ARI Terrestrial Quarterly Update

May 2020

About us

The Arthur Rylah Institute's terrestrial ecology teams produce high-quality science to support evidence based decision-making by governments and communities.

Our 45 scientists have extensive expertise in fauna and flora research, ecological modelling and data interpretation. We work collaboratively with national, state and local agencies, universities and the community.

Bushfire Biodiversity Response: ARI at the frontline

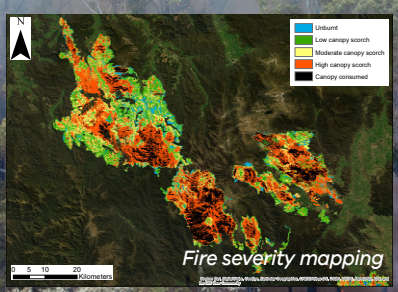
The 2019/20 bushfires were exceptional in both size and impact. In Victoria many areas with extremely high biodiversity value were affected. Over 170 rare or threatened species had more than 50% of their habitat impacted by the fires. This required an immediate and informed response to minimise biodiversity loss.

Scientists from the ARI were essential in generating important information about the impact of the fires on biodiversity. Matt White (pictured emerging from a helicopter), Peter Menkhorst, Geoff Heard, Jenny Nelson and Nick Clemann were among the ARI staff who provided immediate expert information and resources about the threatened species likely impacted by the fires. Also, Luke Collins applied his recent research on fire severity mapping to provide up-to-date fire severity maps for the fire affected areas which were used to aid decision-making.

ARI staff are now contributing to a set of priority actions to help minimise biodiversity losses, including the early reconnaissance theme being led by Tim O'Brien.

Early reconnaissance of fire impacts

Large Brown Tree Frog (Litoria littlejohni)



Fire severity mapping

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Influencing Change

Arthur Rylah Institute for environmental research

1970 - 2020 50 YEARS of science that matters

ARI turns 50!

In April 1970, ARI was formally opened by the Queen. At the time, the State of Victoria was a global leader in the establishment of ARI as a government science institute - the other Australian states followed suit.

In our early years, ARI played a central role in major biological discoveries, terrestrial examples include the identification of the first living example of a Mountain Pygmy Possum (by Bob Warneke) and the discovery of a new species of macropod, the Long-footed Potoroo (by John Seebeck).


Early years: lab work


Early years: field work

Today ARI fulfils a key role in generating knowledge, through world-class, applied ecological research, which supports policy and management to ensure healthy, resilient ecosystems in south-eastern Australia.

This month the terrestrial ecology teams celebrate ARI's 50th Birthday.

Unfortunately, plans for a large celebration were hampered by Victoria's bushfires and the COVID-19 pandemic. However, we had a staff virtual celebration on the day and plan to have further, larger celebrations during National Science Week (15-23 August 2020) to recognise this momentous occasion.

ARI scientists help Mallacoota residents heal after devastating bushfire

A team of both ARI aquatic and terrestrial experts (including Jemma Cripps, Nick Clemann, Michele Kohout and Zak Atkins) joined East Gippsland Catchment Management Authority, and members of the local community, on boat trips around Mallacoota Lakes. Discussions were held to understand the impact of the fires on the flora and fauna of the area.

The trips were a fantastic opportunity for locals to share their experiences of the recent bushfire, and to discuss the impact on ecosystems, and subsequent recovery, with experts in that field of research.


Long-footed Potoroo (Potorous longipes)


Camera trap

Important equipment and data saved from recent bushfire

Camera traps enable the collection of photos of rare and cryptic animals that are otherwise difficult to survey. However, cameras are often installed in remote areas making it difficult and dangerous to retrieve during bushfire and flood events.

Cameras collecting important data to inform the modernisation of the Regional Forest Agreements (RFA) were threatened by bushfires west of Harrietville in January. In a great example of swift action, they were recovered with the aid of both regional DELWP staff deployed to the fire, and ARI researchers. Images on the cameras included records of Long-footed Potoroos ('Endangered' under the EPBC Act 1999).

These records have since been used to inform fire response actions for this species and will be used to update habitat distribution models for the RFA.

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Glossy Black-Cockatoo

Glossy Black-Cockatoo: a species on the brink?

While specialisation can reduce competition between species for resources such as food, it can also place them at greater risk of extinction if the environment changes. In Victoria, the Glossy Black-Cockatoo feeds almost solely on the seeds of the Black Sheoak (*Allocasuarina littoralis*), an extreme dietary specialisation. The Black Sheoak is killed by hot fires and less intense fires encourage the tree to release its seed *en masse*, both responses potentially disastrous for the Glossy Black-Cockatoo.

ARI researcher Peter Menkhorst and contractor Martin Schulz have undertaken a fire reconnaissance project (which began as a RFA project) to better understand the extent and abundance of Black Sheoak trees within the Glossy Black Cockatoo's Victorian distribution.

The recent 2019-20 bushfires burnt much of the Victorian distribution of both the Sheoak and the Cockatoo, providing the researchers with an opportunity to build on extensive surveys completed in 2019 and assess the impact of these fires on the Victorian Glossy Black-Cockatoo population. It is hoped the findings from this project will arm managers with knowledge that will help to ensure the ongoing survival of the Black Sheoak and the Glossy Black-Cockatoo population in East Gippsland.

Black Sheoak seeds

Saving Victoria's 'Snow in the Paddocks'


Sunshine Diuris

One of Victoria's rarest endemic orchids, the Sunshine Diuris (*Diuris fragrantissima*), was once common in western Melbourne. The first Europeans called the flowers 'Snow in the Paddocks' and orchid lovers would collect the beautifully scented flowers. However, the orchid began to 'melt away' as the grasslands they relied on were modified by livestock grazing, and cleared for crops and real estate.

Now the species persists as a small population of just thirty-seven wild plants at an industrial site in Melbourne's western suburbs. To understand and conserve the species, ARI scientist Mike Duncan is part of a collaborative effort to ensure its long-term survival. This has included some attempts to reintroduce cultivated plants. The outlook is positive as improved knowledge of how reintroduced individuals survive and reproduce will increase the chances of successful reintroductions, and perhaps return the snow to the paddocks of western Melbourne.

Newspaper article **Research article**

ARI leads national workshop on IUCN Red List of Ecosystems for alpine ecosystems under climate change

Understanding the risks of climate change and how it interacts with existing threats is needed to identify those ecosystems more vulnerable to collapse, and for developing management priorities to reduce the risk of collapse.

ARI and Deakin University hosted a national workshop that brought together leading risk assessment experts and alpine ecosystem ecologists from around Australia (including ARI scientists, Arn Tolsma, Annette Muir, Matt White and Tracey Regan). The workshop focused on assessing the risk of collapse of alpine ecosystems within Australia using the IUCN Red List of Ecosystems.

These assessments are providing valuable insights into risks to Victorian alpine ecosystems and ways forward to reduce these risks.


Attending experts


Alpine landscape

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Feature publications

Brown, G., Robertson, P. and **Fanson, B.**, (2020), Identifying a surrogate metric for monitoring the population status of a secretive habitat specialist, the heath skink *Liopholis multiscutata*, in south-eastern Australia, Austral Ecology 45: 206-214. https://doi.org/10.1111/aec.12848

Pacioni, C., Trocini, S., Wayne, A. F., Rafferty, C., and Page, M., (2020), Integrating population genetics in an adaptive management framework to inform management strategies. Biodiversity and Conservation 29, 947-966. https://doi.org/10.1007/s10531-019-01920-7

Macak, P.V. (2020), Nest boxes for wildlife in Victoria: an overview of nest box distribution and use. The Victorian Naturalist, 137: 4-14. https://search.informit.com.au/documentSummary;dn=034359217626573;res=IELHSS

Primack, R., **Regan,TJ.**, Devictor, V., Zipf, L., Godet, L., Loyola, R., Maas, B., Pakeman, R., Cumming, G., Bates, A., Pejchar, L., and Pin Koh L., (2020), Are scientific editors reliable gatekeepers of the publication process? Biological Conservation, 238: 108232. https://doi.org/10.1016/j.biocon.2019.108232

Forsyth, D. M., Pople, A., **Woodford, L.**, Brennan, M., Amos, **M., Moloney, P. D., Fanson, B.**, and Story, G., (2020), Landscape-scale effects of homesteads, water, and dingoes on invading chital deer in Australia's dry tropics. Journal of Mammalogy, 100: 1954-1965. https://doi.org/10.1093/jmammal/gyz139

Gibson, R., Danaher, T., Hehir, W. and **Collins, L.**, (2020), A remote sensing approach to mapping fire severity in south-eastern Australia using Sentinel 2 and Random Forest, Remote Sensing of Environment, 240: 111702. https://doi.org/10.1016/j.rse.2020.111702

Miller, A.D., Nitschke, C., Weeks, A., Weatherly, W.L., Heyes, S.D., **Sinclair, S.**, Holland, O.J., Stevenson, A., Broadhurst, L., Hoebee, S.E. and Sherman, C.D., (2020), Genetic data and climate niche suitability models highlight the vulnerability of a functionally important plant species from south-eastern Australia. Evolutionary Applications (early online). https://onlinelibrary.wiley.com/doi/abs/10.1111/eva.12958

Geary, W.L., Hradsky, B.A., **Robley, A.** and Wintle, B.A., (2020), Predators, fire or resources: What drives the distribution of herbivores in fragmented mesic forests? Austral Ecology: 45: 329-339. https://doi.org/10.1111/aec.12861

Burns, P.A., **Clemann, N.** and **White, M.**, (2020), Testing the utility of species distribution modelling using Random Forests for a species in decline. Austral Ecology (early online). https://doi.org/10.1111/aec.12884

Lilleyman, A., **Rogers, D.I.**, Jackson, M.V., Fuller, R.A., O' Brien, G., and Garnett, S.T., (2020), An artificial site provides valuable additional habitat to migratory shorebirds in a tropical harbour. Pacific Conservation Biology (early online). https://doi.org/10.1071/PC19036

van Harten, E., Reardon, T., Holz, P.H., Lawrence, R., Prowse, T.A.A., and **Lumsden, L.F.**, (2020), Recovery of southern bent-winged bats (*Miniopterus orianae bassanii*) after PIT-tagging and the use of surgical adhesive. Australian Mammalogy (early online), https://doi.org/10.1071/AM19024

Holz, P. H., Stent, A., **Lumsden, L. F.**, and Hufschmid, J. (2020), Trauma found to be a significant cause of death in a pathological investigation of Bent-winged Bats (*Miniopterus orianae*). Journal of Zoo and Wildlife Medicine, 50: 966-971. https://doi.org/10.1638/2018-0176

Holz, P., Hufschmid, J., Boardman, W.S.J., Cassey, P., Firestone, S., **Lumsden, L.F.**, Prowse, T.A A., Reardon, T., and Stevenson, M. (2020), Does the fungus causing white-nose syndrome pose a significant risk to Australian bats? Wildlife Research, 46: 657-668. https://doi.org/10.1071/WR18194

Straka, T.M., Lentini, P.E., **Lumsden, L.F.**, Buchholz, S., Wintle, B.A., and van der Ree, R. (2020), Clean and green urban water bodies benefit nocturnal flying insects and their predators, insectivorous bats. Sustainability, 12: 2634; https://doi.org/10.3390/su12072634

Griffiths, S.R., **Lumsden, L.F.**, Robert, K.A. and Lentini, P.E., (2020). Nest boxes do not cause a shift in bat community composition in an urbanised landscape. Scientific Reports, 10: 6210. https://doi.org/10.1038/s41598-020-63003-w

Knowledge transfer: some recent presentations and workshops

ARI seminars (subscribe here):

- 'Conservation in the Kimberly - a perspective from working within an NGO'. Over 50 people attended the seminar by Biodiversity 2037 Project officer Richard Faulkner (view here)
- 'How behavioural change science can be used to improve biodiversity conservation outcomes'. Over 150 people, from diverse organisations, attended the seminar by ARI co-supervised PhD student Melissa Hatty (view here)

World Congress of Herpetology:

- 'Optimizing habitat management for amphibians: from simple models to complex decisions' (Geoff Heard)

Australasian Bat Society Conference:

- 'Challenges in accurately determining population numbers and trends for critically endangered cave-dwelling bats' (Lindy Lumsden)

Victorian Biodiversity Conference:

- Symposium: 'How can science influence policy' (Josephine Machunter)
- 'Population estimate and rate of increase of southern right whales *Eubalaena australis* in south-eastern Australia' (Kasey Stamation)
- 'Representing biodiversity for Regional Forest Agreement negotiations' (Cindy Hauser)
- 'The joy of ecological monitoring: Victorian Volcanic Plains Grassland Monitoring Program 2.0' (Brad Farmilo)
- 'Broad-scale surveys for Leadbeater's Possum reveal widespread occurrence across the Central Highlands of Victoria' (Jemma Cripps)
- 'How many nest boxes are there in Victoria?' (Phoebe Macak)

VEPP Stream 1: Native Vegetation Investments Online Evaluation Workshop.

- 'Improving Native Vegetation Management and Monitoring Outcomes' (Claire Moxham)