



Centre for
Biodiversity
Analysis



Centre for Biodiversity Analysis 2021-22 Annual Report

October 2022

Through science and training, with a focus on advanced applications of genomics and spatial environmental analysis, the mission of the Centre for Biodiversity Analysis is to improve the understanding, protection and resilience of Australia's unique biodiversity and ecosystems in the face of accelerating environmental change. In 2022 we reached a significant, and impressive, milestone for any scientific enterprise - 10 years of operation.

The CBA was established in 2012 as a collaborative initiative of ANU and CSIRO, with the University of Canberra joining in 2018. Thanks to the strong support and participation from these three partner institutions, the CBA celebrated its 10th birthday in July 2022.

10 years of the Centre for Biodiversity Analysis 2012-2022 - a summary:

- Over 70 research groups from across ANU, UC and CSIRO have engaged with the CBA via Ignition Grant, Synthesis Groups and Visiting Scientist funding programs (plus many more through workshop, seminar, symposia and conference attendance).
- We have funded 73 Ignition Grants and 14 Synthesis Groups; hosted 42 workshops in total (including 13 ECR- led training workshops); and supported 21 visiting scientists, who in addition to interacting with their ANU, CSIRO and/or University of Canberra hosts, also presented training workshops and/or seminars during their time in Canberra.
- Targeted capacity building and support has led to over 20 co-supervised Honours, Masters and PhD Students being facilitated through the Centre.
- CBA-funded research and other activities has resulted in 30+ publications. Further funding initiated from CBA-funded projects has included SIEF-RI (including the Ecogenomics and Bioinformatics Laboratory), ARC Linkage, Discovery and LEIF, CSIRO FSP, ABRS and several Bioplatforms Australia initiatives.
- Notable progress has been made in taking biodiversity science from the lab into the policy landscape with the CBA's Synthesis Groups and Knowledge Broker making significant connections with Federal, State and ACT governments. As part of this we have hosted 15+ knowledge exchange events including round-tables, workshops, symposia and conferences.

To celebrate the diversity and depth of collaborative science accomplished by the CBA over the last 10 years, over 70 researchers from across ANU, UC and CSIRO (and their collaborators and stakeholders) attended the CBA's 10th Anniversary Science Symposium in October. The program showcased a wonderfully diverse collection of CBA-funded research, highlighting the value of the Centre and the level of collaboration, and future research, it has generated across its three partner institutes, and beyond. The diversity, quality and breadth of the science and the outstanding, and sometimes serendipitous outcomes, were impressive. Even more so considering the modest support provided by the CBA.

In April, the CBA co-hosted with the ACT Government a 1-day symposium on 'Climate Change Adaptation for Environment and Heritage in the ACT'. Attended by ACT Minister for the Environment Rebecca

Vassarotti, ACT Minister for Land Management Mick Gentleman, and (over 100) ACT managers and policy makers and researchers from ANU, CSIRO and University of Canberra, the symposium was aimed to kick start detailed planning in the area of climate adaptation in the ACT by exposing government managers, policymakers and scientists to the cutting-edge research and thinking of ANU, University of Canberra and CSIRO on climate change adaptation.

This year the CBA also facilitated some of the first Industry PhD internships at ANU, in collaboration with ANU's College of Science and Canberra-based genotyping company Diversity Arrays Technology (DART). DART has provided 3 fully-funded 6 month internships with a total support package of \$20,000 to for students to work with them across their areas of operation in statistics, programming and genomic DNA extraction. These will be eligible for the new RTP weighting which will incorporate the additional weighting of 2.0 within the current RTP funding allocation formula to each research doctorate student reported as completing an eligible industry internship.

With COVID-related restrictions relaxing a little, we were delighted to host our first in-person technical training workshop in over a year. Over 25 students and researchers participated in May's NicheMapR technical workshop at the ANU presented by Prof Michael Kearney, from the University of Melbourne. We also continued our funding programs, with 1 new Synthesis Group and 3 new Ignition Grant proposals awarded this year. Results from previously funded CBA projects also continued to be published with 5 new publications reported.

As restrictions (hopefully) continue to ease, the CBA has an exciting range of workshops, symposia and meetings lined up for 2023, including international visitors Pam and Doug Soltis from Florida Museum/ University of Florida; Camille Roux from Université de Lille; Rudolf Meier from the Museum fur Naturkunde, Berlin; Mario Dos Reis from Queen Mary University of London; and Scott Edwards from Harvard University.

Summary of the activities coordinated, facilitated and funded by the Centre for Biodiversity Analysis (Year 10, 2021-22).

Interactions and collaborations in **bold**. Detailed information on each activity is available on the CBA webpage via links.

Date	Activity	Type	Notes
Oct 2021	Developing best-practice for eDNA in monitoring and management	Symposium & workshop	CBA-facilitated online mini-symposium and workshop to establish the National Environmental DNA Test Protocols (NETPs). Speakers: Alejandro Trujillo-Gonzalez (UCanberra), Geoff Grossel (Department of Agriculture, Water and the Environment), Jodie Van de Kamp (CSIRO), Mark Sykes (Fera Science Ltd, UK), Nicole White (Curtin University). Proceeding workshop to discuss the draft guideline had 50 participants from a wide cross-section of Government departments, other stakeholders and academics from Australia and New Zealand.
Oct 2021	Liaison Committee Meeting	Meeting	
Oct 2021	Forbes, O., et al. 2021. Bayesian spatio-temporal modelling to assess the role of extreme weather, land use change and socio-economic trends on cryptosporidiosis in Australia, 2001–2018. <i>Science of The Total Environment</i> , 791.	Publication	Project: Biodiversity change: A risk factor for human health?
Mar 2022	Liaison Committee Meeting	Meeting	
Mar 2022	Round 7 of Synthesis Group and Round 14 of Ignition Grant funding announced. Ignition+ grants (up to \$50K) introduced in this round which aimed to develop substantial new capabilities and enduring research collaborations that will benefit ANU, CSIRO and UC.	Funding program – CBA grants	1 Synthesis Group and 3 Ignition Grant proposals received.
Mar 2022	OneDArT: Developing an ecological data capture, storage and analysis platform	Round table workshop	CBA-facilitated meeting - Stakeholder meeting for the DAiT PIP project (UC, DAiT, ANU, ACT Government) - focus on field metadata use cases.
Apr 2022	Climate Change Adaptation for Environment and Heritage in the ACT	Workshop, Policy knowledge exchange	CBA-facilitated workshop in collaboration with the ACT Government to expose government managers, policymakers and scientists to the cutting-edge research and thinking of ANU, UCanberra and CSIRO on climate change adaptation.
May 2022	Introduction to molecular lab fundamentals	Training workshop	Run by the EBL for new Hons and PhD students (and others) who don't have a strong genetics/molecular background.

Date	Activity	Type	Notes
May 2022	Mechanistic niche modelling using NichemapR	Technical training workshop	CBA workshop on using NichemapR software package to understand how climate constrains the distribution and abundance of organisms, presented by Michael Kearney, University of Melbourne
Jul 2022	The Centre for Biodiversity Analysis turns 10		Thanks to the strong support and participation from our three partner institutions, ANU, UCanberra and CSIRO , the CBA celebrated its 10 th birthday in July 2022.
Jul 2022	DARt industry PhD internships advertised	HDR student internships	CBA facilitated, with the ANU College of Science, 3 fully-funded 6 month internships (\$20,000 each). These will be eligible for the new RTP weighting.
Jul 2022	Synthesis groups approved by Liaison Committee:		1 proposal funded (CBA funding: \$25,000)
1	MegaMove: a global synthesis for informing marine megafauna conservation	Synthesis Group	Ana Sequeira, ANU ; Anthony Richardson, Karen Evans, CSIRO ; Mirjam van der Mheen, Hannah Calich, Michelle Van Compernelle, Abbie Rogers, UWA ; Jorge Rodriguez, IFISC ; Nuno Queiroz, CIBIO ; Sarah Marley, SRUC ; Carlos Duarte, KAUST ; David Sims, MBA ; Graeme Hays, Deakin ; Victor Eguiluz, IFISC ; Rob Harcourt, Macquarie ; Mark Meekan, AIMS ; Dan Costa, UCSC
Mar 2022	Liaison Committee Meeting	Meeting	
Mar 2022	Hua, X., Cardillo, M., & Bromham, L. 2022. Adapting to extremes: Reconstructing evolution in response to changing climate over time and space in the diverse Australian plant genus <i>Acacia</i> . <i>Journal of Biogeography</i> , 49, 727–738.	Publication	Ignition Project: Developing new methods for using distribution data to identify taxa that can tolerate extreme conditions
Mar 2022	Campbell, C. D., Gleeson, D. M., Furlan, E. M., Muirhead, K. A., & Caron, V. 2022. Detection of a cryptic terrestrial insect using novel eDNA collection techniques. <i>Environmental DNA</i> , 4, 820–829.	Publication	Ignition Project: eDNA: The next frontier of pest and biological control detection in agriculture
Mar 2022	Sharpe, Lynda & Prober, Suzanne & Gardner, Janet. 2022. In the Hot Seat: Behavioural Change and Old-Growth Trees Underpin an Australian Songbird's Response to Extreme Heat. <i>Frontiers in Ecology and Evolution</i> . 10.	Publication	Ignition Project: Using data on avian performance to enhance Mallee restoration under climate change
Jun 2022	Ashman Lauren G., Hartley Diana, Jin Mengjie, Rowell David M., Teasdale Luisa, Ślipiński Adam, Zwick Andreas. 2022. <i>Rhytiphora</i> : a phylogenetic and morphological study of Australia's largest longhorn	Publication	Ignition Project: Phylogeny of the longhorn beetle genus <i>Rhytiphora</i> (Coleoptera: Cerambycidae)

Date	Activity	Type	Notes
	beetle genus (Coleoptera: Cerambycidae). Invertebrate Systematics 36, 493-505.		
Jul 2022	Ignition grants approved by Liaison Committee:		3 proposals funded (CBA funding: \$75,000)
1	Do cultivars degrade genetic variation in conspecific remnant populations?	Ignition Grant	William Higgis, Stephen Sarre, UC ; Joanne Bennett, ANU , Rebecca Jordan, CSIRO
2	Spider wasp venoms: past and present.	Ignition Grant	Daniel Dashevsky, Juanita Rodriguez, CSIRO ; Alexander Mikheyev, ANU ; Andrew Walker, Sam Robinson, UQLD
3	Environmental DNA for aquaculture biosurveillance - using harmful algae <i>Heterosigma</i> as a model.	Ignition Grant	Tansyn Noble, Luana Lins, James Wynne, Richard Taylor, Anusuya Willis, CSIRO ; Alejandro Trujillo Gonzalez, UC ; Benjamin Schwesinger, ANU
Aug 2022	Climatic refugia in the coldest neotropical hotspot, the Andean páramo	Visiting Scientist seminar	CBA visiting scientist Gwendolyn Peyre, University of the Andes , hosted by Adrienne Nicotra (ANU) and Ben Kefford (UC).
Aug 2022	Putting pen to paper: Scientific writing for researchers	ECR-led training workshop	Writing workshop to provide postgraduate students and ECRs with the foundational skills to write well, and equip them with techniques for tackling academic writing of any kind.
Aug 2022	OneDART end-user engagement workshop: data quality and analytics	Workshop	CBA-facilitated meeting - Stakeholder meeting for the DART PIP project (UC, DART, ANU, ACT Government) - focus on data quality and analytics.
Sep 2022	Plant invasions in the northern Andes: a socio-ecological perspective	Visiting Scientist seminar	CBA visiting scientist Gwendolyn Peyre, University of the Andes , hosted by Adrienne Nicotra (ANU) and Ben Kefford (UC).
Oct 2022	CBA 10th anniversary science symposium	Symposium & social function	A showcase of CBA-funded research to celebrate the Centre's 10th year. Presentations from ANU, CSIRO and UC students and researchers.

CBA Projects in progress (funded in previous 12 months)

Project	Update (provided by grant recipients)
<p>Precision Landscape Regeneration – integrating climate change responses, production and biodiversity (Nov 2020)</p> <p>Justin Borevitz (RSB, ANU), Kirsty Yeates (RSB, ANU), Wolfram Buss (RSB, ANU), Eelco Rohlings (Earth Sciences, ANU), Albert Van Dijk (Fenner, ANU), Michelle Young (Fenner, ANU), Craig Strong (Fenner, ANU), Ida Kubiszewski (Crawford Public Policy, ANU), Bob Costanza (Crawford Public Policy, ANU),</p>	<p>Synthesis Group workshop was delayed due to COVID-related restrictions. Some funds will be used for the ARC ITRH Precision Agriculture for Landscape Regeneration proposal workshop with Fiona Cameron as the host/convenor (accommodation and catering) (Sept 2022).</p>

Project	Update (provided by grant recipients)
<p>Francis Chiew (Land & Water, CSIRO), Stuart Brown (manager Boorowa Agricultural Research Station, CSIRO), Sue McIntyre (Land & Water, CSIRO / Fenner, ANU), Rose Andrew (UNE), Phillipa McCormack (UTAS), Rowan Reid (Aust. Agroforestry), Henry Adams (Common Capital), Liz Clarke (Soils For Life / Fenner, ANU), Luke Peel (The Mulloon Institute), Susan Orgill (NSW DPI / Fenner, ANU) Cris Brack (Fenner, ANU / Independent), Kate Andrews (NRM Australia / Fenner, ANU).</p>	
<p>Using thermal tolerance limits to understand species susceptibility under climate change (Nov 2020)</p> <p>Karel Mokany (Land & Water, CSIRO), Sam Andrew (Environomics FSP, CSIRO), Joanne Bennett (CEEG, UC) Rachael Gallagher (Macquarie), Pieter Arnold (RSB, ANU), Octavio Jimenez Robles (RSB, ANU), Alicia Cook (UTS), Bryony Horton (Department of Planning, Industry and Environment), Enrico Rezende (Pontificia Universidad Católica de Chile), Jennifer Sunday (McGill University), Lydia Guja (ANBG / ANH, CSIRO), Adrienne Nicotra (RSB, ANU), Andrea Leigh (UTS), Rosalie Harris (RSB, ANU), Veronica Briceño (RSB, ANU), Michael Kearney (UMelbourne), Carla Sgró (Monash), Sharon Robertson (UWollongong), Timothy Feeley (UBritish Columbia), Ben Kefford (CEEG, UC).</p>	<p>Completion date extended to Nov 2022 due to COVID-related travel restrictions. Synthesis Group workshop planning is underway. International participants have been approached. Workshop is planned for mid-2022.</p>
<p>Comparative phylogeography of a unique obligate pollination mutualism (Nov 2020)</p> <p>Liz Milla, Francisco Encinas-Viso (ANH, NRCA, CSIRO), Bernd Gruber (CEEG, IAE, UC).</p>	<p>Completion date extended to Dec 2022 due to COVID-related travel restrictions. Samples will be collected in August. The CBA funding will be spent on DART sequencing soon after we collect the samples (around September), with the writing up of results following that.</p>
<p>Developing a collections-based reference dataset for species identification in environmental DNA (eDNA) monitoring (Nov 2020)</p> <p>Linda Neaves, Adrian Manning (FSES, ANU), Sue McIntyre, Andrew Young, Linda Broadhurst, Andreas Zwick (NRCA, CSIRO).</p>	<p>Lab work was limited during COVID lockdowns when access to the Collection. Some samples have been collected. Lab work should be completed by the end of 2022.</p>

