



## 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.

## ARI shows environmental watering improves health of a declining floodplain tree

Dams, irrigation and land clearing have altered the natural flows of our rivers and the frequency of flooding events. The change in river flows paired with drought has caused declines in the health of floodplain vegetation, and the food and shelter this provides to wildlife. Environmental watering (water managed to benefit the environment) is being implemented to help restore the function of floodplain ecosystems.

In collaboration with several agencies, ARI's Claire Moxham is leading a [long-term research program](#) aimed at better understanding how the restoration of river flows (i.e. via environmental watering) can best be used to improve the health of floodplain trees. [ARI's research](#) has shown that environmental watering increased canopy health and the number of flowers, fruits and seeds being produced by Black Box trees in the floodplains at Hattah Lakes.

This research has generated new knowledge that forms the foundation of management recommendations which will lead to improved environmental watering strategies in north-western Victoria and the important floodplain communities they contain.



*A healthy Black Box community on a floodplain*

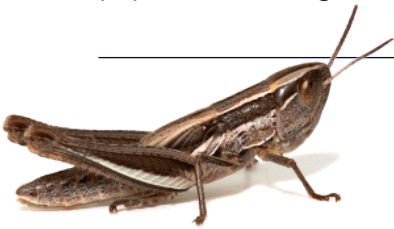
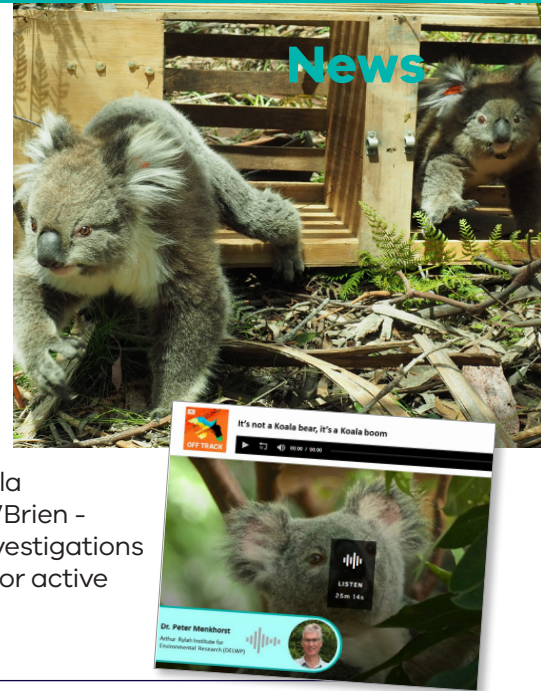
*Close up of Black Box seed (dark)*



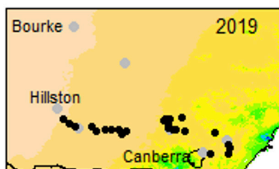
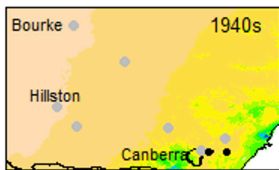
## It's not a Koala bear, it's a Koala boom

While the Koala has declined to critically low numbers in some parts of NSW and Qld, recent modeling shows [Koala numbers are holding up well in Victoria](#). ARI's Peter Menkhorst joined Ann Jones from ABC's 'Off Track' radio show and podcast to discuss the history of Victorian Koalas and the role of humans in shaping the current boom in population size.

Past research over a number of years about the impact of high-density Koala populations led ARI's Peter Menkhorst, Dave Ramsey, Arn Tolsma and Tim O'Brien – along with collaborators from DELWP and other agencies – to a series of investigations into Koala management such as quantifying the habitat triggers required for active population management and [the response of Koalas to translocation](#).



MACROTONA



## Long-term perspectives: Grasshopper country 70 years on

Research investigating global declines in insects have revealed the generally poor baseline that exists for assessing changes in insect diversity. To address this gap in knowledge some researchers are using an untapped source of baseline distribution data – Ken Key's 70 year old field notebooks!

ARI's Steve Sinclair accompanied entomologists from the University of Melbourne and Texas A&M University to survey locations across western NSW that were previously sampled during Ken Key's collecting expeditions. The research team [recently published the outcomes of the resurvey efforts](#) showing that many changes occurred over time, but there was no evidence of wholesale collapse of the grasshopper fauna.

Map showing the western expansion of Macrotona over the collecting periods with mean annual rainfall plotted in the background. Photo credit: Michael Kearney

## Combating the effects of river regulation and drought on turtles

River regulation (e.g. dams and other water diversions) can alter natural river flow regimes, reduce connectivity, and decrease food and habitat available for turtles. ARI's Katie Howard is leading a [study using acoustic radio-tracking tags on Murray River Turtles](#) (a threatened species in Victoria) to gain insights into the role of environmental watering (managed flooding for the environment) on the movement and habitat use of turtles.

This study will indicate where individuals are moving and how long they spend within broad areas, and can be used to compare if habitat use changes with water availability.

Understanding the relationship between water regulation and turtle movements, and how this may affect turtle health and reproduction will contribute to management aimed at improving turtle habitat.



Radio-tracking tag

Returning tracked Murray River turtle



## Influencing Change

### Sustainable management of Kangaroo populations in Victoria

The commercial harvesting of Kangaroos in Victoria requires strong regulation informed by science. This will ensure the long-term sustainability of kangaroo populations. ARI's Michael Scroggie and Dave Ramsey have created a [spatially explicit population model for grey kangaroos in Victoria](#). This research will guide the level of sustainable offtake from harvesting and culling programs.

The model incorporates kangaroo age, sex structure and dispersal capabilities making the model a more realistic representation of real kangaroo populations and provides managers with more flexibility to explore the implication of different management regimes. The model was used by DELWP to help set [Kangaroo harvest quotas for 2021](#) and continues to support the ecologically sustainable management of kangaroos in Victoria.



Eastern Grey Kangaroo  
(*Macropus giganteus*)

### Impacts of flooding and estuary mouth opening on estuary vegetation

Estuaries are aquatic systems that occur where fresh water meets the sea at the mouths of rivers. The unique fringing vegetation of estuaries – due to variation in geomorphology and rainfall – must be tolerant of flooding events that occur when sandbars develop, and an estuary mouth closes.

Estuary mouth-opening is rarely monitored, leaving a poor legacy of learning from experience. A team of ARI scientists, led by Steve Sinclair, have developed [a method of assessing fringing vegetation](#) and have now applied this method to assess [the condition of vegetation around most of Victoria's estuaries](#).

The condition scores and reports map out where degraded and high quality sites exist. It is expected that by quantifying and monitoring vegetation responses using this method (both under inundation and after opening) better management decisions will be made in the future. The team recently presented this work to

the Victorian Estuary Managers Working Group and are now proceeding to write up a paper for submission to a scientific journal.



Dead stems of Swamp Paperbark  
(*Melaleuca ericifolia*) killed by  
flooding due to mouth closure.

## Influencing Change

## Feature publications

Falster, D., Gallagher, R., Wenk, E., Wright, I., Indarto, D., Baxter, C., Andrew, S.C., Lawson, J., Allen, S., Fuchs, A.....  
**White, M.** et al. (2020) AusTraits – a curated plant trait database for the Australian flora. bioRxiv.  
<https://doi.org/10.1101/2021.01.04.425314>

Hoffmann, A., White, V., Jasper, M., Yagui, H., **Sinclair, S.**, Kearney, M. (2020) An endangered flightless grasshopper with strong genetic structure maintains population genetic variation despite extensive habitat loss. *Authorea* (preprint).  
<https://doi.org/10.22541/au.160403053.38828134/v1>

Leal, C.G., Lennox, G.D., Ferraz, S.F., Ferreira, J., Gardner, T.A., **Thomson, J.R.**, Berenguer, E., Lees, A.C., Hughes, R.M., MacNally, R., Aragão, L.E. (2020) Integrated terrestrial-freshwater planning doubles conservation of tropical aquatic species. *Science*, 370: 117-121.  
<https://doi.org/10.1126/science.aba7580>

Kearney, M.R., Hossain, M.A., **Sinclair, S.J.**, Song, H. (2020) Grasshopper country before and after: a resurvey of Ken Key's collecting expeditions in New South Wales, Australia, 70 years on. *Austral Entomology* (early online)  
<https://doi.org/10.1111/aen.12515>

**Muir, A.**, Heyes, S., Morgan, J., Hoebee, S., Enright, N., Whelan, R., **Geschke, A.**, Bennett, A., Walsh, S., Weatherly, W., Milne, R. (2020) Conservation challenges for Victorian

Banksias: Workshop May 2020. *Ecological Management & Restoration* (early online)  
<https://doi.org/10.1111/emr.12448>

Godinho, L.N., **Lumsden, L.F.**, Coulson, G., Griffiths, S.R. (2020) Flexible roost selection by Gould's wattled bats (*Chalinolobus gouldii*) using bat boxes in an urban landscape. *Australian Journal of Zoology* (early online)  
<https://doi.org/10.1071/ZO20022>

Humphries, T., Dowling, K., Turville, C., **Sinclair, S.**, Florentine, S. (2020) Ecology, distribution and control of the invasive weed *Nassella trichotoma* (Nees) Hack. ex Arechav.: A global review of current and future challenges. *Weed Research*, 60: 392-405.  
<https://doi.org/10.1111/wre.12449>

Humphries, T., Florentine, S.K., Dowling, K., Turville, C., **Sinclair, S.** (2020) Weed management for landscape scale restoration of global temperate grasslands. *Land Degradation & Development* (early online)  
<https://doi.org/10.1002/ldr.3802>

**Sinclair, S.J.**, Avirmed, O., **White, M.D.**, Batpurev, K., **Griffioen, P.A.**, **Liu, C.**, Jambal, S., Sime, H. and Olson, K.A. (2021) Rangeland condition assessment in the Gobi Desert: A quantitative approach that places stakeholder evaluations front and Centre. *Ecological Economics*, 181, p.106891.  
<https://doi.org/10.1016/j.ecolecon.2020.106891>

## Knowledge transfer: some recent presentations and workshops

**ARI seminars** (subscribe here on the [ARI website](#)):

▶ 'Nature connectedness: exploring integrated ArtScience experiences through head, heart, and hand.' (Christina Renowden; Collaboration and Communication)

'Exploring human attitudes and behaviours to improve conservation outcomes.' (Dr Lily van Eeden; Collaboration and Communication, RMIT/Behaviourworks postdoc)

▶ 'What about people? The shifting role of people in our ecological equations.' (Fern Hames; Collaboration and Communication)

**ARI Project Seminar**

▶ 'Revegetation benefits for biodiversity.' (Tim O'Brien, Sacha Jellinek, Angie Haslem)

**Off Track with Ann Jones (ABC Radio and Podcast)**

▶ 'It's not a Koala bear, it's a Koala boom' (Peter Menkhorst, Waterbirds and Wetlands Program)

**Melbourne Water Webinar Series**

▶ 'Turtles of Victoria' (Katie Howard, Threatened Fauna Program)

**SWIFFT Seminar – Native Grasslands**

▶ 'Two ways of knowing natural temperate grasslands of the Victorian Volcanic Plain' (Brad Farmilo [co-presenter], Vegetation Ecology and Threatened Flora Program)  
[Seminar notes](#)

**East Asian Australasian Flyway Shorebird Science Meeting**

▶ 'The importance of supratidal foraging to coastal shorebirds: a case study from the Western Treatment Plant, Australia' (Danny Rogers; Waterbirds and Wetlands Program)

**Decision Analysis Affinity Group Virtual Conference**

'Using Decision Analysis to Integrate Biodiversity into Fire Management Planning' (Josephine MacHunter, Fire Ecology Program)

Further info: [research.ari@delwp.vic.gov.au](mailto:research.ari@delwp.vic.gov.au)