carrying out a discarded cocoon, indicating hatching activity in mid-summer.
- Ants were always observed to disperse away from the path into grassy areas rather than crossing the path first.
- Behaviour upon approaching the nest appeared to match descriptions of navigation by other *Myrmecia* species.



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Myrmecia nobilis among leaf litter (Ian Smith)