



Centre for
Biodiversity
Analysis



Centre for Biodiversity Analysis 2018-19 Annual Report

October 2019

Established in 2012, the CBA is a joint initiative of ANU and CSIRO founded on world-class biodiversity science spanning evolutionary biology, genomics, bioinformatics, spatial modelling, population and ecosystem ecology, and paleoecology; and key infrastructure such as the National Biological Collections and advanced genomic and computer laboratories, including the Ecogenomics and Bioinformatics Lab (EBL).

Over 2018-19 the Centre for Biodiversity Analysis (CBA) has continued to work towards its goal of achieving impact in biodiversity discovery, management and training through collaborative evolutionary biology. The capacity and reach of the CBA were enhanced with the University of Canberra (UC) joining the Centre at the beginning of 2018, building a large, interactive research community of over 70 research and lab groups across our three partner institutions.

A major objective of the CBA is to exchange knowledge, perspectives and challenges amongst scientists and policy makers, and find ways to effectively engage, now and into the future. This continued to advance with the appointment of the UC-based 0.5FTE Knowledge Broker this year. Paula Doyle will play a key role in forging new partnerships by facilitating two-way exchanges of information between knowledge producers (biodiversity scientists at ANU, UC and CSIRO) and those who use this knowledge (environmental policy makers and managers).

Via the Ignition Grant and Synthesis Group programs - our key tools for facilitating collaboration across our three partner institutions - 17 novel collaborative endeavours were initiated in the past 12 months. Many of these new Ignition Projects and Synthesis Groups will advance our long-term goal of taking evolutionary biology from the lab into the policy landscape via new collaborations with the Fenner School of Environment and Society (FSSES) and the Institute for Applied Ecology (IAE) at U Canberra, and connections with State/Territory and Federal government agencies.

CBA Director Craig Moritz chaired the multidisciplinary expert panel, convened by the Australian Academy of Science, which has produced an independent report on the disastrous Murray-Darling Basin fish kills that occurred this summer.

Five new student projects were funded under our Student Awards program, and seven students (2 Honours, 2 Masters and 3 PhDs) are currently working with ANU and CSIRO supervisors under the CBA Umbrella Agreement. To simplify HDR student appointments, with the ANU contracts team, we have begun to use the CBA Umbrella Agreement for co-supervised ANU-CSIRO students if project is within the scope of the CBA (even if CBA is not providing any funding). An ECR Register for CBA Post docs and students has been established to identify CBA-affiliated ECRs, and help provide collaborative opportunities such as training workshops, project funding, etc.

The Synthesis Group "Using expert elicitation to identify impacts of climate change on Australia's alpine animals" funded in our first round in early 2018 assisted with the development of new funding opportunity led by Adrienne Nicotra - "Australian mountain environmental research infrastructure facility" (LIEF grant, \$1.12m).

Results from three previously CBA-funded projects were published, co-authored by researchers from CBA-partner institutions (ANU and CSIRO), other universities and State/Territory and Federal government agencies.

The CBA continued its diverse program of training workshops presented by leading international and local researchers. CBA hosted, and provided partial support to, sabbatical leave visits by internationally renowned scientists, each of whom interacted widely with CBA members and gave seminars and workshops: Matthew Hahn and Leonie Moyle (Indiana), Jeff Good (Montana) and Jeremy Brown (Louisiana). Four advanced training workshops were facilitated, attracting over 150 participants from our partner institutions and across Australia. A further three discussion-based workshops were also hosted

The current CBA agreement with ANU, CSIRO and UC ends in June 2020 and we are now exploring options for refunding of the Centre for an additional 3-5 years.

Summary of the activities coordinated, facilitated and funded by the Centre for Biodiversity Analysis (Year 7, 2018-19).

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

Date	Activity	Type	Notes
Oct 2018	National Institutes Grant reporting	Reporting	NIG progress report
Oct 2018	Dinnage, R. et al. 2018. Larger plants promote a greater diversity of symbiotic nitrogen-fixing soil bacteria associated with an Australian endemic legume. <i>Journal of Ecology</i> https://doi.org/10.1111/1365-2745.13083	Publication	CBA-funded Ignition Project: Environmental drivers of Acacia-associated symbiotic microbe diversity
Dec 2018	SNPs in population- and phylogenomics	Technical workshop	3-day workshop at the University of Canberra. Presenters: Adam Leaché, Washington ; Remco Bouckaert, Auckland ; Luciano Beheregaray, Chris Brauer, Flinders ; Sam Banks, CDU ; Bernd Gruber, Arthur Georges, UCanberra ; Renee Catullo, Justin Borevitz, Craig Moritz, ANU ; Andrzej Kilian, DART . CBA funding: Invited speakers' flights/accommodation; catering costs for tea breaks and lunches and dinner: \$13,500
Dec 2018	Phylogenomics workshop using IQ-TREE	Technical workshop	1-day workshop at ANU. Presenters: Minh Bui & Rob Lanfear, ANU .
Jan 2019	Jeff Good's sabbatical	Visiting scientist seminar & workshop	Matched by RSB (\$5K); CBA funding: \$5,000.00
Jan 2019	Bowd, E., et al. 2019. Long-term impacts of wildfire and logging on forest soils. <i>Nature Geosci</i> 12, 113-118. https://doi.org/10.1038/s41561-018-0294-2	Publication	Ignition Project: The Untold Story of Underground Communities: Fungi and Soil Seed-banks in Mountain Ash forests
Feb 2019	Adaptive radiation on remote islands: extrinsic and intrinsic barriers in shaping diversity	Seminar	Speaker: Rosemary Gillespie, University of California, Berkeley . Lunch after seminar. CBA funding: \$525.00
Feb 2019	Taming the BEAST Down Under	Technical workshop	Workshop hosted at USydney. CBA sponsored ECR fee-waiver scholarships (Travel Grants). Presenters: Alexei Drummond, Auckland ; Remco Bouckaert, Auckland ; Tanja Stadler, ETH Zürich ; Mike Lee, Flinders & SAM ; Sebastian Duchon, Melbourne . CBA funding: \$5,000.

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Feb 2019	Report: Investigation of the causes of mass fish kills in the Menindee Region NSW over the summer of 2018–2019	Knowledge exchange/ policy engagement	In response to the initial fish kill events, Federal Labor requested scientific advice from the Australia Academy of Science . CBA Director Craig Moritz chaired the AAS multidisciplinary expert panel.
Mar 2019	Round 3 Synthesis Group and Round 10 of Ignition Grant funding announced.	CBA grants	3 Synthesis Group and 10 Ignition Grant proposals received
Mar 2019	The evolution of seasonal camouflage	Visiting scientist seminar	Speaker: Jeff Good, University of Montana
Mar 2019	Bayesian phylogenetics and macroevolution in RevBayes	Technical workshop	3-day workshop at ANU. Presenter: Tracy Heath, Iowa State . CBA funding: Invited visitor's flights and catering costs for tea breaks = \$5000.
Mar 2019	Synthesis groups approved by Liaison Committee:		2 proposals funded (CBA funding: \$36,288)
1	Using expert elicitation to identify impacts of climate change on Australian species	Synthesis Group	Meeting, app development. Adrienne Nicotra, Rachel Slatyer, Sonya Geange (RSB, ANU), Lydia Guja (CSIRO/ANBG), Dave Albrecht, Sam Andrew (ANH, CSIRO) + participants from NSW Office of Environment and Heritage, Sydney Botanic Gardens, Dept of Environment , and several other agencies and universities. CBA funding: \$11,368
2	Genomic empowerment of Australian bee systematics, taxonomy, conservation and diversity	Synthesis Group	Juanita Rodriguez, Olivia Evangelista (ANIC, CSIRO), Francisco Encinas-Viso (ANH, CSIRO), Saul Cunningham, Julian Brown (Fenner, ANU), Sasha Mikeyev (RSB, ANU), Simon Tierney, Olivia Bernauer, Laura Brettell (HIE, Western Sydney), Katja Hogendoorn (WAI, Adelaide), Michael Schwarz (Flinders), Tobias Smith (Queensland), Remko Leijs (SA Museum), Terry Houston (WA Museum), Ken Walker (Mus Vic) Michael Batley (Aust Mus), Eduardo Almeida (University of Sao Paulo), Sydney Cameron (Illinois at Urbana-Champaign), Bryan Danforth (Cornell), Laurence Packer (York), Romina Rader (New England), Sandra Rehan (New Hampshire). CBA funding: \$24,920
Mar 2019	Ignition grants approved by Liaison Committee:		7 proposals funded (CBA funding: \$68,026)
1	What do humans and insects have in common? Using advances in human genetics to understand insecticide resistance in the cotton bollworm, <i>Helicoverpa armigera</i>	Ignition Grant	Student project - may turn it into a PhD project. Amanda Padovan, Tom Walsh (L&W, CSIRO), Dan Andrews (JCSMR, ANU), Angela McGaughran (E&E, RSB, ANU). CBA funding: \$9,918
2	The role of honey bee microbiome evolution in adaptation to environmental stress	Ignition Grant	Student project. Alexander Mikheyev (E&E, RSB, ANU), Amy Paten (L&W, CSIRO), Vienna Kowallik (OIST), Kiera O'Halloran (Honours student, RSB, ANU). CBA funding: \$10,000
3	Building a reference genome for a non-model species: <i>Wahlenbergia ceracea</i>	Ignition Grant	Student project. Rocco Notarnicola (E&E, ANU PhD student), Loeske Kruuk (E&E, RSB, ANU), Benjamin Schwessinger, Diep Ganguly (PS, RSB,

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			ANU), Alexander Schmidt-Lebuhn (ANH, NRCA, CSIRO). CBA funding: \$10,000
4	Barcoding and capture-based approaches for eggshell genomics to improve biodiversity assessment in Australian birds	Ignition Grant	Alicia Grealy, Naomi Langmore (E&E, RSB, ANU), Clare Holleley (ANWC, CSIRO). CBA funding: \$10,000
5	Can environmental selection on physiological phenotypes help explain the success of invasive species in Australian rainbowfishes?	Ignition Grant	Peter Unmack (IAE, UC), Chris Fulton (E&E, RSB, ANU). CBA funding: \$10,000
6	Arbovirus surveillance: Invertebrate-borne viruses as biocontrol agents	Ignition Grant	Leon Court, Chris Hardy, Matthew Morgan (L&W, CSIRO), Michael Frese (IAE, UC). CBA funding: \$9,000
7	Developing DNA-based non-invasive population monitoring for the threatened Broad-toothed Rat to assist in threat management outcomes	Ignition Grant	Stephen Sarre, Cat Campbell (IAE, UC), Wendy Ruscoe (Health and Biosecurity, CSIRO), Mel Schroder (NSW-NPWS). CBA funding: \$9,108
Mar 2019	CBA Knowledge Exchange Specialist position advertised	Knowledge exchange/ policy engagement	To increase impact through stronger engagement with end-users the CBA intends to appoint a 0.5FTE Knowledge Broker to be based at UC.
Apr 2019	Integrating traits across genes and trees: a semantic approach	Seminar	Speaker: Paula Mabee, University of South Dakota
Apr 2019	Population genomics for non-model species	Symposium & workshop	Speakers: Matt Hahn, Leonie Moyle, Dan Vanderpool, Indiana University ; Jeff Good, UMontana , Jason Bragg, Royal Botanic Gardens Sydney , Helen Bothwell, Angela McGaughran, Sasha Mikheyev, Craig Moritz, Kevin Murray, Allen Rodrigo, ANU ; Tom Walsh, Amanda Padovan, CSIRO . CBA funding: catering costs for tea breaks & social function \$500.
April 2019	QuestaGame 2019 BioQuest	Outreach	Sponsorship and promotion of QuestaGame 's citizen science University bioQuest. CBA funding: 1,650.00
May 2019	New CBA Knowledge Broker appointed	Knowledge exchange/ policy engagement	Paula Doyle appointed the new CBA Knowledge Broker, who will be based at the Institute of Applied Ecology at the University of Canberra, Monday-Wednesday. Paula comes to the CBA from a science education background and will use her wide-ranging communication and relationship-building skills at the interface of CBA research and environmental science policy.
June 2019	Model-based species delimitation workshop	Technical workshop	3-day workshop at ANU. Presenters: Lacey Knowles, Arnaud Becheler, University of Michigan and Jeet Sukumaran, San Diego State University
June 2019	Why are there so many species? Form, function, and biodiversity in Papuan microhylid frogs	Seminar	Speaker: Marguerite Butler, University of Hawaii
June 2019	National Environmental Science Program - CBA discussion	Round table workshop /	Discussion to develop a response on the behalf of the CBA to the Australian

Date	Activity	Type	Notes
		policy engagement	Government consultation on the future of the National Environmental Science Program (NESP) .
Jul 2019	Emerging Areas of Research in Reintroduction Biology	Symposium	Speakers: Laurence Berry, AWC ; Kathy Belov, USyd ; Janine Deakin, UCan ; Deon Gilbert, ZoozVic ; Catherine Grueber, USyd ; Richard Jakob-Hoff, AuckZoo ; Gordon Luikart, UMontana ; Adrian Manning, ANU ; Nicki Mitchell, UWA ; Edward Narayan, WSyd ; Ben Philips, UMelb ; Jenny Pierson, Tidbinbilla; Catherine Price, USyd ; Ben Scheele, ANU ; Helen Taylor, R Zoo Soc Scotland ; Andrew Weeks, UMelb ; Erin Vaughn, CSIRO ; Tom Rowell, ANU .
Aug 2019	Landscape Genomics	Symposium & workshop	Speakers: Brenna Forester, Colorado State University , Helen Bothwell, ANU , Collin Ahrens, Western Sydney University , Bernd Gruber, University of Canberra , Karel Mokany, CSIRO . CBA funding: Flights & accommodation - Brenna Forester; catering; accommodation Colin Ahrens (\$7,000).
Sept 2019	Invading the desert: allotetraploid <i>Nicotiana</i> sect. <i>Suaveolentes</i> (Solanaceae) radiates in the Australian arid zone in the last million years	Seminar	Seminar presented by CSIRO Herbarium visitor Mark Chase (Royal Botanic Gardens, Kew). Lunch following seminar: \$300.
Oct 2019	Round 4 Synthesis Group and Round 11 of Ignition Grant funding announced.	CBA grants	2 Synthesis Group and 6 Ignition Grant proposals received
Oct 2019	Ceccaroni, L. et. al. 2019. Opportunities and Risks for Citizen Science in the Age of Artificial Intelligence. <i>Citizen Science: Theory and Practice</i> . 4.	Publication	Workshop: Citizen science and biodiversity in the age of artificial intelligence

CBA Projects in progress (funded in previous 12 months)

Project	Update (provided by grant recipients)
Telomere length as a biomarker for stress in an Australian pest moth (Honours project) (Mar 2018) Kerensa McElroy CSIRO; Angela McGaughan, ANU, Nonthakorn (Bea) Apirajkamol (RSB Masters student)	Nonthakorn Apirajkamol's Masters thesis was submitted Oct 2019: <i>The effects of development and chronic oxidative stress on telomere length in an agricultural pest moth, Helicoverpa armigera</i> . The project will result in at least one publication - we're working on this now. We are hoping that Bea will end up doing a follow-up PhD in collaboration with myself and/or CSIRO/ANU, but we're working on options right now.
Wealth from weeds: Isolation of fungal disease resistance genes from invasive weeds for integration into crop plants (Mar 2018)	The two ignition grants that I kindly received from CBA have resulted in the generation of a large amount of very interesting genomic-based data. We are currently in the process of completing the analysis of this data and preparing two manuscripts which we aim to submit for publication within

Project	Update (provided by grant recipients)
<p>Gavin Hunter, CSIRO; Sambasivam Periyannan, ANU</p> <p>Elucidating the diversity and population structure of the invasive coastal weed <i>Euphorbia paralias</i> (Sea spurge) in Australia (Mar 2018)</p> <p>Gavin Hunter, Ben Gooden, CSIRO; Celeste Linde, ANU</p>	<p>the first half of 2020. Manuscripts generated from the ignition grants are envisaged to form the basis of future funding applications. Importantly, these two ignition grant projects have resulted in the establishment of long-term collaborations with Dr. Celeste Linde and Dr. Sambasivam Periyannan who are based at ANU and with whom I aim to undertake more collaborations in the future.</p>
<p>Evolution of chemical defences in Tasmanian dalodesmid millipedes (Diplopoda: Dalodesmidae) (Honours project) (Mar 2018)</p> <p>Juanita Rodriguez, CSIRO; David Rowell, ANU; Hannah Zurcher (RSB Hons student)</p>	<p>Hannah Zurcher's honours thesis was submitted Oct 2019: <i>Evolution of chemical defenses in Tasmanian dalodesmid millipedes</i>. From this work, we have produced two conference papers and submitted one manuscript describing a new genus of millipede.</p>
<p>eDNA: The next frontier of pest and biological control detection in agriculture (Sept 2018)</p> <p>Valerie Caron CSIRO; Dianne Gleeson, Cat Campbell, UC</p>	<p>The project is completed. We are working on a publication for Environmental DNA journal. Hopefully we will submit it in January. The collaboration has been very good. I am unsure if any grants will come out of this. We had discussions with our main funder, and it looks like this is not one of their priority at the moment.</p>
<p>Evo-devo in non-model beetles by studying herbivorous ladybirds (Coccinellidae) (Sept 2018)</p> <p>Hermes Escalona, Adam Slipinski, CSIRO; Maja Adamska, ANU; Yoshinori Tomoyasu, Miami</p>	<p>Collaborator Yoshinori Tomoyasu (Miami University) will visit Canberra in Feb 2020 as part of this project. He will present a CBA seminar: "Exploring the evolutionary origin of insect wings from an evo-devo perspective".</p>
<p>Evolution of Müllerian mimicry in Australian velvet ants (Hymenoptera: Mutillidae) (Sept 2018)</p> <p>Juanita Rodriguez, Thekla Pleines, CSIRO; Renee Catullo, ANU; Claudia Schipp, UQLD; Kevin Williams, CDF, USA; Joseph Wilson, USU-Tooele</p>	<p>We had a planned a manuscript submission by December 2019, however we have had delays in the molecular laboratory work and have not been able to complete the manuscript yet. Could we request an extension to December 2020? Extension granted.</p>
<p>Laser scanning ecosystem structure to map habitat quality and measure landscape change (Sept 2018)</p> <p>Kara Youngentob, Adrian Manning, ANU; Tommaso Jucker, CSIRO, Shukhrat Shokirov (RSB PhD student)</p>	<p>Shukhrat Shokirov was successful in receiving a top-up scholarship PhD from CSIRO. This provides an additional 20k for his project and another 14k top-up to his stipend over the next two years.</p>
<p>Developing hyRAD-X capabilities in the CBA for population genomics and identification of cryptic species: a high-throughput tissue to SNP pipeline, tested in <i>Monotoca</i> (Ericaceae) (Sept 2018)</p> <p>Todd McLay, Sarah Mathews, Dave Albrecht, Luisa Teasdale, CSIRO;</p>	<p>No update provided.</p>

Project	Update (provided by grant recipients)
Kevin Murray, Niccy Aitken, Ashley Jones, ANU	
<p>New approaches to understanding trophic ecology in marine ecosystems for industry application (Sept 2018)</p> <p>Allen Rodrigo, Louis Ranjard, ANU; Dianne Gleeson, Elise Furlan, UC; Simon Nicol, Dept Agriculture & Water Resources</p>	No update provided.
<p>Genetic rescue of the Southern Brush-tailed Rock Wallaby: Is there genomic evidence it is reducing inbreeding? (Student project) (Sept 2018)</p> <p>Jennifer Pierson, ACT Gov, Janine Deakin, UC; Richard Hill, VIC Dept Land, Water & Parks</p>	No University of Canberra honours student recruited yet.
<p>How to use genomic data for relatedness and quantitative genetic estimation in non-model species (Apr 2018)</p> <p>Timothée Bonnet, Megan Head, Loeske Kruuk, ANU; Bernd Gruber, Elise Furlan, Arthur Georges, UC; Clare Holleley, David Bush, CSIRO; Ben Hayes, UQLD</p>	<p>The CBA synthesis group "How to use genomic data for relatedness and quantitative genetic estimation in non-model species" organised a workshop from October 28 to 31 2019 at Kioloa Coastal Campus. There were 23 attendees, from ANU-RSB, UC, CSIRO, but also from outside Canberra: U. Sydney, U. Sunshine Coast, U. Auckland; and one instructor, Prof. Ben Hayes from U. Queensland, a world leader in the development of quantitative genetic methods for agronomy. During the workshop, Prof. Hayes trained the attendees in the latest methods to estimating relatedness from genomic data (Single Nucleotide Polymorphisms) and subsequently use these estimates for quantitative genetic analyses, in particular to estimate heritabilities and to identify genes of major effect. During practical sessions attendees worked on their own data, to produce some of the first results of genomic heritability for several populations of wild animals. CBA funding was used to pay for housing and catering on campus, for travel between Canberra and Kioloa, and to pay for the flights of the instructor and of the attendant coming from New-Zealand.</p> <p>Following the workshop, about a dozen of attendees decided to get involve in the writing of a paper on how to produce quantitative genetic estimates from genomic data in wild populations. The paper is expected to contain a review of the handful of publications using these methods on wild populations, a tutorial, and some example analyses using real data owned by the authors. The workshop also helped dynamized Canberra's quantitative genetic community which now holds a monthly meeting to discuss journal articles and new research projects with participants from RSB (plant science and ecology and evolution), CSIRO and UC.</p>
<p>Using expert elicitation to identify impacts of climate change on Australia's alpine animals (Apr 2018)</p> <p>Rachel Slatyer, Adrienne Nicotra, Sonya Geange, ANU; Francisco Encinas-Viso, Bryan Lessard, Juanita Rodriguez, CSIRO; Kate Umbers, WSU; Ary Hoffmann, Umelb; Erik</p>	<p>In November 2018 we held a successful expert elicitation workshop at Katoomba, NSW. 23 experts attend whose expertise spanned mammals, reptiles, amphibians, fish, crustaceans, aquatic and terrestrial insects, fire modelling, alpine plant ecology. Three more experts participated remotely. Participants were from universities and government departments. We developed estimates for the future abundance and distribution of 30 species across the Australian alps. Data analysis is now underway and will be published alongside data from the alpine plants expert elicitation workshop that was held in 2017 (Morgan & Nicotra).</p>

Project	Update (provided by grant recipients)
<p>Wapstra, Geoff While, UTAS; Ken Green, NPWS</p>	<p>We will produce a major publication on the current state and future of Australia's alpine biota with practical management guidelines. We have attracted media attention, Kate spoke to ABC South Coast Radio live during the workshop and more recently to Jo Kahn from ABC Radio National's Off Track about the project. We will continue to seek out media attention and acknowledge the CBA as our major funders.</p> <p>Our next steps are to engage a research assistant to complete the data analysis in collaboration with Anca Hanea and James Camac (Uni Melb expert elicitation expert). We expect the manuscript to be published this year (2019).</p> <p>To develop an automated system (web app) to automate the expert elicitation process and test this in the context of an arid plant expert elicitation workshop in May. (This will be the subject of a subsequent application for CBA synthesis funding)</p> <p>https://onlinelibrary.wiley.com/doi/full/10.1111/gcb.15750</p>
<p>Crossing Lines: a new synthesis on Asian, Melanesian and Australian biotic exchange (Apr 2018)</p> <p>Craig Moritz, Mike Crisp, Janelle Stevenson, ANU; Sarah Matthews, Leo Joseph, CSIRO; Arthur Georges, UC; Darren Crayn, Elizabeth Joyce, JCU/CSIRO; Paul Oliver, QM; Nick Matzke, Auckland; Alicia Toon, UQLD; Mike Lee, SAM; Kale Sniderman, UMelb; Kevin Rowe, NMV</p>	<p>We hosted a workshop "Crossing Lines: A new synthesis on Asian, Melanesian and Australian biotic exchange" at Mt Stromlo Observatory in February 2019. This was a small and targeted gathering of scientists from across Australasia, with diverse but complementary skills spanning in plant and animal biogeography, macro-evolutionary inference, paleoclimatology and plate tectonic modelling. This cross-taxon, cross-discipline focus was particularly insightful, and led to the formulation of a number of new hypotheses for key events in both the geological and biotic history of Australia. Looking forward, we are working on a number proposals for review papers and future grant applications that arose out of this meeting over the coming year.</p>
<p>Reconciling comparative and meta-analytic practices in an era of big data (Sept 2018)</p> <p>Daniel Noble, Megan Head, Michael Jennions, Renee Catullo, Loeske Kruuk, Martin Westgate, ANU; Ross Thompson, UC; Shinichi Nakagawa, Malgorzata Lagisz, UNSW; Marguerite Butler, University of Hawaii; Matthew Pennell, University of British Columbia; Kerrie Mengersen, QUT</p>	<p>The Synthesis Group workshop was held at Kioloa campus in June 2019. Marguerite Butler (University of Hawaii) also gave a CBA seminar at ANU during her time in Canberra for the Synthesis Group workshop. The synthesis funds have been instrumental in training students both in comparative and meta-analysis about each other's fields and the challenges and approaches in each. The synthesis funds were also excellent in establishing a number of collaborations and interactions with researchers outside the ANU, including Matt Symonds (Deakin), Marguerite Butler (University of Hawaii, USA), Matt Pennell (UBC, Canada), Shinichi Nakagawa (UNSW), Will Cornwell (UNSW), plus lots of internal collaborations and interactions which has been very nice for the Noble group having just started here at the ANU. We have two papers we are currently working on from the Synthesis Group workshop.</p>
<p>Improving species conservation: Pathway to the wild (Sept 2018)</p> <p>Adrian Manning (Fenner), Craig Moritz (RSB), Jennifer Pierson (Tidbinbilla), Andrew Young (CSIRO). Co-funded with Fenner School of Environment and Society.</p>	<p>The Synthesis Group workshop 'Emerging Areas of Research in Reintroduction Biology' was held in July 2019 at ANU. On the first day of the invited participants presented a series of short introductory talks that were open to the general community. This was followed by a workshop that aimed to provide an evidence-based approach to selecting research themes for Tidbinbilla Nature Reserve's Threatened Species Research and Recovery Program. Program here: https://cba.anu.edu.au/news-events/events/emerging-areas-research-reintroduction-biology</p>