APPENDIX 9G

Rank 2 Tree Assessment (2025)

Australian Black Cockatoo Specialists

Assessment of tree #1567 for its nesting value for three species of Black Cockatoo in Lot 508 Elliot Rd Keysbrook, Western Australia

Doral Mineral Sands
Pty Ltd
Western Australia

12 March 2025

1. INTRODUCTION

Australian Black Cockatoo Specialists (ABCS) are pleased to submit this report to Doral Mineral Sands Pty Ltd (DMS) regarding the inspection of Tree #1567, which was previously identified by M.J. & A.R. Bamford Consulting Ecologists (BCE) as containing a suitable black cockatoo hollow. The inspection took place on Monday, 10 March 2024, at Lot 508 Elliot Road, Keysbrook, WA.

2. BACKGROUND

Doral Mineral Sands Pty Ltd (Doral) is proposing to expand its operations in the Keysbrook area and has been undertaking investigations into fauna values as part of the environmental assessment and approvals process. These investigations have included surveys for potential nesting trees for black-cockatoos, and Doral commissioned Bamford Consulting Ecologists (BCE) to undertake a re-assessment of potential nesting trees that have been identified in previous surveys.

In the report "Re-assessment of Potential Nest Trees for Black-Cockatoos and Comments on Other Conservation Significant Species in the Keysbrook Project Area," M. Banford provided the following findings in Appendix 9E, Results and Discussions – Black Cockatoo Nest Tree Assessment:

- 3 (2.8%) of the trees were assigned Rank 2. One of these had been identified as Rank 2 previously (tree ID B108), one was a former Rank 3 tree that was upgraded on the basis of chew marks around a hollow entrance (tree ID A631), and one was a tree presumably recorded previously as a Rank 4 or 5 (tree ID waypoint 1567). Of these three trees, only tree ID waypoint 1567 was very clearly a black-cockatoo nest tree, with clear and fresh chew marks around a high hollow entrance into a large, vertical trunk (see Figure 2). The hollow was too high to examine with the pole camera, but its appearance and presence of chew marks suggest recent black-cockatoo activity (but not confirmed breeding). The hollow appeared to be at the site of a recent branch-fall, so may not have been visible, or even accessible to black-cockatoos, previously.

3. INSPECTION METHOD

As the nesting season nears its conclusion, most Black Cockatoo nesting activity is expected to have already been completed. However, ABCS possesses extensive expertise in identifying and confirming nesting attempts by Black Cockatoos. **Rick Dawson, with over 28 years of experience in black cockatoo research, has inspected more hollows by ladder than most individuals in Western Australia, including sites spanning from the Murchison to Ravensthorpe.** This depth of experience ensures accurate assessments of hollow suitability and nesting evidence, allowing for **reliable confirmation** of recent or ongoing breeding activity.

Survey Objective and Scope

The primary objective of this survey was to determine whether **Tree 1567 in Lot 508** has been used for nesting by Black Cockatoos or whether it is suitable for future use. The scope of this assessment included:

- **A detailed visual inspection** of all hollows in Tree#1567 using a high-resolution camera pole, supplemented by **high-resolution photographs** taken with a telephoto lens.
- **Recording of any evidence** indicating nesting activity or the suitability of the hollow for Black Cockatoos.
- **Documentation of any use by non-target species.**

Black Cockatoo Prospecting Behaviour

Black Cockatoos are known to engage in **prospecting behaviour**, which involves inspecting a hollow for suitability over several days before committing to nesting. Prospecting behaviours may include:

- **Chewing** at the top or side walls of the hollow,
- **Entering** the hollow,
- Presence of a **heavy faecal load**,
- **Compacting** the hollow floor, and
- **Digging depressions** in the hollow floor.

These behaviours indicate interest in a hollow **but do not confirm active nesting**. As part of the assessment, all such signs were carefully documented to distinguish between prospecting and actual nesting activity.

ABCS'S – COMMITMENT TO CONSERVATION AND ACCURATE ASSESSMENTS

Australian Black Cockatoo Specialists (ABCS) prides itself on its expertise in identifying hollows that are either actively used or suitable for black cockatoos.

We also ensure that **all hollows are assessed correctly, even if they are not being used by black cockatoos**, so that environmental offsets are applied appropriately, and conservation measures are effectively targeted. Misidentifying hollows as black cockatoo nest sites dilutes the integrity of conservation efforts, potentially misdirecting resources and undermining genuine habitat protection. ABCS is widely recognized for its **dedicated work in black cockatoo conservation**, providing critical insights that support the long-term protection and management of these threatened species. Through rigorous, science-driven assessments and a commitment to ecological integrity, we strive to safeguard black cockatoo populations and their habitats for the future. See Appendix 2 for a list of Peer reviewed manuscripts.

4. FINDINGS

Tree #1567 is not suitable for use by black cockatoos and is unlikely to become suitable in the short to medium term. The hollow in question, located more than 15 meters above the ground, exhibits multiple structural deficiencies that make it fundamentally unsuitable for nesting.

The floor of the hollow is highly uneven, featuring three distinct depressions and a small cavity measuring approximately 10 cm wide and 20 cm deep—dimensions that are far too small to accommodate black cockatoos. The most significant issue is the open side of the hollow, which provides no protection from predators, wind, rain, or extreme temperatures, making it an unsafe environment for egg incubation and nestling rearing.

Although the hollow may have had potential in the past, a major structural change has permanently eliminated its viability. The detachment of a branch removed a crucial side wall, fully exposing the interior and rendering the hollow entirely unsuitable for nesting. The prolonged formation of floor depressions further suggests that this hollow may never provide the stable, enclosed conditions required for successful breeding. Additionally, extensive chewing—most likely by galahs—indicates occupation by other species, yet there is no evidence of black cockatoo breeding.

Prospecting Behaviour of Female Black Cockatoos

1. Female black cockatoos actively prospect for breeding hollows throughout the year, even in unsuitable locations. This prospecting behaviour includes chipping at the outer edges of hollows, a behaviour observed in both viable and non-viable nesting hollow. Field inspections of numerous hollows with evidence of chipping have revealed that only approximately one in ten is ultimately used for nesting *(Pers. Obs*. Dawson)
2. Selecting a suitable nesting hollow is a significant investment, as breeding requires a commitment of more than 120 days. Consequently, females thoroughly inspect multiple hollows within their breeding area before choosing a site, regardless of whether their previous nesting attempt was successful. Notably, females rarely reuse a hollow in the following year if it was previously unsuccessful.
3. Chipping at the edge of a hollow is a clear indication of prospecting but does not, on its own, confirm nesting activity. This behaviour highlights the ongoing search by female black cockatoos for optimal nesting hollows.

5. CONCLUSION

Given these permanent structural issues, the hollow in its current state is unlikely to improve in the short term and may never become a viable breeding site for black cockatoos. The combination of an unstable floor, inadequate cavity dimensions, and a fully exposed interior significantly reduces its suitability for nesting. Without the protective enclosure, and flat floor surface necessary for successful egg incubation and chick rearing, this hollow does not meet the essential requirements for black cockatoo breeding.

While female black cockatoos actively prospect for potential nesting sites, their selection process is highly discerning, and only a small fraction of inspected hollows are ultimately used. Given the structural deficiencies of this hollow, it is highly improbable that it will ever support successful breeding in its current form.

CONTACT INFORMATION

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12 March 2025

APPENDICES

1. Photographs and Details of Hollow Inspections – A compilation of photographic evidence and detailed descriptions of each inspected hollow, including structural assessments and observations of potential or active use by black cockatoos.

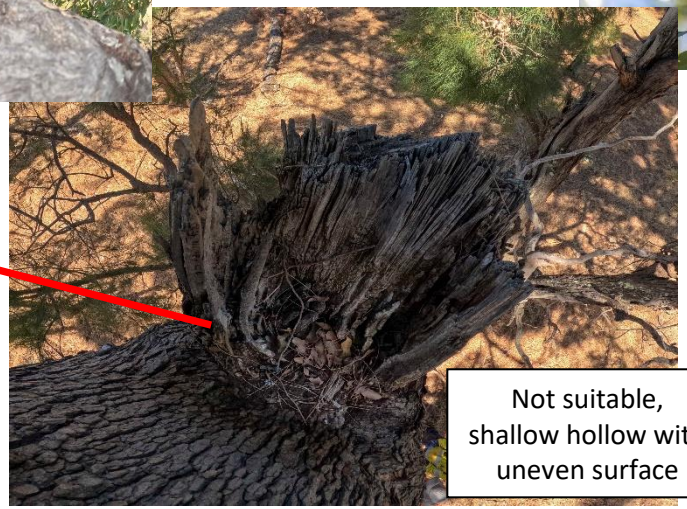
2. List of Peer-Reviewed Manuscripts in Support of the Report – A collection of scientific publications and research studies that provide supporting evidence and context for the findings and methodologies used in this assessment.

APPENDIX 1

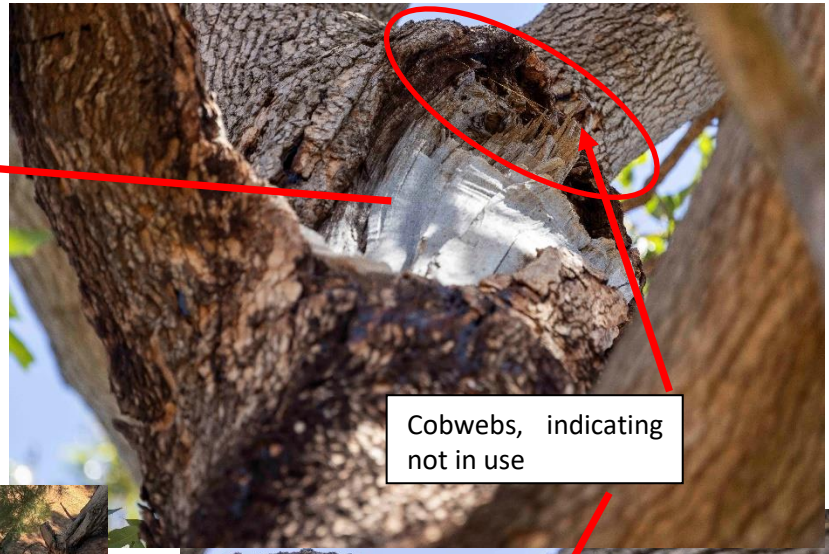
Tree #1567 (continued next page)

Tree #1567, large Marri DBH 1000mm

Not suitable, very shallow indent.



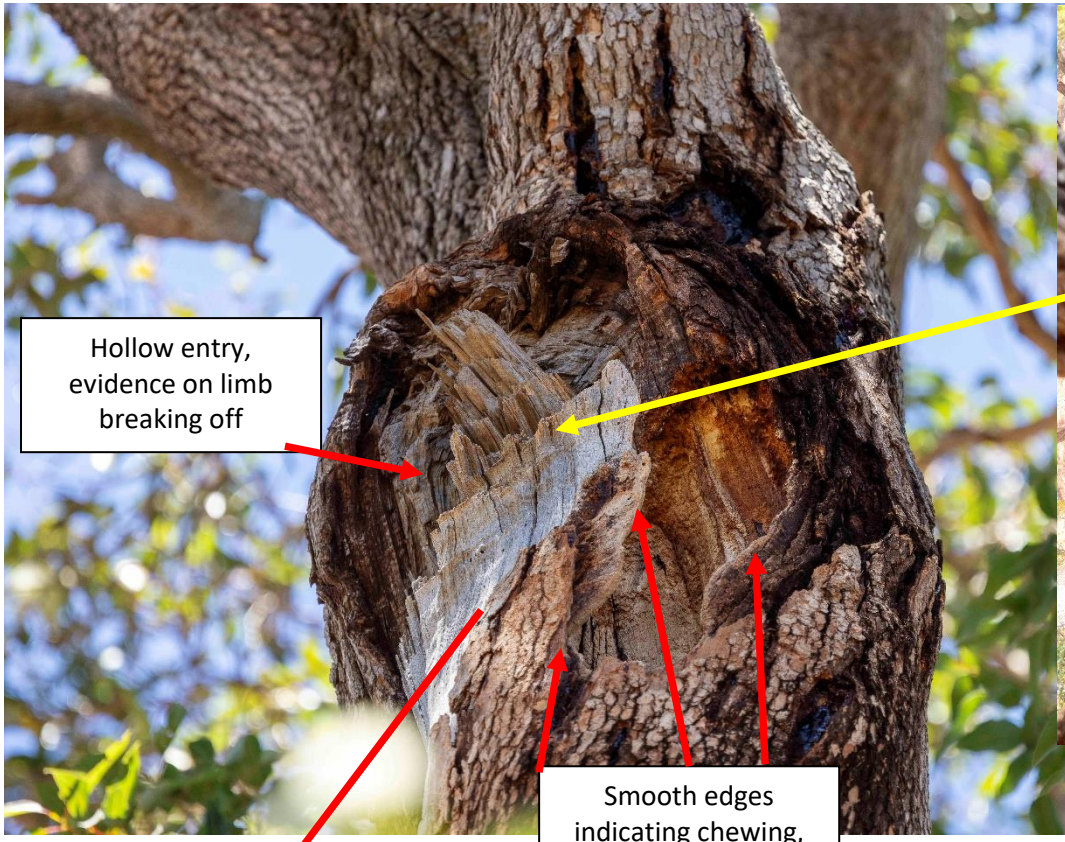
Not suitable, shallow hollow with uneven surface

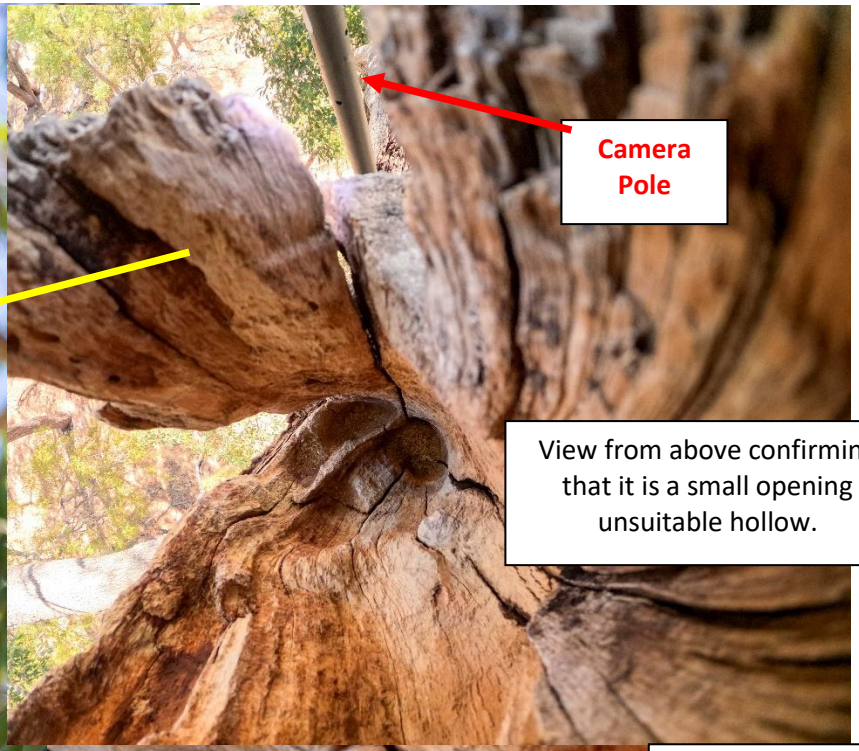


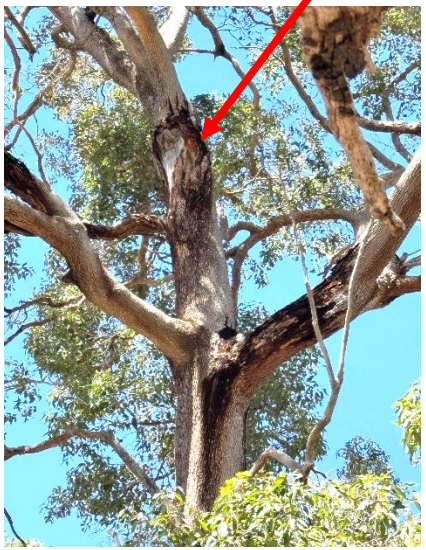
Cobwebs, indicating not in use

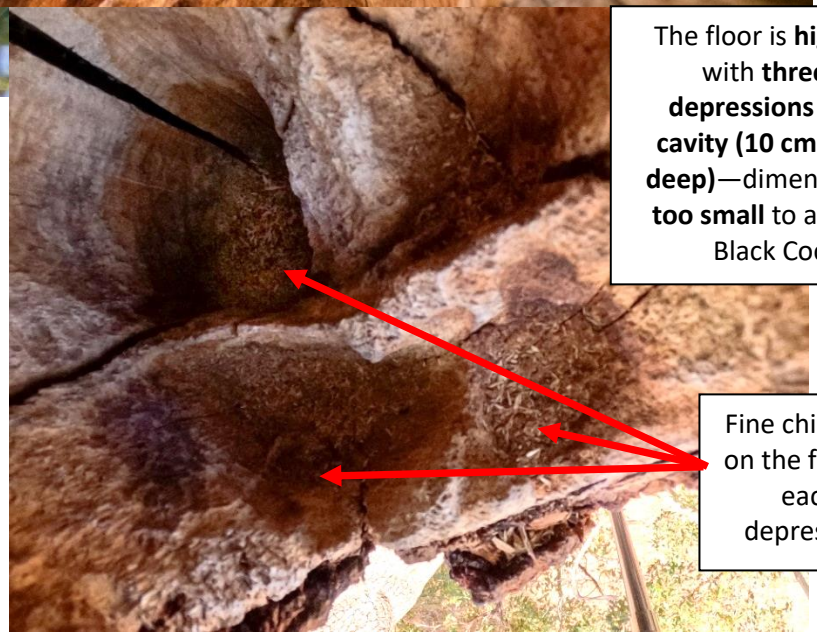
East	Northing	Status of tree	DBH mm	DMS_ID	Lot No	**Suitable**	Comment/ Assessment
39857.3	64411468	Live Marri	1000	1567	Lot508	**NO**	**Large, mature Marri** with multiple hollows located in branch forks. The **two lower hollows** have not developed sufficiently to be suitable for Black Cockatoos. The **upper hollow**, **15 meters high**, exhibits **multiple structural deficiencies** that make it fundamentally unsuitable for nesting. The floor is **highly uneven**, with **three distinct depressions** and a **small cavity (10 cm wide, 20 cm deep)**—dimensions that are **too small** to accommodate Black Cockatoos. Additionally, the hollow is **open on one side**, providing **no protection** from predators, wind, rain, or extreme temperatures. These factors make the hollow **unsafe for egg incubation and chick rearing**, confirming that it is not a viable nesting site.

Tree #1567 (continued from previous page









APPENDIX 2 - List of Peer-Reviewed Manuscripts in Support of the Report

1. Saunders, Denis A. and Rick Dawson (2009). Update on Longevity and Movement of Carnaby's Black Cockatoo. *Pacific Conservation Biology* 15: 72-74. https://doi.org/10.1071/PC090072 Citations 11 Reads 312
2. Dawson, R., Saunders, D. A. and Mawson, P. (2011). The vulnerable and the endangered: Carpet Python predation on a breeding female Carnaby's Black Cockatoo. *Australian Zoologist*. 35: 679-680.Citations 2 Reads 221
3. Saunders, D. A., Mawson, P. and Dawson, R. (2011). The impact of two extreme weather events and other causes of death on Carnaby's Black Cockatoo: a promise of things to come for a threatened species? *Pacific Conservation Biology* 17: 141-148. http://dx.doi.org/10.1071/PC110141 Citations 96 Reads 1575
4. Saunders, D. A., Dawson, R. and Mawson, P. (2011). Photographic identification of bands confirms age of breeding Carnaby's Black Cockatoo. Corella.35: 52-54. Citations 8 Reads 112
5. Saunders, D. A., Wintle, B. A., Mawson, P. R. and Dawson, R., (2013). Egg-laying and rainfall synchrony in an endangered bird species; implications for conservation in a changing climate. *Biological Conservation* 161: 1-9. .http://dx.doi.org/10.1016/j.biocon.2013.02.004 Citations 26 Reads 157
6. Dawson, R., Saunders, D. A., Lipianin, E. and Fossey, M. (2013). Young-age breeding by a female Carnaby's Cockatoo. *West Australian Naturalist* 29: 63-65.
7. Groom, C., Warren, K., Le Souëf, A., and Dawson, R. (2014b). Attachment and performance of Argos satellite tracking devices fitted to black cockatoos (*Calyptorhynchus* spp.). *Wildlife Research* **41**, 571–583. doi:10.1071/WR14138
8. Saunders, D. A., Mawson, P. R. and Dawson, R. (2014). One fledgling or two in the endangered Carnaby's Cockatoo (*Calyptorhynchus latirostris*) – a strategy for survival or legacy from a bygone era? Conservation Physiology 2: http://dx.doi.org/10.1093/conphys/cou001 Citations 24 Reads 186
9. White N. E., Bunce M., Mawson P. R., Dawson R., Saunders D. A. and Allentot, M. E. (2014). Identifying conservation units after large-scale land clearing: a spatio-temporal molecular survey of endangered white-tailed black-cockatoos (*Calyptorhynchus* spp.) *Diversity and Distributions* 20: 1208-1220 doi: 10.1111/ddi.12202. Citations 19 Reads 45
10. Saunders, D. A., Mawson, P. R. and Dawson, R. (2014). Use of tree hollows by Carnaby's Cockatoo and the fate of large hollow-bearing trees at Coomallo Creek, Western Australia 1969-2013. *Biological Conservation* 177: 185-193. https://doi.org/10.1016/j.biocon.2014.07.02 Citations 52 Reads 224
11. Saunders, D. A., Dawson, R., Doley, A., Lauri, J., Le Souëf A., Mawson, P. R., Warren, K. and White, N., (2014). Nature conservation on agricultural land: a case study of the endangered Carnaby's Cockatoo *Calyptorhynchus latirostris* breeding at Koobabbie in the northern wheatbelt of Western Australia. *Nature Conservation* 9: 19-43. Doi:10.3897/natureconservation.9.8385 Citations 9 Reads 421
12. Saunders, D. A., Dawson, R. and Nicholls, A. O. (2015). Aging nestling Carnaby's cockatoo, *Calyptorhynchus latirostris*, and estimating the timing and length of the breeding season. Nature Conservation 12: 27-42 http://dx.doi.org/10.3897/natureconservation.12.4863 Citations 13 Reads 173
13. Saunders, D. A., Dawson, R. and Nicholls, A. O. (2016). Breeding failure and nestling body mass as a function of age of breeding females in the endangered Carnaby's Cockatoo, Calyptorhynchus latirostris. *Australian Zoologist* 38 (2): 171-182
14. Williams, M. R., Yates, C. J., Saunders, D. A., Dawson, R. and Barrett, G. W. (2017). Combined demographic and resource models quantify the effects of potential land-use change on the endangered Carnaby's cockatoo (Calyptorhynchus latirostris). *Biological Conservation* 210: 8-15. https://dx.doi.org/10.1016/j.biocon.2017.03.018 Citations 18 Reads 124

15. Saunders, D. A. and Dawson, R. (2018). Cumulative learnings and conservation implications of a long-term study of the endangered Carnaby's Cockatoo Calyptorhynchus latirostris. *Australian Zoologist* 39(4), 591-609. https://doi.org/10.7882/AZ.2017.010
Citations 20 Reads 764
16.Rycken, S, K.S. Warren, L. Yeap, B. Jackson, K. Riley, M. Page, R. Dawson, K. Smith, P. R. Mawson, W. Bouten and J. M. Shephard. (2018). Assessing flock integration of GPS tagged black cockatoos: Utilisation of behavioural change point analysis. *Journal of Wildlife Management* https://doi.org/10.1002/jwmg.21609
17. Saunders, D. A., White, N. E., Dawson, R. and Mawson, P. R. (2018). Breeding site fidelity, and breeding pair infidelity in the endangered Carnaby's Cockatoo *Calyptorhynchus latirostris*. *Nature Conservation* 27: 59-74. doi:10.3897/natureconservation.27.27243
Citations 4 Reads 258
18. Saunders, D. A., Dawson, R., Mawson, P. R. and Nicholls, A. O. (2019). Factors affecting nestling condition and timing of egg-laying in the endangered Carnaby's cockatoo *Calyptorhynchus latirostris*. *Pacific Conservation Biology* 25: 1–13.
https://doi.org/10.1071/PC19010 Citations 2 Reads 49
19. Le Souëf, A., Vitali, S., Dawson, R., Shephard, J. M., and Warren, K. S. (2019). Fly Away Home: a collaborative program to return rehabilitated black cockatoos to the wild in Western Australia. In 'Scientific Foundations of Zoos and Aquariums'. (Eds A. B. Kaufman, M. J. Bashaw, and T. L. Maple.) pp. 327–338. (Cambridge University Press.) doi:10.1017/9781108183147.013
20. Rycken, S., Shepherd, J. M., Yeap, L., Vaughan-Higgins, R., Page, M., Dawson, R., Smith, K., Mawson P. R. and Warren, K. S. (2020). Regional variation in habitat matrix determines movement metrics in Baudin's cockatoos in southwest Western Australia. *Wildlife Research* 48(1): 18-29. https://doi.org/10.1071/WR19076
21. Saunders, D. A., Mawson, P. R. and Dawson, R. (2020). Predation by Southwestern Carpet Python *Morelia spilota imbricata* of Carnaby's Cockatoo *Calyptorhynchus latirostris* in a breeding hollow. *Australian Zoologist* 41(1): 54-57 https://doi.org/10.7882/AZ.2020.007.
Citations 1 Reads 47
Saunders, D. A., Dawson, R., Mawson, P. R. and Cunningham, R. B. (2020) Artificial hollows provide an effective short-term solution to the loss of natural nesting hollows for Carnaby's Cockatoo *Calyptorhynchus latirostris*. *Biological Conservation* 245: 11pp.
https://doi.org/10.1016/j.biocon.2020.108556. Citations 19 Reads 143
22. Saunders DA, Mawson PR, Dawson R, Johnstone RE, Kirkby T, Warren K, Shephard J, Rycken SJE, Stock WD, Williams MR, Yates CJ, Peck A, Barrett GW, Stokes V, Craig M, Burbidge AH, Bamford M, Garnett ST 2021. Carnaby's Black-Cockatoo *Zanda latirostris*. In The Action Plan for Australian Birds 2020. (Eds ST Garnett and GB Baker) pp. 402-407. CSIRO Publishing, Melbourne.
23. Saunders, Denis, Dawson, Rick and Mawson, Peter. (2022). Artificial nesting hollows for the conservation of Carnaby's Cockatoo *Calyptorhynchus latirostris*: definitely not a case of erect and forget. *Pacific Conservation Biology*. https://doi.org/10.1071/PV21061
Citations 6 Reads 301
24. Rycken, S., Warren, K. S., Yeap, L., Donaldson, R., Mawson, P. R., Dawson, R. and Shephard, J. M. (2022). Forest specialist species in the urban landscape: Do different levels of urbanisation affect the movements of Forest Red-tailed Black Cockatoos (*Calyptorhynchus banksii naso*)? *Avian Conservation and Ecology* 17(1): 11. https://doi.org/10.5751/ACE-02061-170111
25. Saunders, D. A. and Pickup, G. 2023. A review of the taxonomy and distribution of Australia's endemic Calyptorhynchinae black cockatoos. *Australian Zoologist*
https://doi.org/10.7882/AZ.2023.022 Citations 5 Reads 363
26. Riley, K., Warren, K., Armstrong, N., Yeap, L., Dawson, R., Mawson, P. R., Saunders, D. A., Cooper, C. E. and Shephard, J. M. 2023. Accelerometry reveals limits to use of an energy-saving anthropogenic food source by a threatened species; a case of Carnaby's cockatoos (*Zanda*

latirostris) and canola*. Ecology and Evolution*. http://dx.doi.org/10.1002/ece3.10598 Citations 3 Reads 109

27. Rycken, S., Warren, K. S., Yeap, L., Jackson, B., Mawson, P. R., Dawson, R. and Shephard, J. M. (2023). Movement of Carnaby's Cockatoo (*Zanda latirostris*) across different agricultural regions in Western Australia. *Pacific Conservation Biology* 30, PC23015 https://doi.org/10.1071/PC23015
28. Le Souëf A. T., Bruce, M., Barbosa A., Shephard, J., Mawson P. R., Dawson, R., Saunders D. A. and Warren, K. S. 2024. Health parameters for wild Carnaby's cockatoo (*Zanda latirostris*) nestlings in Western Australia: results of a long-term study. *Conservation Physiology* **12**, 10.1093/conphys/coae005 Citations 1 Reads 91
29. Mawson, P. R., Dawson, R. and Saunders, D. A. (2024). Breeding by Barn Owls *Tyto alba* in artificial nest hollows established for an endangered black cockatoo in the northern wheatbelt of Western Australia. *Australian Zoologist*. https://doi.org/10.7882/AZ.2024.019 Citations 0 Reads 74
30. Mawson, P. R., Dawson, R. and Rycken, S. E. J. (2024). Breeding by Regent Parrots *Polytelis anthopeplus* in artificial nest hollows: A solution to a serious conservation problem. *Australian Zoologist* 43, https://doi.org/10.7882/AZ.2024.028 Citations 0 Reads 19
31. Saunders, D. A., Mawson, P. R., Dawson, R., Beswick, H., Pickup, G. and Usher, K. (in press 2024). Movements of adult and fledgling Carnaby's cockatoos (*Zanda latirostris* Carnaby, 1948) from eleven breeding areas throughout their range. *Pacific Conservation Biology* **30, PC24042**. doi:10.1071/PC24042
32. Le Souef, A., Stojanovic, D., Burbidge, A., Dawson, R., Heinsohn, R., Vitali S., Warren, K. Retention of transmitter attachments on black cockatoos (Calyptorhynchus spp.):
33. White, N.E., Dawson, R., Coghlan, M.L., Tridico, S.L., Mawson, P.R., Haile, J., Bunce, M. Application of STR markers in wildlife forensic casework involving Australian black-cockatoos (Calyptorhynchus spp.):
34. White, N.E., Mawson, P.R., Dawson, R., Bunce, M.A., Spencer, P.B.S Characterisation and cross-species utility of 20 microsatellite markers for population and forensic applications in the endangered Carnaby's Black-cockatoo, Calyptorhynchus latirostris:
35. Anna Le Souef, Simone Vitali, Rick Dawson, Kristen Warren. (2020) Hindlimb Paralysis Syndrome In Wild Carnaby's Cockatoos (Calyptorhynchus Latirostris): A New Threat For An Endangered Species.
36. Saunders, D. A., Mawson, P. R., Dawson, R. (2024). Longevity in Carnaby's Cockatoo (*Zanda latirostris*, Carnaby, 1948). (for Pacific Conservation Biology submitted 5 September 2024).
37. Saunders, D. A., Mawson, P. R., Dawson, R. and Pickup, G. (2024). A challenging future for Carnaby's Cockatoo (*Zanda latirostris*) under a changing climate. (for Pacific Conservation Biology submitted 5 September 2024).