



Environmental Defenders Office

30 August 2022

Professor Alice Clark
Chair
Independent Planning Commission of NSW

By email: [REDACTED]
[REDACTED]

CONFIDENTIAL AND PRIVILEGED

Dear Chair

Re: Mount Pleasant Optimisation Project (SSD 10418) – supplementary submission on the new material

1. We refer to the statement released by the Independent Planning Commission (**the Commission**) on 23 August 2022, advising of the reopening of public submissions for the Mount Pleasant Optimisation Project (SSD 10418) (**Project**) in respect of new material it received from the Department of Planning and the Environment (**DPE**) on 12 August 2022 regarding the identification of the stripped legless lizard (*Delma vescolineata*).
2. On behalf of our client Denman Aberdeen Muswellbrook Scone Healthy Environment Group Inc (**DAMS HEG**), we set out its submission on the supplementary materials below. As the Commission is aware, DAMS HEG is a local community organisation concerned about the environmental, social and economic impacts of continuing and prolonging coal mining in the Upper Hunter. DAMS HEG was formed to provide community voice to industry and all levels of government in defence of our natural environment in the interests of human health and wellbeing, and the protection of biodiversity.
3. Our client's primary position remains that the Commission must refuse development consent for the Project. On the evidence before the Commission, there is no legally reasonable, rational or logical basis on which the Commission can approve the Project under the *Environmental Planning and Assessment Act 1979* (**EP&A Act**). The new material before the Commission is yet another factor supporting the Project's refusal; the Project is not in the public interest.
4. As we face the climate crisis and the extinction crisis, the Commission is presented with an opportunity to take responsibility in making its decision under the EP&A Act, to ensure it is in a manner that is truly consistent with the public interest and ecologically sustainable development (**ESD**). To exercise its powers in a manner that is consistent with ESD and the

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precautionary principle, the Commission must accordingly refuse development consent. There is a risk of causing serious irreversible harm to this species if the Project is approved. The development must not proceed until scientific research is carried out to determine the extent of the likely harm on this species. This consideration must be in the context of the climate and extinction crisis.

5. The Commission is unable to discharge its legal duty as the consent authority for the Project under [s 4.15\(1\)\(b\)](#) of the EP&A Act to properly assess the Project's likely impact on the environment. There is insufficient evidence before the Commission as to the Project's likely impact on this new species. Therefore, the Project must accordingly be refused.
6. In the alternative, the Commission must impose an alternative condition to that recommended by the DPE, if it exercises its discretion to grant development consent, which our client says is irrational in the circumstances.
7. To make its decision in a manner consistent with the precautionary principle, the Commission must refuse development consent. Should the Commission grant the application, it must ensure **no mining or clearing occurs** under the consent sought until the likely impacts on this species are known. Once the likely impacts are ascertained, any consent must include a condition that avoids or mitigates those impacts to the greatest extent practicable. This condition must be in place prior to the Applicant being authorised to commence operations.

1. The Commission must refuse development consent

8. The Commission must exercise its power to refuse consent to the application currently before it under [s 4.38\(1\)\(b\)](#) of the EP&A Act. The precautionary principle tells us the Project's must not proceed. Nor is there enough information before the Commission to determine the likely impact of the Project on this newly identified species.
9. As the Commission is aware, it must exercise its powers for the purpose of achieving the objects of the Act, as relevant to its decision. The objects of the EP&A Act under [s 1.3](#) include the following:
 - to promote the social and economic welfare of the community and **a better environment by the proper management, development and conservation of the State's natural** and other resources;¹
 - to facilitate **ecologically sustainable development** by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment, and²
 - to protect the environment, including the **conservation of threatened and other species of native animals** and plants, **ecological communities and their habitats**.³

¹ EP&A Act s 1.3(a).

² EP&A Act s 1.3(b).

³ EP&A Act s 1.3(e).

10. [Section 4.15\(1\)](#) of the EP&A sets out matters the Commission must take into consideration including:

- a the **likely impacts of the development including environmental impacts** on both the natural and built environments, and social and economic impacts in the locality;⁴
- b the **suitability of the site** for the development;⁵ and
- c the **public interest**.⁶

11. The new material engages the precautionary principle and the convention on biological diversity and ecological integrity; both principles of ESD are relevant to the Commission's determination as part of its consideration of the public interest.⁷

12. Although the precautionary principle is not defined in the EP&A Act, it has the same meaning as it has in [s 6\(2\)](#) of the *Protection of the Environment Administration Act 1991 (POEA Act)* which provides:

if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by—

- (i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and
- (ii) an assessment of the risk-weighted consequences of various options

13. The precautionary principle is triggered by the satisfaction of two threshold questions:

- i. a threat of serious or irreversible environmental damage; and
- ii. scientific uncertainty as to the environmental damage.⁸

14. On behalf of our client, we engaged Dr Sumner, an expert evolutionary ecologist who has research expertise in conservation genetics and drivers of species extinctions (**attachment A**). In Dr Sumner's opinion, the precautionary principle must be applied in this situation which requires there must be no clearing or habitat destruction until the appropriate studies are undertaken.

15. Dr Sumner says there should be no clearing and habitat destruction in the range of the newly identified species (*Delma vescolineata*) until the extent of the species and the connections between habitat fragments and populations has been determined with appropriate focused surveys and genetic analyses.⁹ At present there is not enough information about the genetic diversity, population history and connectivity of the species to determine that clearing this

⁴ EP&A Act s 4.15(1)(b).

⁵ EP&A Act s 4.15(1)(c).

⁶ EP&A Act s 4.15(1)(e).

⁷ *Patra Holdings v Minister for Land* (2002) 119 LGERA [11]; *Minister for Planning v Walker* (2008) 162 LGERA 423 [56]; *Barrington-Gloucester-Stroud Preservation Alliance Inc v Minister for Planning and Infrastructure* (2012) 194 LGERA 113 [170]; *Bulga Milbrodale Progress Association Inc v Minister for Planning and Infrastructure and Warkworth Mining Ltd* (2013) 194 LGERA 347 [63]; *Gloucester Resources Limited v Minister for Planning* (2019) 234 LGERA 257 [498].

⁸ *Telstra Corporation Limited v Hornsby Shire Council* (2006) 67 NSWLR 256 Preston CJ at [128].

⁹ Attachment A, p 6.

habitat will not increase the extinction risk of species.¹⁰ From the little we know of *D. vescolineata*, it is made up a small number of populations with an extremely limited geographic distribution.¹¹ In Dr Sumner's experience, small populations can be more at risk of stochastic extinction events – random events such as fire, floods or disease that can wipe out an entire population.¹²

16. It is clear the Commission must exercise its powers in a manner consistent with the precautionary principle. There is a high risk of serious irreversible harm if this Project proceeds and scientific uncertainty as to the impact on this species.
17. In *Gloucester Resources Limited v Minister for Planning* (2019) 234 LGERA 257 (**Rocky Hill case**), Preston CJ at [498] said that the precautionary principle has “been held to require consideration of the impact of a development on climate change and the impact of climate change on a development.”¹³
18. Approving this mine while we are in a climate and extinction crisis is inconsistent with the precautionary principle. This mine will contribute to the climate crisis, which is likely to further exacerbate the localised impact this Project will have on this newly identified species.
19. To exercise its powers in a manner that is consistent with the precautionary principle, the Commission must refuse development consent under [s 4.38\(1\)\(b\)](#) of the EP&A Act.
20. Furthermore, the Commission cannot discharge its legal duty as the consent authority for the Project under [s 4.15\(1\)\(b\)](#) of the EP&A Act to properly assess the Project’s likely impact on the environment based on the information currently before it. Until a comprehensive study is undertaken which assesses the likely impact of the Project’s on this new species, the Commission is unable to grant any consent authority for the Project. In Dr Sumner’s opinion, the biodiversity surveys within the Mt Pleasant Mining Lease to-date do not include methods appropriate to determining the distribution of the species or its genetic diversity within the Project area.¹⁴
21. Section 4.15 is the statutory successor of former s 79C(1) and, before then, s 90(1) of the EP&A Act. Moffit P when considering s 90(1) in *Parramatta City Council v Hale* (1982) 47 LGRA 319 said at [340]:

The obligation is to take into consideration (a) to (s) matters which are in fact relevant, and not those which the authority or its officers considers relevant. By remaining ignorant of relevant environmental matters, an authority could not avoid its obligation to consider and, in its ignorance, give a valid consent without considering harm (not de minimis) to the environment which in fact fell within (b). Accordingly, despite the absence of a direct obligation to do so, the requirement of s. 90(1) to consider carries with it an indirect obligation, which rests upon the authority to acquaint itself with such material as will permit it to consider such s. 90(1) matters as are in fact material.

¹⁰ Attachment A, p 2.

¹¹ Attachment A, p 3.

¹² Attachment A, p 3.

¹³ Citing *Gray v Minister for Planning* (2006) 152 LGERA 258; [2006] NSWLEC 720; *Taralga Landscape Guardians Inc v Minister for Planning and RES Southern Cross Pty Ltd* (2007) 161 LGERA 1; [2007] NSWLEC 59; *Aldous v Greater Taree City Council* (2009) 167 LGERA 13; [2009] NSWLEC 17; and *Hunter Environment Lobby Inc v Minister for Planning* [2011] NSWLEC 221.

¹⁴ Attachment A, p 4.

Thus, if it is to consider the impact of the development upon the environment, if is to consider whether it is likely to cause harm, if it is to consider the ways the environment may be protected or, if it is to consider the ways likely harm may be mitigated, it must be aware of each of these matters, namely, what is the impact, the likely harm and the ways to protect or mitigate.

22. As such, the Commission is obliged to acquaint itself with materials that enable it to consider the likely impacts of the development on the legless lizard (*Delma Vescolineata*). At present there is insufficient evidence before the Commission to determine the “likely impacts” of the Project and it is unable to discharge its obligations under s 4.14 of the EP&A Act.
23. In any event, approving this Project now, based on the evidence before the Commission is contrary to the precautionary principle and convention on biological diversity and ecological integrity. As the Commission is aware, it must exercise its powers for the purpose of achieving the objects of the Act, as relevant to its decision.
24. At present, the Commission does not have before it any evidence as to the likely impact of the Project on this newly discovered species. Nor is there any evidence before the Commission that DPE’s recommended condition of consent can mitigate the Project’s impact on this species. In Dr Sumner’s opinion, there is no information about the species distribution or vulnerability to the Project. To exercise its powers in a manner that is consistent with ESD and the precautionary principle, the Commission must accordingly refuse development consent.
25. When applying the precautionary principle, the Commission must also consider the Project’s impact on climate change. There is a threat of serious irreversible harm, if the Commission approves this Project, now in the middle of the climate crisis and extinction crisis.
26. Our client’s view is it would be unreasonable for the Commission to determine the Project is in the public interest and it must accordingly conclude that development consent should be refused.

2. In the alternative, the Commission must impose an appropriate condition on consent

27. In granting any consent to the application, which our client says is irrational in the circumstances, [s 4.38\(1\)\(b\)](#) of the EP&A Act, enables the Commission to modify the proposed development or grant any consent on any such conditions it deems necessary.
28. Pursuant to cl 14(1)(b) of the Mining SEPP, before granting consent for development the Commission must:

consider whether or not the consent should be issued subject to conditions aimed at ensuring that the development is undertaken in an environmentally responsible manner, including conditions to ensure the following— ...

(b) that **impacts on threatened species and biodiversity, are avoided, or are minimised to the greatest extent practicable**
29. As provided above, the Commission is required to consider the likely impact of the proposed development on the environment. As part of the public interest, the Commission when making

its decision must consider the principles of ESD including the precautionary principle.

30. When assessing the “likely impact” an impact is “likely” if there is a “real chance or possibility” of the impact *whether or not* the impact is “more probable than not”.¹⁵
31. In Dr Sumner’s opinion there is presently insufficient information about the genetic diversity, population history and connectivity of the species to determine that clearing this habitat will not increase the extinction risk of the species.¹⁶
32. While there is insufficient evidence currently before the Commission to discharge its obligations under the EP&A Act, in Dr Sumner’s opinion on the limited information available, it is highly likely the species will be classified as endangered.¹⁷
33. As such it is more likely than not this species will reach the threshold for protection status under the BC Act. In the circumstances, the Commission should not accept in this instance there is distinction between the treatment of:
 - a a species that as a matter of fact likely to be threatened or endangered; and
 - b a species that is deemed at law to be threatened or endangered and is therefore afforded protections under the relevant statute, in this instance, the *Biodiversity Conservation Act 2016 (NSW)*(BC Act).
34. If the Commission exercises its discretion to approve the Project, the difficult it faces is ensuring a condition is crafted which ensures the impacts on this species of are avoided or minimised to the greatest extent practicable.
35. According to Dr Sumner this requires **no clearing and habitat destruction occurs before further studies** are undertaken including PhD Project, incorporating broader distribution surveys and genetic analysis of populations.¹⁸ This includes among other things:

Looking at the genetic diversity present within each population and how it connects to other populations across the landscape are important to managing and maintaining the evolutionary potential of the species to ensure that it persists into the future.¹⁹
36. The DPE recommended condition of consent is inconsistent with the precautionary principle. There is insufficient information to determine the likely impact of the Project on this new species. If the applicant is authorised to commence operations prior to knowing the impacts on this species, it will likely be too late to avoid or minimise those impacts to the greatest extent practicable. The suggested condition assumes biodiversity offsets are appropriate mechanism to mitigate the impact on this species and only in the event it is listed as threatened within 2 years of commencement.
37. The Biodiversity Conservation Division within DPE considered that “because there is little known about the species and its conservation needs such that land based offsets may not be

¹⁵ *Hoxton Park Residents Action Group Inc v Liverpool City Council* (2011) 184 LGERA 104 at [43]-[47].

¹⁶ Attachment A, page 2.

¹⁷ Attachment A, p 5.

¹⁸ Attachment A, p 5.

¹⁹ Attachment A, p 5.

sufficient to mitigate impacts.”²⁰ The Commission should be aware of the recent report of the Audit Office of NSW titled ‘[Effectiveness of the Biodiversity Offsets Scheme](#)’, which highlights findings from the NSW Government’s Biodiversity Outlook Report 2020 which estimates:

without effective management, only 50% of species and 59% of ecological communities that are listed as threatened in New South Wales will still exist in 100 years.

38. Key findings of the report which the Commission should consider include:

- DPE has not effectively designed core elements of the NSW Biodiversity Offsets Scheme. DPE did not establish a clear strategy to develop the biodiversity credit market or determine whether the Scheme’s operation and outcomes are consistent with the purposes of the Biodiversity Conservation Act 2016;
- A market-based approach to biodiversity offsetting is central to the Scheme’s operation but credit supply is lacking and poorly matched to growing demand: this includes a potential undersupply of in-demand credits for numerous endangered species.
- there are key concerns around the Scheme’s integrity, transparency, and sustainability which are yet to be fully resolved; and
- there is a risk that biodiversity gains made through the Scheme will not be sufficient to offset losses resulting from the impacts of development, and that DPE will not be able to assess the Scheme’s overall effectiveness.²¹

39. The approach recommended by the DPE is inconsistent with the convention on biological diversity. Conserving biodiversity must not be an afterthought. As the climate crisis and extinction crisis worsens, decision-makers must tackle the root cause of biodiversity loss and prioritise it over economic considerations.²² As per [s 6\(2\)](#) of the POEA Act, “conservation of biological diversity and ecological integrity should be a fundamental consideration”.

40. To make its decision in a manner consistent with the precautionary principle, the Commission must accordingly refuse development consent. Should the Commission grant the application, it must ensure **no mining or clearing occurs** under the consent sought until the likely impacts on this species are known. Once the likely impacts are ascertained, any consent must include a condition that avoids or mitigates those impacts. This condition must be in place prior to any commencement of operations.

3. Findings the Commission must make

41. The Proponent must be required to undertake a comprehensive study as to the likely impact of the Project on the newly identified species of legless lizard (*Delma Vescolineata*) prior to any approval of the Project. No mining or clearing should be permitted until the likely impacts on this species are known.
42. Approving this Project now, based on the evidence before the Commission is inconsistent with the public interest and ESD in particular the precautionary principle and the convention on

²⁰ BCD letter to DPE date 11 August 2022 re Advice in relation to the newly-described legless lizard, *Delma vescolineata* p 4.

²¹ Audit Office of NSW, [Effectiveness of the Biodiversity Offsets Scheme](#) 2022 p 2.

²² Secretariat of the Convention on Biological Diversity, Global Biodiversity Outlook 3, <<http://www.cbd.int/gbo3/>>, 5.

biological diversity and ecological integrity. The new material before the Commission is yet another factor supporting the Project's refusal; the Project is not in the public interest.

43. In light of the extinction crisis and climate crisis, the Commission must refuse development consent for the Project. We are now in a time where climate change is the greatest contributor to species extinction and approval of this Project in the circumstances is illogical, unreasonable, and irrational.
44. Accordingly, on the evidence before the Commission it must refuse development consent for the Project.

Yours faithfully

Environmental Defenders Office



Jayne Cooper

Solicitor

Mt. Pleasant Optimisation Project (SSD-10418)

Independent Expert Report to NSW Independent Planning Commission

Prepared by Dr Joanna Sumner

Senior Manager of Genetic Resources, Museums Victoria

29th August, 2022

Dr Joanna Sumner, 23 Birch St Preston, Victoria 3072.

I was engaged by the Environmental Defenders Office on behalf of Denman, Aberdeen, Muswellbrook and Scone Healthy Environment Group Inc (DAMS HEG) and asked to provide an independent expert report on questions pertaining to the additional material provided to the NSW Independent Planning Commission following the publication of a description of a new species of lizard, *Delma vescolineata*, in the Hunter Valley region.

I have received a copy of the Expert Witness Code of Conduct, which I have read, and I agree to be bound by it.

My relevant qualifications as an expert in the preparation of the report include:

- 25 years of work in reptile conservation genetics and evolution in Australia, including assessments of extinction risk: Geyle, H et al. (2020) Reptiles on the brink: identifying the Australian terrestrial snake and lizard species most at risk of extinction. *Pacific Conservation Biology* 27, 3-12.
- Taxonomic descriptions of reptiles: Melville J, Chaplin K, Sarre S, Sumner J, Gruber B and Hutchinson M (2019) Taxonomy and conservation of Grassland Earless Dragons: new species and an assessment of the first possible extinction of a reptile in Australia. Royal Society Open Science 6: 190-233.
- PhD on the effect of habitat fragmentation on the genetic diversity of a lizard (*Ecology and genetic diversity of the prickly forest skink (Gnypetoscincus queenslandiae) in a fragmented habitat*). University of Queensland 2002.
- Postdoctoral research on evolution of lizards along the Great Dividing Range (*Testing Theories of Historical Divergence using South-Eastern Australian Reptiles*), Australia Research Council Postdoctoral Grant, Australian National University, 2005-2007.
- Supervision of student, Susie Maldonado's research on the genetic diversity of *Delma impar*: Maldonado, S.P. Melville, J., Peterson G.N. L., Sumner, J. (2012) Human-induced versus historical habitat shifts: identifying the processes that shaped the genetic structure of the threatened grassland legless lizard, *Delma impar*. *Conservation Genetics* 13 (5): 1329-1342.

Additional qualifications can be found in my attached CV (Attachment A).

I was asked to address the following issues related to the newly described and named species of legless lizard, *Delma vescolineata*:

- a. summarise any key impacts predicted to arise as a consequence of the Project, within your area of expertise.
- b. submit an opinion on what research (including time requirements) is required to understand the species distribution, habitat requirements, and conservation status of this species?
- c. What conditions could be recommended to ensure the impacts on the species are managed appropriately, bearing in mind the conditions proposed by the proponent.

Summary of opinion.

If the mine extension is approved and clearing goes ahead what will be the effect on this newly described species? Is there a chance that clearing of known *Delma vescolineata* habitat at the mine site will increase the extinction risk of this species?

If the Project is approved, the proponent MACH Energy Australia Pty Ltd may begin work in the Project Expansion area, and in doing so it will be clearing the habitat of one of only six known *D. vescolineata* populations. If approved, clearing of known habitat of *D. vescolineata* can occur before this newly described species has been assessed for conservation purposes.

In my opinion we currently do not have enough information about the genetic diversity, population history and connectivity of the species to determine that clearing this habitat will not increase the extinction risk of species.

Assessment of issues

a. summarise any key impacts predicted to arise as a consequence of the Project, within your area of expertise.

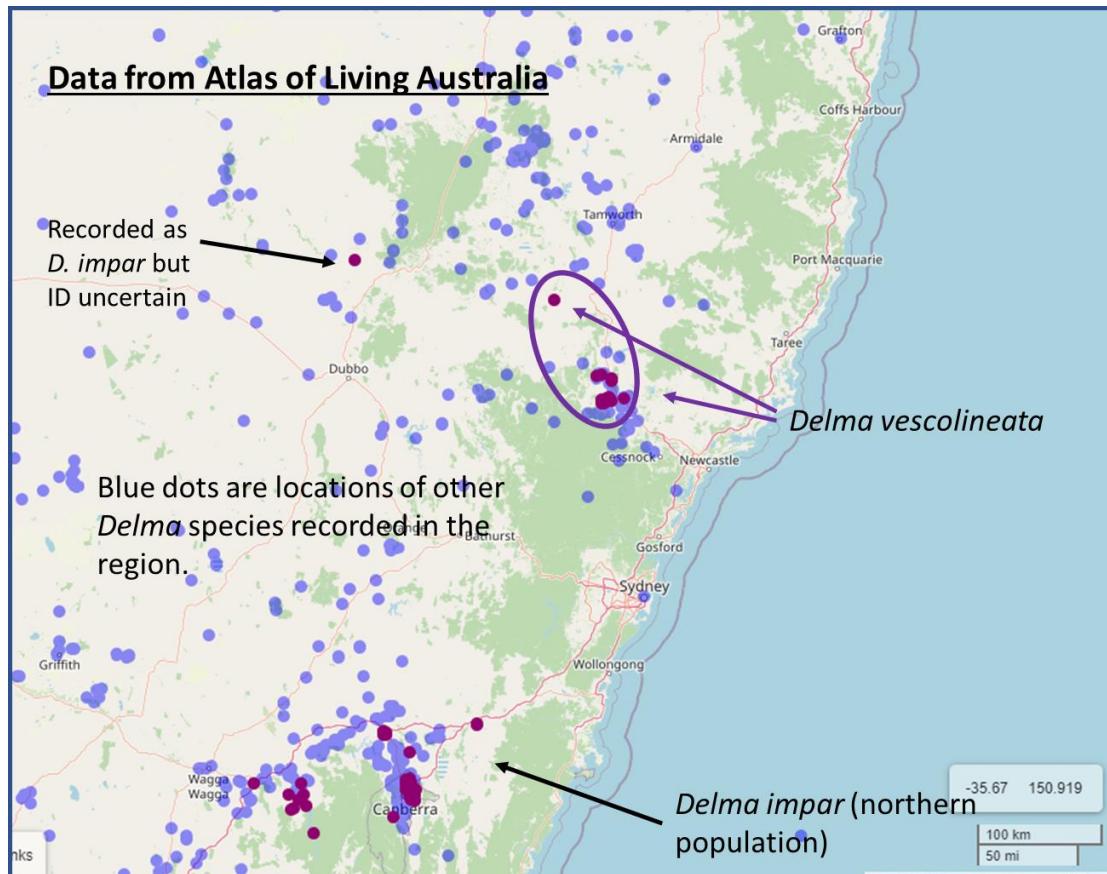
1. Loss of a significant proportion of species habitat.

The total known distribution of *Delma vescolineata* consists of 6 sites:

- four sites around Muswellbrook, separated by waterways (Hunter River and Lake Liddell) and more recently by the town and mine sites,
- one museum specimen collected 78 km north of Muswellbrook at Pine Ridge, Windy Station (-31.6°, 150.4°) and identified as *D. vescolineata* using morphological characters.
- one museum specimen from Bulga, (-32.6°, 151.0°), south of Muswellbrook, that is consistent with *D. vescolineata* head scale morphology. It was tentatively assigned to the new species but was not included in analyses by Mahoney et al. (2022) as it is a juvenile, and no genetic material was available to confirm the identification.

Mahoney et al. (2022) record that there are 35 Hunter Valley observation records in the Atlas of Living Australia identified as *D. impar*, with 23 of these observed in 2018. They compared specimens previously assigned to *D. impar* from the Hunter Valley region and concluded "all were *D. vescolineata* sp. nov., with no evidence of true *D. impar* present in the region."

I agree with the authors' reasoning that there are no *Delma impar* in the Hunter region and that all lizards currently recorded as *D. impar*, are in fact *D. vescolineata*. I think it is extremely likely that this species may be found in other areas close to the current distribution, but unlikely that that the distribution of the new species is significantly greater than this area. Other *Delma* species have been found throughout the region, that are neither *Delma impar*, nor *Delma vescolineata*, indicating that the narrow distribution of known *D. vescolineata* records is not because there are large areas that have not been surveyed.



The biodiversity surveys in the area of the mine extension for reptiles include "reptile active searches, pitfall trapping, funnel trapping and opportunistic observations "(Mach Energy Environmental Assessment pp 7-80) but did not include the use of tile survey lines, a survey method that targets legless lizards. I think it is likely that more animals will be found in the area of the Mining Lease at Mt Pleasant if appropriate methods are used. The *D. vescolineata* individual found within the Mining Lease is on the border of the Project Extension region. From looking at Google maps images of the current mine site I assume that substantial land clearing will occur in the Project Extension area, and this will include a significant proportion of the habitat of this population of *D. vescolineata*. It is my opinion that surveys using appropriate methods for finding legless lizards should be undertaken in uncleared habitat across the mining lease to determine the extent of the distribution of this species in the area before any clearing occurs.

2. Loss of genetic diversity

From the little we know of *D. vescolineata* it is made up a small number of populations with an extremely limited geographic distribution. Small populations can be more at risk of stochastic extinction events – random events such as fire, floods or disease that can wipe out an entire population. If populations are fragmented and intervening habitat destroyed, there is less chance that once a population goes extinct that animals will be able to move back into that area to rehabit it. Over time, small fragments of habitat have fewer and fewer species and complex ecological interactions may break down. Fragmented habitat may also allow greater access to predators such as cats and foxes, increasing the likelihood of predation.

Small populations may lose genetic variation through chance losses of alleles from one generation to the next. Genetic variation is the building block that evolution works from – the ability for species to evolve in response to changes in the environment is vital; especially in the current climate emergency. Population genetic analyses can inform management planning and can be designed to minimise the chance that *D. vescolineata* will lose whole populations and the unique genetic information present in each population – it's evolutionary potential (Frankham et al 2017). Additional surveys and genetic sampling (tail tips and shed skins) throughout the known and potential range of the species and genetic analyses of these samples is important to build on the initial genetic analyses undertaken by Mahony et al. (2022). This work was rigorous in determining that this species is distinct, but a larger sample size will be needed to determine whether there are different populations within the species and whether there is dispersal between these populations either historically or currently.

b. In your opinion, what research (including time requirements) is required to understand the species distribution, habitat requirements, and conservation status of this species?

I advise that a multi-year study of the species be undertaken to estimate population size and extent of occurrence at all the known sites. It will be necessary to survey over multiple years to determine the trajectory of the population – whether population numbers are increasing or decreasing over time. More accurate estimates of population size can be done by identifying individuals (allowing mark recapture analysis) – this was done successfully in *Delma impar* using photographs of head scale patterns (O'Shea 2005). This technique is likely to work for identification of individual *D. vescolineata* also. A focussed study on the known areas should include methods such as tile grids that give excellent survey results for Delma species without excessive disturbance of shelter sites (O'Shea 2005). A PhD project, which has a time frame of a minimum of 3 years (once a candidate and funding have been found) would be the *minimum* amount of time to gain this information. If funding was available, field programs could (and should) start sooner.

I recommend that additional tile surveys are carried out in potential habitat where the species has not yet been found to more accurately determine the geographic range of the species and how broadly distributed the species is within this area. Potential habitat can be identified using habitat models that look at the habitat types and climate for current sites in which *D. vescolineata* have been found and look for similar habitat and climate in the region. This work could be completed in approximately 12-18 months, depending on the number of potential sites identified. Tile transects will need to be laid out well in advance of the surveys to allow time for animals to begin using these retreat sites. This work is necessary to calculate the restricted range of *D. vescolineata* (calculated

by extent of occurrence and area of occupancy) and the proportion of distribution that is on protected land (e.g., NSW National Park estate), both needed for determining the Conservation status of the species. Surveys of potential habitat should also record key threats such as land clearing and fragmentation of habitat.

I recommended that genetic material be collected (tail tips from all captured animals plus any shed skins found under tiles) and additional population genetic work undertaken expanding the SNP genotyping undertaken by Mahony et al (2022) to determine whether there is evidence of connectivity among current sites or whether sites need to be managed separately. Management of the species should ensure there is habitat connectivity to facilitate dispersal and to monitor for inbreeding that can occur in small, isolated populations. SNP analyses are undertaken in batches of 96 samples, so are best done at the completion of field programmes. DNA extractions and genetic analyses will require approximately 6-12 months, depending on the previous expertise of the researchers and may be completed as part of the PhD program.

It is not clear how many sites this species is present at, but this information is vital for conservation assessments. *D. vescolineata* are currently known from a maximum of 6 locations, with no information about local abundance at any of these sites or whether there is dispersal between adjacent sites. It appears to be unlikely between the north and south Muswellbrook sites as the Hunter River runs between the areas. I do not know whether The Hunter River runs all year round. If it dries up regularly there is potential for lizards to disperse across stream beds.

If the location of all known and potential sites in which the species has been identified are included, and a polygon drawn around each location in Google Earth, the maximum known area of the species is currently 955km². The area of occupancy is likely to be considerably less than this, however widescale surveying of potential habitat will be required to determine this.

A species with a geographic range of this area would most likely fall under the category of Endangered (B. Geographic Range) as listed in V. THE CRITERIA FOR CRITICALLY ENDANGERED, ENDANGERED AND VULNERABLE:

"Extent of occurrence estimated to be less than 5,000 km², and estimates indicating at least two of a-c: a. Severely fragmented or known to exist at no more than five locations. b. Continuing decline, observed, inferred or projected, in any of the following: (i) extent of occurrence (ii) area of occupancy (iii) area, extent and/or quality of habitat (iv) number of locations or subpopulations (v) number of mature individuals" IUCN RED LIST CATEGORIES AND CRITERIA Version 3.1 Second edition ([RL-2001-001-2nd.pdf \(iucn.org\)](http://iucn.org).)"

c. What conditions could be recommended to ensure the impacts on the species are managed appropriately, bearing in mind the conditions proposed by the proponent.

Due to the limited population distribution of this species and the high possibility that it will be classified as Endangered due to its extremely limited distribution, I would strongly recommend that the precautionary principle is applied in this situation and there is no clearing and habitat destruction in the range of the species until the extent of the species has been determined with appropriate focussed surveys. There is the potential that the Mount Pleasant Extension area covers the majority of one of only 6 sites at which this species exists. A focussed survey for this species should be undertaken across the entire Mount Pleasant Optimisation Project and adjoining habitat

to determine the extent of the distribution of *D. vescolineata* in the Mount Pleasant area. It is important to determine whether the species is present in the Relinquishment area as well as the known location in the Project Extension area.

The importance of the Mount Pleasant population will be best understood in the context of the entire species, so I would recommend that no clearing and habitat destruction occurs before the completion of the suggested PhD project and broader distribution surveys, including genetic analysis of populations. Looking at the genetic diversity present within each population and how it connects to other populations across the landscape are important to managing and maintaining the evolutionary potential of the species to ensure that it persists into the future.

To reduce the chance of inbreeding of small, isolated populations, care should be taken during any land clearing that occurs that there are corridors of habitat left uncleared to facilitate ongoing migration between remaining habitat fragments. Connecting corridors between habitat fragments to allow natural migration may help to mitigate loss of genetic diversity in any small remaining populations.

There has been considerable research on habitat restoration in *Delma impar*, some of which may be relevant to *D. vescolineata*. Scroggie et al (2019) found that *D. impar* can persist in the face of fire and grazing and may be benefited by this grassland habitat disturbance in some cases, but that intense and concurrent instances of both disturbances triggered population collapse in small, isolated populations. This may be relevant if there is a requirement to restore habitat for *D. vescolineata*. The collapse of small populations may occur when there are no connecting areas from which individuals may recolonise. If there is to be potential for habitat restoration, there should be patches of habitat retained adjacent to cleared areas and habitat corridors through which individuals can recolonise. Habitat restoration may also be facilitated by the presence of artificial refuges, but additional research is needed to determine the habitat preferences of *D. vescolineata*.

As a note, the Victorian Department of Environment Land Water and Planning no longer recommend ad hoc salvage translocations of *Delma impar* to neighbouring sites to mitigate against habitat destruction during approved land clearing. I also do not recommend this as there is little evidence to support the survival of salvaged animals in adjoining areas. There is an additional risk of introducing disease or parasites into populations with the salvaged animals. Unless there is good evidence that salvage translocations are successful, including long term monitoring of the salvaged individuals, it is, in my opinion, an exercise in making proponents feel better about destroying habitat and is not of proven benefit to the salvaged animals (see Menkhorst et al. 2016). Any translocations should be carefully managed for conservation benefit such as increasing genetic diversity.

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Dr Joanna Sumner

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I have been involved in the fields of molecular ecology, population genetics, phylogeography and conservation biology for 25 years. I love both field-based and lab-based research and the way they complement each other so well.

I joined Museum Victoria in 2006 as an ARC postdoctoral researcher and started my current position as Manager of Genetic Resources in 2007. I manage the Ian Potter Australian Wildlife BioBank and the DNA research laboratories. I have continued my research on topics ranging from conservation genetics of alpine skinks to identifying the components of snake venoms.

QUALIFICATIONS

2002 PhD University of Queensland, Australia. Thesis entitled: "Ecology and genetic diversity of the prickly forest skink (*Gnypetoscincus queenslandiae*) in a fragmented habitat." Dean's Award for Outstanding PhD Thesis

1993 B.Sc. 1st Class Honours University of Sydney, Australia. Thesis entitled: "Distribution and identity of species in the *Antechinus stuartii* – *A. flavipes* group (Marsupialia: Dasyuridae) in south-eastern Australia".

1990 – 1992 Bachelor of Science University of Sydney, Australia (Terrestrial Ecology and Genetics).

EMPLOYMENT

2017 – ongoing: Senior Manager of Genetic Resources, Museum Victoria.

2019-2021 (part-time in conjunction with employment): Homeward Bound leadership course: global leadership initiative for women in STEMM.

2008 – 2017: Manager of Genetic Resources, Museum Victoria.

2011-2013: Deputy Head, Terrestrial Sciences Department, Museum Victoria

2006 - 2008: ARC Postdoctoral Fellow: Testing Theories of Historical Divergence using South-Eastern Australian Reptiles.

Mar - Dec 2005: Honorary Fellow, University of Wollongong.

Oct 2002 – Feb 2005: Part-time Research Associate Zoological Society of San Diego.
Komodo Dragon Project, Indonesia.

Dec 2004 – Jan 2005: Consultant WWF - Indonesia, Marine Turtle Research.

Aug – Sep 2004, Nov 2002 – Jan 2003: Consultant WWF - Forests for Life, Asia Pacific Program.

Feb - Apr 2002: Senior tutor / Laboratory coordinator, University of Queensland.

Jan – Jun 1999: Research Assistant for Dr Nancy FitzSimmons, University of Queensland / University of Canberra.

Jul 1995 – Aug 2001: PhD. candidate, University of Queensland.

Jul 1995 – Dec 1999: Casual tutor, University of Queensland and University of Sydney.

Dec 1993 - Apr 1995: Research assistant for Prof. Richard Shine, University of Sydney.

PROFESSIONAL EXPERIENCE AND SOCIETY MEMBERSHIP:

2017-2022: member IUCN SSC Skink Specialist Group

2012-2022: Committee member, Victorian Dept. of Environment, Land, Water and Planning, Threatened Native Faunal Translocation Evaluation Panel

2018-22: member The Society for the Preservation of Natural History Collections

2016-7: Board Member, Deakin University, School of Life and Environmental Sciences, Life Sciences Advisory Board

2016-20: Treasurer, Australian Society of Herpetologists

2015: Steering Committee, FaunaBANK, FAUNA research Alliance

2015: Vice-president, Australian Society of Herpetologists

2014: President, Australian Society of Herpetologists

2012-2015: Australian Barcode of Life Network Steering Committee member

GRANTS, PRIZES AND AWARDS

2022-2024: ARC Discovery Grant: Impacts of Quaternary climate change on shaping past reptile and frog communities along a 3000km latitudinal gradient, from the Australian tropics to the temperate south. \$549,841

2021-22: BioPlatforms Threatened Species Initiative: Corangamite Water Skink Conservation Genomics

2020-2022: Bioplatforms Australian Amphibian and Reptile Genome (AusARG) Program: Population genomics and species distribution of *Egernia* skinks in Bushfire affected areas.

2020-2022: Ian Potter Foundation Grant: Impacts of fire on reptiles and invertebrates in the Little Desert: developing evidence-based management strategies \$300 000

2019: McCoy Seed Grant: Testing thermal imaging drones for detecting a critically endangered bird \$20 000

2018-2020: ARC Linkage Grant: Ecology, morphology and diversification of Australian lizards \$348 000

2016-2020: Oz Mammal Genome Initiative \$1 000 000

2016-2019: ARC Linkage Grant: Co-evolutionary Processes Driving Venom Diversity in Tiger Snakes \$164 000

2016: McCoy Seed Grant: Wildlife Pathogen Collection \$19 179

2014: McCoy Seed Grant: Victorian Venom Bank \$17 986

2007: ARC Futures Networks Early Career Researchers Phylogeography and Coalescence Workshop \$15 000

2006-2008: ARC Postdoctoral Fellow DP0663875: Testing Theories of Historical Divergence using South Eastern Australian Reptiles \$318 000

2002: Dean's Award for Outstanding PhD Thesis, University of Queensland

1999: Rainforest CRC Research Support Scheme, UQ \$7400

1999: University of Queensland Postgraduate Travel Grant \$5000

1996-1999: Dept. of Zoology, UQ postgraduate conference grants \$300 each year

1996: Student Travel Award: Australian Society of Herpetologists, UQ \$200

1995-1998: Australian Postgraduate Award to undertake PhD research

PUBLICATIONS AND CONFERENCE PRESENTATIONS

Book Chapter

FitzSimmons, N. and **Sumner, J.** (2016) Genetics in Field Ecology and Conservation. Pp 352-369 in: C.K. Dodd, Jr. ed. *Reptile Ecology and Conservation*, Oxford University Press, UK.

Book Review

Sumner J (2019) Reptiles of Victoria: A Guide to Identification and Ecology by Peter Robertson and A. John Coventry for *Herpetological Review*, 50(4), 824–825.

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44. Tasoulis T, Wang R, **Sumner J**, Dunstan N, Pukala TL, Isbister, GK (2022) The unusual metalloprotease-rich venom proteome of the Australian elapid snake *Hoplocephalus stephensii*. *Animal Toxins*, 14(5), p.314.
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