# Faunal Compliance Statement

## Project name: BER799: Sunveld Energy PV Development, Velddrif, Western Cape Province

**Compiled for: Cape Environmental Assessment Practitioners (Pty) Ltd (Cape EAPrac)**

**Applicant: Sunveld Energy (Pty) Ltd**

Sunveld Energy

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# Report Information

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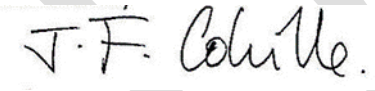
Jonathan Colville of Terrestrial Ecologist & Faunal Surveys has over fourteen years post-PhD experience in the fields of terrestrial ecology, including investigating the spatial patterns of South Africa's animal and plant diversity. Between 2009 and 2019, Jonathan was involved with the South African National Biodiversity Institute's (SANBI) Biodiversity, Research, Assessment and Monitoring Division (BRAM) undertaking ecological research on South Africa's animal and plant diversity. Since 2020 Jonathan has been operating as a specialist faunal consultant for EIAs and conservation projects. A detailed CV is provided below in Appendix 1.

**Signed Statement of Independence:**

In terms of Chapter 5 of the National Environmental Management Act of 1998 (Act No. 107 of 1998), as amended, and the Environmental Impact Assessment Regulations, 2014, specialists involved in Environment Assessment Processes must declare their independence and provide their contact details, relevant experience, and a curriculum vitae.

I, Jonathan F. Colville, as the appointed independent specialists, do hereby declare that I am financially and otherwise independent of the client and their EAP, and that all opinions expressed in this document are my own and based on my scientific and professional knowledge, and available information.



Jonathan F. Colville

## Conditions Pertaining to this Report

The content of this report is based on my best scientific and professional knowledge, and available information. Jonathan Colville reserves the right to modify the report in any way deemed fit should new, relevant, or previously unavailable or undisclosed information becomes known to him from on-going research or further work in this field, or pertaining to this investigation, and he will inform Cape EAPrac accordingly. This report must not be altered or added to without the prior written consent of Jonathan Colville. This also refers to electronic copies of the report, which are supplied for the purposes of inclusion as part of other reports, including main reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must refer to this report. If these form part of a main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.

# Introduction

Cape EAPrac has been engaged by Sunveld Energy (PTY) LTD `to undertake a Basic Assessment for a proposed Sunveld Energy PV Development (Farm Doornfontein, Velddrif, Western Cape Province).

Cape EAPrac utilised the National Web based Environmental Screening Tool (https://screening.environment.gov.za/screeningtool/) to generate an online site sensitivity report. The screening tool uses faunal species data provided by the South African National Biodiversity Institute (SANBI).

The Screening Tool rated the development footprint of the above project as of "**Medium**" sensitivity for an invertebrate Species of Conservation Concern (SCC), with possible suitable habitat for:

- Dung beetle (*Pachysoma aesculapius*): Medium

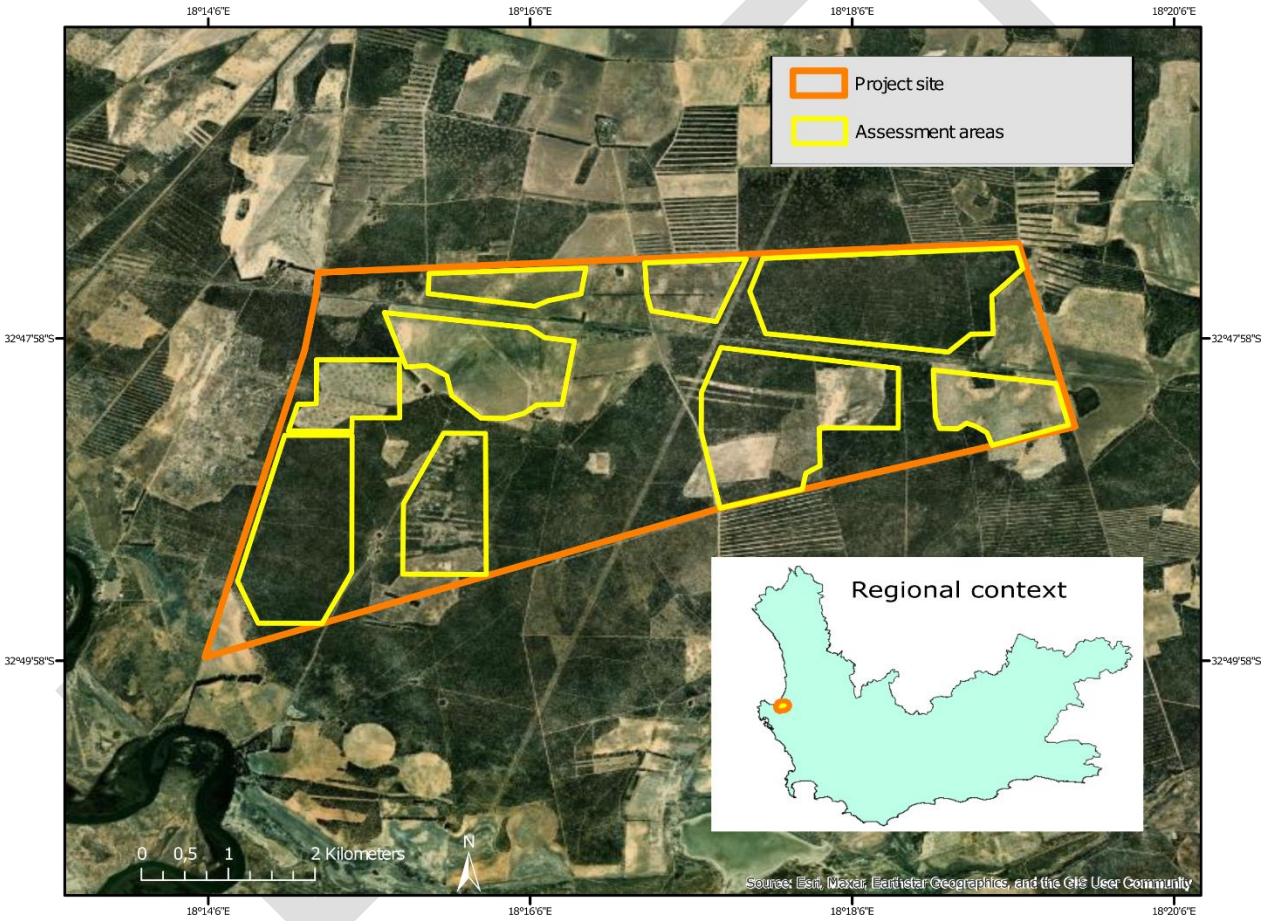



**Figure 1: Location of the proposed development area, and its regional context in the Western Cape Province.**

# Terms of Reference

I, Jonathan Colville, was appointed by Cape EAPrac on 14 December 2022 to conduct a site sensitivity verification in two phases, a desktop study, and a site visit to assess the possibility of suitable available habitat for the dung beetle SCC at the project site. Based on the information obtained from these two phases, either a Terrestrial Animal Species Compliance Statement would

then be issued, or a Terrestrial Animal Species Specialist Assessment would subsequently be required, as stipulated in the Government Gazette, No. 43855 (Published in Government Notice No. 1150) of 30 October 2020: "Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Animal Species".

1. Carry out a desktop study to determine if the beetle SCC has been recorded at or near the project area and to ascertain the habitat requirements of the SCC.
2. Conduct a site visit of the project area to assess the physical and biological characteristics of the site with regards to habitat suitability for the beetle SCC and identify any sensitive areas, buffer zones, no-go areas, and possible alternatives.
3. Prepare a report detailing the findings of the desktop study and site visit, with conclusions and the issuing of a Terrestrial Animal Species Compliance Statement or a recommendation that a Terrestrial Animal Species Specialist Assessment would be required.

## Assumptions and Limitations

The following limitations and assumptions apply to this assessment:

- It is assumed that all third-party information used (e.g. GIS data and species historical records) was correct at the time of generating this report.
- A one-day site visit was undertaken during spring on a warm and sunny day. Undertaking a site visit in spring is seasonally a suitable time of the year to detect the listed beetle SCC at the project site (Davis, 1987; South African National Biodiversity Institute (SANBI), 2020).
- Not all parts of the project site were accessible due to locked farm gates; these areas were accessed using a visual assessment of the habitat form the perimeter looking into the project area.

## Site Sensitivity Verification

The screening tool indicated "**Medium**" sensitivity for the beetle SCC. Considering the known habitat preferences for the SCC species, it is the opinion of the specialists that the project area ranges from **Low to High sensitivity**; several areas representative of natural vegetation are considered **High and Medium to High sensitivity** and should ideally be excluded within the development footprint. The nature of the site and its suitability as habitat for the beetle species is discussed in the remainder of the report. The **High** sensitive areas are indicated in the figures below, and shown on a constraints map.

## Methodology

The methodology used in this report, including a background desktop study and site visit, is outlined in the subsections below.

### Desktop Study

- Distributional records for the beetle SCC were extracted from digitized databases of several South African museums (e.g., Iziko Museum of South Africa, Ditsong National Museum of Natural History, South African National Collections of Insects).
- Online resources, such as the IUCN Red List of Threatened Species (https://www.iucnredlist.org/), iNaturalist (https://www.inaturalist.org/), and GBIF (https://www.gbif.org/) were also consulted for information on geographic distributions and habitat requirements for listed invertebrate SCC.
- Published information on the beetle SCC was investigated to further assess its distribution range, ecology, habitat, and any life history requirements.

### Site Visit

- The project area (Figure 1) was surveyed on 07 September 2023 to assess habitat quality, in terms of the type and amount of natural vegetation remaining. The extent of disturbance that the project area has experienced, in terms of changes to its vegetation and physical properties (e.g. soil) was also considered.
- Season: Spring.
- Areas at and around selected points on the track surveyed by the specialists were investigated across the project area and photographed (Figure 5 - 24).
- At each sample point the habitat was characterised, photographs were taken, and evidence of key habitat features, and activity related to the SCC were recorded.
- Seasonal Relevance: For the beetle SCC, spring is an ideal time for detection (Davis, 1987; South African National Biodiversity Institute (SANBI), 2020).

## Results

### Desktop Study

The main vegetation types (SANBI, 2018; Skowno *et al.*, 2019) (Figure 2) found at the project site is:

- Saldanha Flats Strandveld (**Endangered**)
- Hopefield Sand Fynbos (**Least Concern**); borders the project area.

The project area bisects fragments of both natural vegetation and areas of habitat that have been moderately to heavily transformed over several decades (Figure 3). Most of the project area falls across an ecosystem type with a South African Red List of Ecosystems Status of **Endangered** and that still retain their natural extent (Figure 4) (South African National Biodiversity Institute and Department of Forestry, 2021).

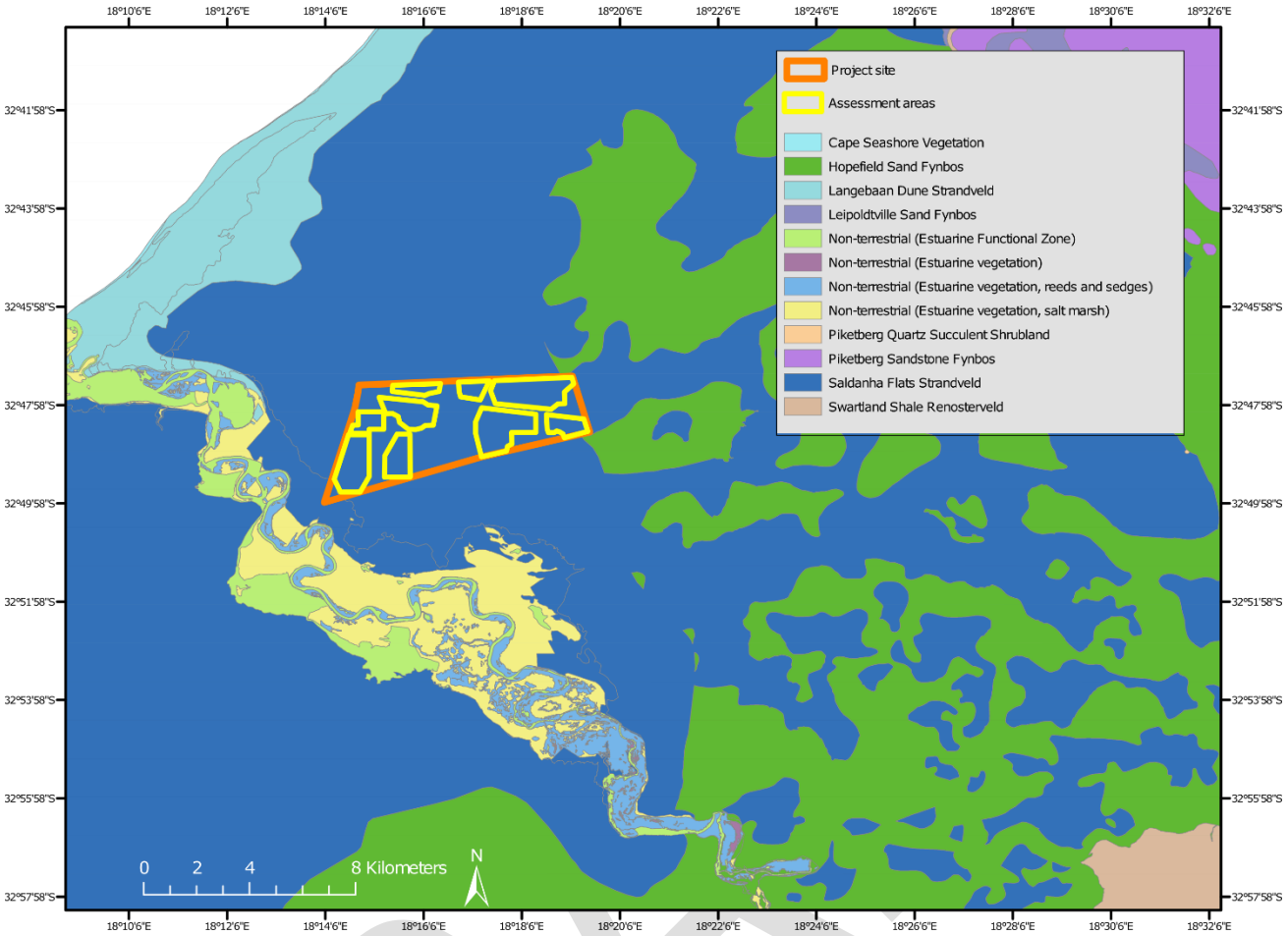



**Figure 2: The vegetation types found at, and bordering, the project area (SANBI, 2018; Skowno et al., 2019).**

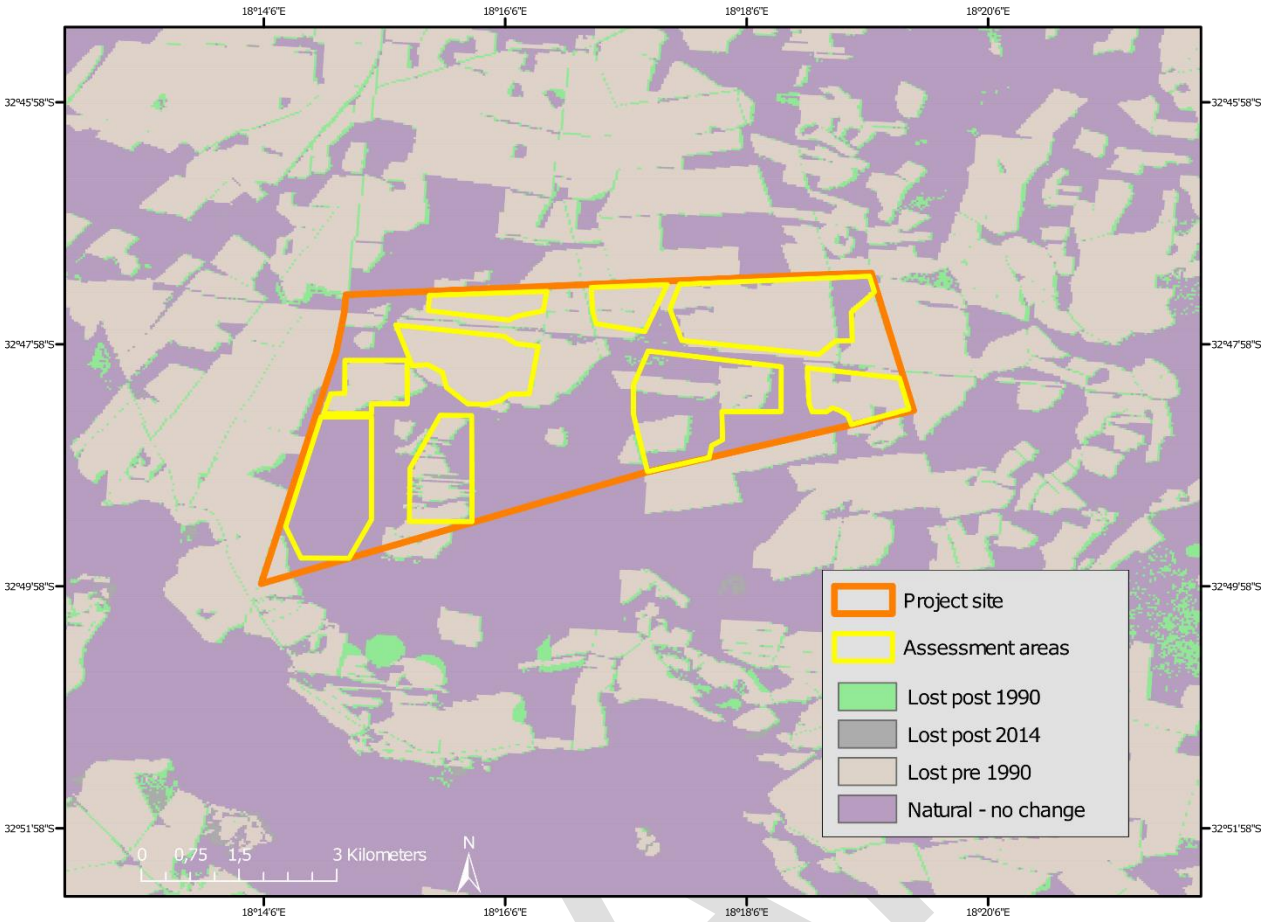



**Figure 3: Land cover derived terrestrial habitat change layer showing that areas of natural vegetation are still founded across the project site. Areas of natural vegetation that have been transformed where altered pre-1990 (Skowno, 2020).**

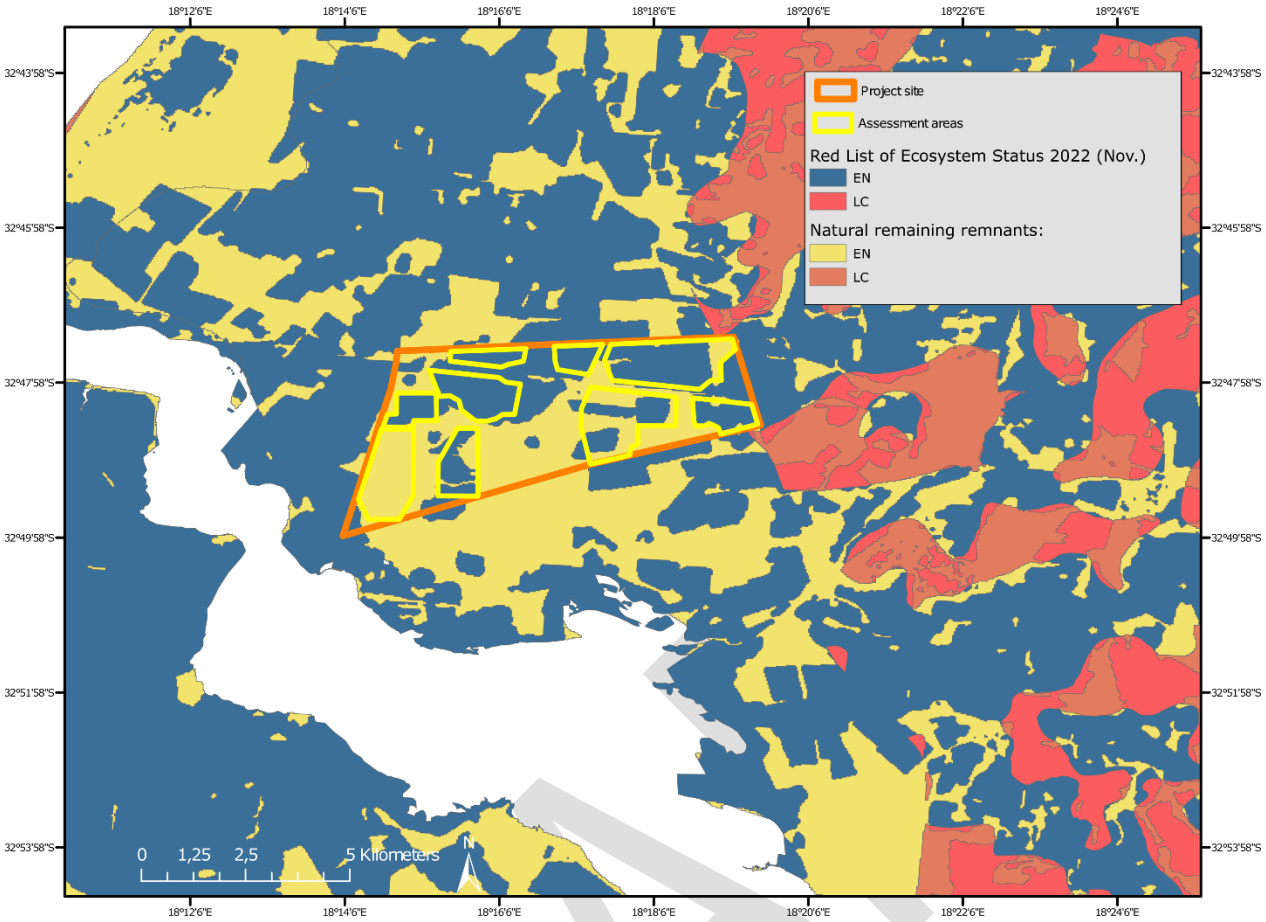



**Figure 4: Red List of Ecosystems Status for the terrestrial realm of South Africa and the current remaining natural extent (ca. 2018) of an ecosystem type (South African National Biodiversity Institute and Department of Forestry, 2021). (EN = Endangered; LC = Least Concern).**

## Invertebrate Species of Conservation Concern

- *Pachysoma aesculapius (Olivier, 1789) (Dung beetle)*
- This species of flightless dung beetle is endemic to South Africa and restricted to low-altitude areas (>300m) of the south-western parts of the Western Cape Province (Harrison, Scholtz and Chown, 2003).
- Its estimated EOO extends across the project area.
- A historical collection record from 1973 for *P. aesculapius* is known from the north-eastern part of the project (see constraints map below).
- It has an IUCN Red List Category and Criteria of Vulnerable B1ab (ii,iii)+2ab(ii,iii) (Davis, 2013).
- *Pachysoma aesculapius* is a large-sized, day-active, flightless dung beetle that preferentially collects dry dung pellets, but will also collect plant detritus, which it carries to a permanent burrow (Harrison, Scholtz and Chown, 2003; Davis, 2013; Holter and Scholtz, 2013). It is associated with sandy habitats, particularly "…the firm deep sand of coastal hummocks, riverbanks and vegetated dunes" of the south-western Cape.
- Historical collection records indicate that this species is associated with several types of Sand Fynbos (Leipoldtville Sand Fynbos, Atlantis Sand Fynbos, and Hopefield Sand Fynbos). It has a limited range, extending from Cape Town northwards to the mouth of the Olifants River

(Harrison, Scholtz and Chown, 2003; Davis, 2013). Southern populations near Cape Town and Somerset West are considered extinct (Harrison, Scholtz and Chown, 2003).

- Owing to its flightlessness, and that it appears to occur at low population densities, the species is thought to be highly susceptible to local disturbance (Harrison, Scholtz and Chown, 2003; Davis, 2013). Harrison et al. (2003) consider *P. aesculapius* as the most threatened South African species of *Pachysoma* dung beetle.

## Site Visit

- The weather was warm and sunny, conducive to insect activity.
- The site was investigated spanning the proposed development areas (Figure 5- Figure 24).
- Habitat characteristics and likelihood of the SCC beetle being found around each picture site is given below.

**Figure 5. Areas of natural Saldanha Flats Strandveld, as seen here at the north-western of the project site, are considered as high sensitivity for the dung beetle SCC [GPS: S32.799797 E18.252735].**

**Figure 6.** In contrast to Figure 5 above, large areas of disturbed habitat (previously ploughed) are considered as low sensitivity for the dung beetle SCC and these areas are more suitable for the placement of solar panels. [GPS: S32.802668 E18.247964].

**Figure 7. Further example of areas of low sensitivity areas; a large area (~5 km²) of heavily disturbed habitat (previously ploughed) is found at the southern parts of the project site [GPS: S32.798968 E18.270526].**

**Figure 8. Some areas of the project site have been recently ploughed; these areas are unsuitable for the dung beetle SCC [GPS: S32.7975 E18.26046].**

**Figure 9. Ploughed fields have essentially lost almost all the habitat requirements of the dung beetle SCC and are considered as low sensitivity. As the dung beetle SCC is flightless, the high mechanical disturbance of ploughing would constitute a direct impact on any adult beetles active on the surface, and on their larvae which are found in nesting burrows in the soil from depths between 30 to 60 cm. [GPS: S32.79675 E18.26046].**

**Figure 10.** Several large areas of natural vegetation at the project site offer ideal habitat for the dung beetle SCC, such as an intact plant community, undisturbed soil, and dung resources [GPS: S32.80993 E18.25867].

**Figure 11. Areas of natural vegetation at the project site support a rich community of other insects, such as this Western Cape endemic species of monkey beetle (*Scelophysa trimeni*). Five other South African endemic monkey beetle genera (*Pachycnema*, *Chasme*, *Lepithrix*, *Stigmatoplia*, and *Clania*) were recorded at the project site. [GPS: GPS: S32.80993 E18.25867].**

**Figure 12. Other Western Cape endemic insects that were seen in the areas of natural veld included oil-Collecting bees (Melittidae: *Rediviva*) that collect floral oil from the pink flowers of *Diascia* (Scrophulariaceae), as seen in this picture. (Also note the dung resource that would be utilised by the dung beetle SCC). [GPS: S32.81685 E18.2547].**

**Figure 13.** Large areas of natural vegetation habitat that are considered as high sensitive for the dung beetle SCC are found in the south-western parts of the project site; these should ideally be excluded from the development [GPS: S32.81685 E18.2547].

**Figure 14. Large areas of natural vegetation are found in the south-western areas of the project site; these areas offer ideal habitat for the dung beetle SCC [GPS: S32.82476 E18.24967].**

**Figure 15. Areas of natural vegetation habitat likely support a range of other faunal groups, such as this angulate tortoise (*Chersina angulata;* Least Concern) [GPS: S32.82476 E18.24967].**

**Figure 16. Areas of natural vegetation habitat at the southern corner of the project site, looking eastwards into project site. This area is of high sensitivity for the dung beetle SCC (*Chersina angulata;* Least Concern) [GPS: S32.82287 E18.23762].**

**Figure 17. The north-western areas of the project site on the north side of the R399 are heavily transformed areas (wheat fields) of low sensitivity. [GPS: S32.79623 E18.25836].**

**Figure 18. The north-central areas of the project site on the north side of the R399 are heavily transformed areas (previously ploughed fields) of low faunal sensitivity. This area abuts an area of medium to high sensitivity to the east [GPS: S32.79617 E18.28035].**

**Figure 19.** The north-central areas of the project site on the south side of the R399 are also heavily transformed areas (recently ploughed fields) of low faunal sensitivity. [GPS: S32.79617 E18.28035].

**Figure 20. Natural areas just beyond the north-central parts of the project site, on the south side of the R399, are considered as medium to high sensitivity for the dung beetle SCC (see constraints map below). [GPS: S32.79952 E18.2876].**

**Figure 21. Natural areas near the north-eastern parts of the project site, on the south and north side of the R399, are considered as medium to high sensitivity for the dung beetle SCC. These areas are under threat from invasive alien trees (*Acacia cyclops*) (see constraints map below). [GPS: S32.79952 E18.2876].**

**Figure 22. Natural areas near the north-eastern parts of the project site are under threat from invasive alien trees (*Acacia cyclops*). [GPS: S32.79952 E18.2876].**

**Figure 23.** Natural areas near the north-eastern parts of the project site show some previous disturbance and are considered as medium to possible high sensitivity, considering that they still contain many habitat features suitable for the dung beetle SCC. [GPS: S32.80191 E18.31165].

**Figure 24. The area in the south-eastern corner of the project site is heavily disturbed (previously ploughed) as is considered as low sensitivity. [GPS: S32.80191 E18.31165].**

## Constraints Map

Based on the available ecosystem-level data for habitat and important biodiversity areas and from the habitat assessment during the field site visit, the following constraints map showing areas of **Low, Medium to High, and faunal sensitivity** was produced for the project site (Figure 25).

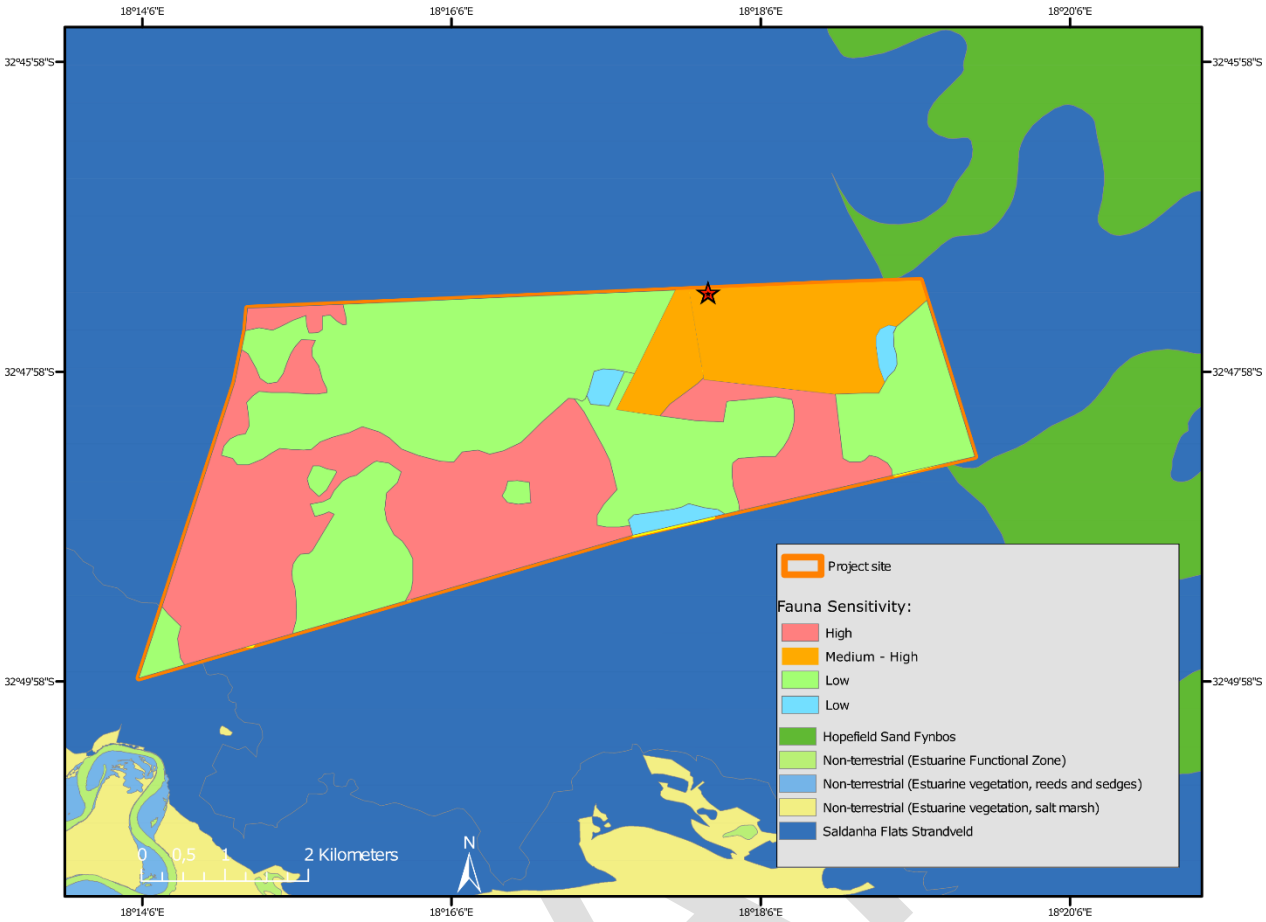



**Figure 25. Constraints map for the project area showing areas of potentially High to medium faunal sensitivity (pale red and orange) based on areas of intact vegetation; areas falling outside of these are considered Low sensitivity (green and pale blue) and ideally the development should be focussed within these areas. (The red star indicates a known historical collection record for the SCC from the project site).**

## Conclusions

- This statement concerning the Terrestrial Animal Species Compliance Statement is applicable to the project area shown in Figure 1, and as described in the documentation provided to me by Cape EAPrac.
- Based on the available information on the SCCs' distribution, its known habitat preferences, the transformed habitat of some sections of the project development area, it is considered that the project will be of **medium–low sensitivity** for the faunal SCC assessed, and overall **low** sensitivity if areas of high sensitive natural vegetation can be excluded from the development.
- There is a very high likelihood that the dung beetle SCC occurs at the project site. There is a historical collection record for the dung beetle from the project area, and the project area has remnant patches (high and possible medium to high sensitive areas on the constraints map) of natural habitat that would support the dung beetle.
- Areas that have been heavily disturbed and transformed (low sensitive areas on the constraints map) are unlikely to support populations of the dung beetle and these areas should be the focus of development.

- Habitat loss is considered one of the main threats faced by the SCC. The proposed development will occur in a broader area within a mosaic of vegetation and soil habitat that is highly fragmented and disturbed through agriculture.
- With the increase in renewal energy (and mining) projects earmarked for the west coast area and overlapping the SCC's known distribution, the cumulative negative impact on the long-term viability of the populations of the SCC and its persistence is a concern.
- Solar energy farms appear to have the potential to retain natural vegetation and promote biodiversity (e.g. Nordberg and Schwarzkopf, 2023). However, the impact of microclimate changes and shading impacts on the dung beetle SCC's larval stage and adult's navigational abilities is not known at this stage and a precautionary approach should be taken. Therefore, areas of high sensitivity should ideally be excluded from development.
- Within the proposed development, areas of sensitivity are associated with:
    - Intact areas of natural vegetation that offer the correct vegetation and soil type, dung resources, and associated habitats for the SCC. These areas should ideally be avoided as part of the development. [*The botanical specialist has also flagged similar areas as high sensitivity]. In addition, during the site visit, the areas of natural vegetation contained a highly rich insect community, with numerous endemic species of pollinating insect, including species of monkey beetle and oil-collecting bees. It is highly likely that these areas would support several other endemic species of insect, such as
    - All invasive alien plants should be cleared from the remaining areas of natural vegetation and a management and monitoring plan should be implemented as part of the EMPr for the project. Alien invasive alien plants are seen as a threat to the habitat of the SCC (Davis, 2013)
- If the above concerns can be accommodated, then this compliance statement of low sensitivity will hold.

## Mitigation Measures

- If the development does go ahead, and even if it is restricted to the low sensitive areas, then the following mitigation measures should still be considered:

- Because the SCC is considered to naturally occur in low population numbers and is thought to be potentially the most endangered of South African *Pachysoma* species (Harrison, Scholtz and Chown, 2003; Davis, 2013), possible mitigation measures should be considered during the construction and operational phases.
- Ideally the construction phase should be done in winter, on the premise that adult activity of the SCC is lowest during this season. However, this may not be feasible in terms of the proposed development timelines.
- Clearing of natural habitat (e.g. for fire breaks) should ideally be done between 09h30 and 13h30 to avoid the morning and late afternoon peak adult activity periods of the SCC.
- Related to the above point, and if possible, manual methods (e.g. hoeing or hand-pulling) to clear fire breaks, etc. of natural vegetation should be used in order to limit the possibility of killing individuals of the SCC and undue soil disturbance. The SCC's burrows are estimated between 30 – 60m cm deep.
- Small to large trenches, holes, and/or pits dug during the construction phase should not be left open for more than 24 hrs; these act as natural pitfall traps for the SCC (and other invertebrates). If trenches, holes, etc., need to be left open for a longer period, then a very

steep/upright soil embankment (~ 30 cm high) should be built around them to act as a barrier.

- Information boards about the SCC and road signs (examples given below) warning of beetles crossing roads should be used to inform construction personal and warn vehicles. Vehicles should also adhere to a low-speed limit (<30km/h) on the project site.

- Related to the above point, toolbox talks to site personnel will help ensure that they are aware of the SCC and mitigation measures.
- Existing dirt and tarred roads should be used wherever possible.
- Compacting/hardening of the sandy soils of the project area should be avoided.
- Vehicles should adhere to demarcated roads and off-road driving should not be allowed.
- All temporary/permanent fences will need a bottom section of mesh of sufficient size (at least 5cm by 5cm) to allow beetles to move freely through and all fence mesh must be flush at ground level, as seen in the picture to the right.

- Any alien vegetation found on the project area should be removed during the construction phase, as invasive alien plants are seen as a threat to the habitat of the SCC (Davis, 2013).

## Acknowledgments

CapeNature is thanked for collecting permits: CN44-87-20545 and CN44-59-13497.

## References

Davis, A. L. V. (1987) 'Geographical distribution of dung beetles and their seasonal activity in south-western Cape Province.pdf', *J. ent. Soc. sth. Afr*, 50(2), pp. 275–285.

Davis, A. L. V. (2013) *Pachysoma aesculapius. The IUCN Red List of Threatened Species 2013: e.T137321A523186*. Available at: https://dx.doi.org/10.2305/IUCN.UK.2013-2.RLTS.T137321A523186.en.

Harrison, J. du G., Scholtz, C. H. and Chown, S. L. (2003) 'A revision of the endemic south-western African dung beetle subgenus scarabaeus (pachysoma) macleay, including notes on other flightless scarabaeini (Scarabaeidae: Scarabaeinae)', *Journal of Natural History*, 37(3), pp. 305–355. doi: 10.1080/713834683.

Holter, P. and Scholtz, C. H. (2013) 'Elongated hindguts in desert-living dung beetles (Scarabaeidae: Scarabaeinae ) feeding on dry dung pellets or plant litter', *Journal of Morphology*, 274(6), pp. 657–662. doi: 10.1002/jmor.20123.

Nordberg, E. J. and Schwarzkopf, L. (2023) 'Developing conservoltaic systems to support biodiversity on solar farms', *Austral Ecology*, 48(3), pp. 643–649. doi: 10.1111/aec.13289.

SANBI (2018) 'South African National Biodiversity Institute (2006- 2018)', in Mucina, L., Rutherford, M.C.

and Powrie, L. W. (ed.) *The Vegetation Map of South Africa, Lesotho and Swaziland*. Version 20. Available at: http://bgis.sanbi.org/SpatialDataset/Detail/18.

Skowno, A. L. *et al.* (2019) *South African National Biodiversity Assessment 2018 Technical Report Volume 1: Terrestrial Realm. South African National Biodiversity Institute, Pretoria. http://hdl.handle.net/20.500.12143/6370*.

South African National Biodiversity Institute (SANBI) (2020) *Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa. South African National Biodiversity Institute, Pretoria. V*.

South African National Biodiversity Institute and Department of Forestry, F. and the E. (2021) *Red List of Terrestrial Ecosystems of South Africa June 2021 – version for public comments. South African National Biodiversity Institute. Pretoria, South Africa*.

# Appendix-1 – CV Jonathan Colville

## CURRICULUM VITAE – JONATHAN F. COLVILLE

### EDUCATION

**PhD (Zoology):** University of Cape Town, 2009. Thesis title: "*Understanding the evolutionary radiation of the megadiverse monkey beetle fauna (Scarabaeidae: Hopliini) of South Africa*".

**Postdoctoral research fellowship:** South African National Biodiversity Institute, 2009-2010.

### PRIOR EMPLOYMENT

**National Research Foundation Research Career Advancement Fellow**: South African National Biodiversity Institute (2014-2019).

**Researcher**, South African National Biodiversity Institute, GEF/UNEP/FAO Global Pollination Project – South Africa (2010-2014).

### PUBLICATIONS

**Books edited:**

- Allsopp, N., **Colville, J.F.**, Verboom, G.T. (2014). *Fynbos: Ecology, Evolution, and Conservation of a Megadiverse Region* (16 chapters; pp 1-377). Oxford University Press.

**Book chapters:**

- Forest F., **Colville J.F.**, Cowling R.M. (2018). Evolutionary diversity patterns in the Cape Flora of South Africa. In: *Phylogenetic Diversity: Applications and challenges in biodiversity science*. R. Scherson, D. Faith (Eds), Springer International Publishing.
- Lebuhn, G., Connor, E.F., Brand, M., **Colville, J.F.**, Keday, D., Resham, B.T., Muo, K., Ravindra, K.J. (2015). Monitoring pollinators around the world. In: *Pollination services to agriculture*. B. Gemmill-Herren (Ed), Routledge.
- **Colville, J.F.**, Potts, A.J., Bradshaw, P.L., Measey, G.J., Snijman, D., Picker, M.D., Procheş, Ş., Bowie, R.C.K., Manning, J.C. (2014). Floristic and faunal Cape biochoria: do they exist? In: *Fynbos: Ecology, Evolution, and Conservation of a Megadiverse Region*. N. Allsopp, J.F. Colville, G.A. Verboom (Eds), Oxford University Press.

- Lach, L., Picker, M.D., **Colville, J.F.**, Allsopp, M.H., and Griffiths, C.L. (2002). Alien invertebrate animals in South Africa. In: *Biological invasions*: *Economic and environmental costs of alien plant, animal, and microbe species*. D. Pimentel (Ed), CRC Press, London.

**Journal articles:**

- Barraclough, D.A., and **Colville, J.F**. (2022). The first species of Nemestrinidae (Diptera) endemic to Madagascar: A remarkable new species of *Atriadops* Wandolleck, 1897. *Zootaxa*. 5196 (1): 145–150.
- Dombrow, H., **Colville, J.F**., Bowie, R.C.K. (2022). Review of the genus *Amblymelanoplia* Dombrow, 2002 (Coleoptera: Scarabaeidae: Melolonthinae: Hopliini) with the description of ninety-three new species from South Africa and observations on its biogeography and phylogeny. *Zootaxa*. 5163 (1): 1-278.
- Melin, A., and **Colville, J.F**. (2022). Description of the male of *Rediviva steineri* Kuhlmann 2012 (Hymenoptera: Melittidae), an endemic oil-collecting bee species from South Africa. *African Entomology*. 30: e11178.
- Allen-Perkins, A., Magrach, A., Dainese, M., Garibaldi, L., … **Colville, J.F**., et al. (2022). CropPol: A dynamic, open, and global database on crop pollination. *Ecology*. 103, 3, e3614.
- Dorchin, N.; van Munster, S.; Klak, C.; Bowie, R.C.K.; **Colville, J.F**. (2022). Hidden diversity – A new speciose gall midge genus (Diptera: Cecidomyiidae) associated with succulent Aizoaceae in South Africa. *Insects*. 13, 75. https://doi.org/10.3390/insects13010075
- Cohen, C., Liltved, W.R., **Colville, J.F**., Shuttleworth, A., Weissflog, J., Svatos, A., Bytebier, B., Johnson, S.D. (2021). Sexual deception of a beetle pollinator through floral mimicry. *Current Biology*. 31: 1–8.
- Krenn, H.W., Karolyi, F., Lampert, P., Melin, A., **Colville, J.F**. (2021). Nectar uptake of a long-proboscid *Prosoeca* fly (Nemestrinidae) – Proboscis morphology and flower shape. *Insects*. 12(371): 1–13.
- McLeod, L., and **Colville, J.F.** (2021). Observations on unusual feeding and mating behaviour of a monkey beetle genus *Amblymelanoplia* Dombrow (Coleoptera: Scarabaeidae: Hopliini). *African Entomology*. 29(1): 301–306.
- **Colville, J.F**., Beale, C.M., Forest, F., Altwegg, R., Huntley, B., Cowling, R.M. (2020). Plant species richness, turnover and evolutionary diversity track gradients of stability and ecological opportunity in a megadiversity centre. *Proceedings of the National Academy of Sciences (PNAS)*. 117 (33): 20027–20037.
- Dombrow, H. & **Colville, J.F.** (2020). Review of the genus *Beckhoplia* Dombrow with the description of fifteen new species from South Africa and observations on its biogeography (Coleoptera: Scarabaeidae: Melolonthinae: Hopliini). *Zootaxa*. 4823(1): 1-64.
- Melin, A., Altwegg, R., Manning, J.C., and **Colville, J.F.** (2020). Allometric relationships shape foreleg evolution of long-legged oil bees (Melittidae: *Rediviva*). *Evolution*. https://doi.org/10.1111/evo.14144.
- Melin, A. & **Colville, J.F**. (2020). A nesting aggregation of *Rediviva intermixta* (Melittinae: Melittidae) with males sleeping together in nests (Namaqualand, South Africa). *The Journal of the Kansas Entomological Society*. 92 (3): 561–568.
- Melin, A., **Colville, J.F**., Duckworth, G.D.; Altwegg, R.; Slabbert, R.; Midgley, J.J.; Rouget, M.; Donaldson, J.S. (2020). Diversity of pollen sources used by managed honeybees in variegated landscapes. *Journal of Apicultural Research*. Doi10.1080\00218839.2020.1750757.
- Melin, A., Krenn, H.W., Manning, J.C., **Colville, J.F.** (2019). The allometry of proboscis length in Melittidae (Hymenoptera: Apoidae) and an estimate of their foraging distance using museum collections. *PLoS ONE*. 14(6): e0217839.
- Melin, A. & **Colville, J.F.** (2019). A review of 250 years of Southern African bee taxonomy and exploration (Hymenoptera: Apoidea: Anthophila). *Transactions of the Royal Society of South Africa*. 74:1, 86-96. [**Featured on Cover Page**]

- Rink, A.R., Altwegg, R., Edwards, S., Bowie, R.C.K., **Colville, J.F.** (2019). Contest dynamics and assessment strategies in combatant monkey beetles (Scarabaeidae: Hopliini). *Behavioural Ecology*. 40: 713–723.
- Barraclough, D., **Colville, J.F.**, Karolyi, F., Krenn, H.W. (2018). A striking new species of *Prosoeca* Schiner, 1867 (Diptera: Nemestrinidae): An important pollinator from the Bokkeveld Plateau, Northern Cape Province, South Africa. *Zootaxa* 4497: 411–421.
- **Colville, J.F.**, Picker, M.D., Cowling, R.M. (2018). Feeding ecology and sexual dimorphism in a speciose flower beetle clade (Hopliini: Scarabaeidae). *PeerJ*: 6:e4632.
- Melin, A., Mathieu, R., **Colville, J.F**., Midgley, J.J., Donaldson, J.S. (2018). Quantifying and evaluating distributed floral resources for managed honeybee pollination using an expanded concept of supporting ecosystem services. *PeerJ*: e5654.
- Cowling, R.M, Bradshaw, P.L., **Colville, J.F.**, Forest, F. (2017). Levyns' Law: Explaining the evolution of a remarkable longitudinal gradient in Cape plant diversity. *Transactions of the Royal Society of South Africa*. 72: 184-201.
- Treurnicht M., **Colville J.F.**, Joppa L.N., Huyser O., Manning J.C. (2017) Counting complete? Finalising the plant inventory of a global biodiversity hotspot. *PeerJ*: 5:e2984.
- Janion-Scheepers, C., Measey, G.J., Braschler, B., Chown, S.L., Coetzee, L., **Colville, J.F.**, Dames, J., Davies, A.B., *et al*. (2016). Soil biota in a megadiverse country: Current knowledge and future research directions in South Africa. *Pedobiologia*. 59: 129-174.
- Karolyi F., Hansal T., Krenn H.W., **Colville J.F.** (2016). Comparative morphology of the mouthparts of the megadiverse South African monkey beetles (Scarabaeidae: Hopliini): Feeding adaptations and guild structure. *PeerJ*: 4:e1597.
- Bradshaw, P.L., **Colville, J.F.**, Linder, H.P. (2015). Optimising regionalisation techniques: Identifying centres of endemism in the extraordinarily endemic-rich Cape Floristic Region. *PLoS ONE*. 10: e0132538.
- Cowling, R.M., Potts, A.J., Bradshaw, P.L., **Colville, J.F.**, Arianoutsou, M., Ferrier, S., Forest, F., Fyllas, N.M., Hopper, S.D., Ojeda, F., Procheş, Ş., Smith, R.J., Rundel, P.W., Vassilakis, E., Zutta, B.R. (2015). Variation in plant diversity in Mediterranean-climate ecosystems: The role of climatic and topographical stability. *Journal of Biogeography*. 42: 552-564.
- Kleijn, D., Winfree, R., Bartomeus, I., Carvalheiro, L.G., Henry, M., Isaacs, R., Klein, A-M., Kremen, C., M'Gonigle, L.K., Rader, R., Ricketts, T., Williams, N.M, Adamson, N-L., Ascher, J.S., Baldi, A., Batary, P., Benjamin, F., Biesmeijer, J.C., Blitzer, E.J., Bommarco, R., Brand, M.R., Bretagnolle, V., Button, L., Cariveau, D.P., Chifflet, R., **Colville, J.F.**, Danforth, B.N., Elle, E., Garratt, M.P.D., Herzog, F., Holzschuh, A., Howlett, B.G., Jauker, F., Jha, S., Knop, E., Krewenka, K.M., Le Feon, V., Mandelik, Y., May, E.M., Park, M.G., Pisanty, G., Reemer, M., Riedinger, V., Rollin, O., Rundlof, M., Sardinas, H.S., Scheper, J., Sciligo, A.R., Smith, H.G., Steffan-Dewenter, I., Thorp, R., Tscharntke, T., Verhulst, J., Viana, B.F., Vaissiere, B.E., Veldtman, R., Westphal, C., Potts, S.G. (2015). Delivery of crop pollination services is an insufficient argument for wild pollinator conservation. *Nature Communications*. 6: 7414**.**
- Manning, J.C., Goldblatt, P., **Colville, J.F.**, Cupidoa, C.N. (2015). Hopliine beetle pollination in annual *Wahlenbergia* species (Campanulaceae) from western South Africa, and the new species *W. melanops*. *South African Journal of Botany*. 100: 58-62.
- Mecenero, S., Altwegg, R., **Colville, J.F.**, Beale, C.M. (2015). Roles of spatial scale and rarity on the relationship between butterfly species richness and human density in South Africa. *PLoS ONE*. 10: e0124327.
- Forest, F., Goldblatt, P., Manning, J.C., Baker, D., **Colville, J.F.**, Devey, D.S., Jose, S., Kaye, M., Buerki, S. (2014). Pollinator shifts as trigger of speciation in painted petal irises (*Lapeirousia*: Iridaceae). *Annals of Botany*. 113: 357-71.

- Karolyi, F., **Colville, J.F.**, Handschuh, S., Metscher, B.D., Krenn, H.W. (2014). One proboscis, two tasks: Adaptations to blood-feeding and nectar-extracting in long-proboscid horse flies (Tabanidae, *Philoliche*). *Arthropod Structure & Development*. 43: 403-413.
- Karolyi, F., Morawetz, L., **Colville, J.F.**, Handschuh, S., Metscher, B.D., Krenn, H.D. (2013). Time management and nectar flow: Flower handling and suction feeding in long-proboscid flies (Nemestrinidae: *Prosoeca*). *Naturwissenschaften*. 100: 1083-1093. [**Featured on Cover Page**]
- Ryan, P.G., **Colville, J.F.**, Picker, M.D. (2013). Juvenile African Pipit feeding on monkey beetles. *Ornithological Observations*. 4: 6-8.
- Karolyi, F., Szucsich, N.U., **Colville, J.F.**, Krenn, H.W. (2012). Adaptations for nectar-feeding in the mouthparts of long-proboscid flies (Nemestrinidae: *Prosoeca*). *Biological Journal of the Linnean Society*. 107: 414-424.
- Picker, M.D., **Colville, J.F.**, Burrows, M. (2012). A cockroach that jumps. *Biology Letters*. 8: 390-392.
- **Colville, J.F.** (2009). Understanding the evolutionary radiation of the mega-diverse monkey beetle fauna (Scarabaeidae: Hopliini) of South Africa. *Frontiers in Biogeography*. 1: 24-29.
- Bohn, H., Picker, M.D., Klaus-Dieter, K. & **Colville, J.F.** (2010). A jumping cockroach from South Africa, *Saltoblattella montistabularis*, gen. nov., spec. nov. (Blattodea: Blattellidae). *Arthropod Systematics & Phylogeny*. 68: 53-69. **[Featured as a "Top 10 New Species discovery" by the International Institute for Species Exploration**].
- **Colville, J.F.**, Picker, M.D., Cowling, R.M. (2002). Species turnover of monkey-beetles (Scarabaeidae: Hopliini) along environmental and disturbance gradients in the Namaqualand region of the Succulent Karoo, South Africa. *Biodiversity and Conservation*. 11: 243–264.
- Picker, M.D., **Colville, J.F.**, van Noort, S. (2002). Mantophasmatodea now in South Africa. *Science*. 297: 1475.


**Technical reports:**


- **Colville, J.F.**, and Cohen, C. (2022). Terrestrial Animal Species Specialist Assessment. Grace Rock Equestrian Farm. Prepared for Delta Ecology and Legacy Environmental Management Consulting.
- **Colville, J.F.**, and Cohen, C. (2022). Terrestrial Animal Species Specialist Assessment. Dana Bay Access Road. Prepared for Sharples Environmental Services cc (SES).
- **Colville, J.F.**, and Cohen, C. (2022). Terrestrial Biodiversity Specialist Assessment. Duyker Eiland Prospecting Rights. Prepared for Elemental Sustainability (Pty) Ltd.
- **Colville, J.F.**, and Cohen, C. (2022). Terrestrial Animal Species Specialist Assessment. Proposed mixed use housing development. Prepared for EcoSense CC.
- **Colville, J.F.**, and Cohen, C. (2022). Terrestrial Animal Species Specialist Assessment. Proposed agricultural development. Prepared for McGregor Environmental Services.
- **Colville, J.F.**, and Cohen, C. (2022). Terrestrial Animal Species Specialist Assessment. Blue Sky's Project Prepared for Doug Jeffery – Environmental Consultants.
- **Colville, J.F.**, and Cohen, C. (2022). Terrestrial Animal Species Specialist Assessment. Proposed Expansion of Nature's View Dam near Citrusdal. Prepared for Earth Grace Environmental Consultancy.
- **Colville, J.F.** (2021). Terrestrial Animal Species Specialist Assessment. Proposed enlargement of existing Kleigat Dam. Prepared for Earth Grace Environmental Consultancy.
- **Colville, J.F.** (2021). Terrestrial Animal Species Specialist Assessment. Moorreesburg Wastewater Treatment Works Upgrade Project. Prepared for Zutari (Pty) Ltd.
- **Colville, J.F.** (2021). Terrestrial Animal Species Specialist Assessment. Maxnau Citrus Development. Prepared for Charl de Villiers Environmental Consulting.
- **Colville, J.F.** (2021). Terrestrial Animal Species Specialist Assessment. Gletwyn Estate Mixed Use Development. Prepared for Johan Neethling Environmental Services cc.
- **Colville, J.F.** (2021). Terrestrial Animal Species Specialist Assessment. Moorreesburg Wastewater Treatment Works Upgrade Project. Prepared for Zutari (Pty) Ltd.

- **Colville, J.F.** (2021). Terrestrial Animal Species Specialist Assessment. Proposed Development of Solar Photo-Voltaic Renewable Energy Power Station. Prepared for Resource Management Services (RMS).
- **Colville, J.F.** & Picker, M.D. (2009-2010). *Invertebrate impact assessment – Oudekraal, Table Mountain*. Prepared for Doug Jeffery Environmental Consultants.
- Picker, M.D. & **Colville, J.F.** (2007). *Invertebrate impact assessment: Worcester Island Development*. SRK Environmental impact report for Consulting Engineers and Scientists, Cape Town.
- Picker, M.D. & **Colville, J.F.** (2006). *Baseline faunal investigation for proposed development at Altona, Worcester, Western Cape Province*. Environmental impact report for SRK Consulting Engineers and Scientists, Cape Town.
- **Colville, J.F.** & Picker, M.D. (2005). *Scoping Phase II: The impact of development of Worcester on the insect and scorpion fauna*. Environmental impact report for Chand Environmental Consultants, Cape Town.
- **Colville, J.F.** (2001) *Scoping and faunal assessment for proposed housing development, Skapenberg, Somerset West*. Prepared for Design consultants CNdV Africa.


## MEMBERSHIPS/RESEARCH ASSOCIATE

- Membership of Entomological Society of Southern Africa (2007-current).
- Membership of Lepidopterists Society of Southern Africa (2014-current).
- Honorary Research Associate (HRA), Statistics in Ecology, Environment and Conservation (SEEC), Department of Statistical Sciences, UCT (2014-current).
- SACNASP registration for Ecological Science (Professional Natural Scientist) (member#: 134759).

## PROFESSIONAL SERVICES

- Editorial board *African Entomology* (2010-current).
- Editorial board *Metamorphosis* (2017-current).
- Editorial board *PeerJ* (2019-current).
- CAPE Invasive Alien Animal (IAA) Working Group (2016-2018).