

# EcoEd

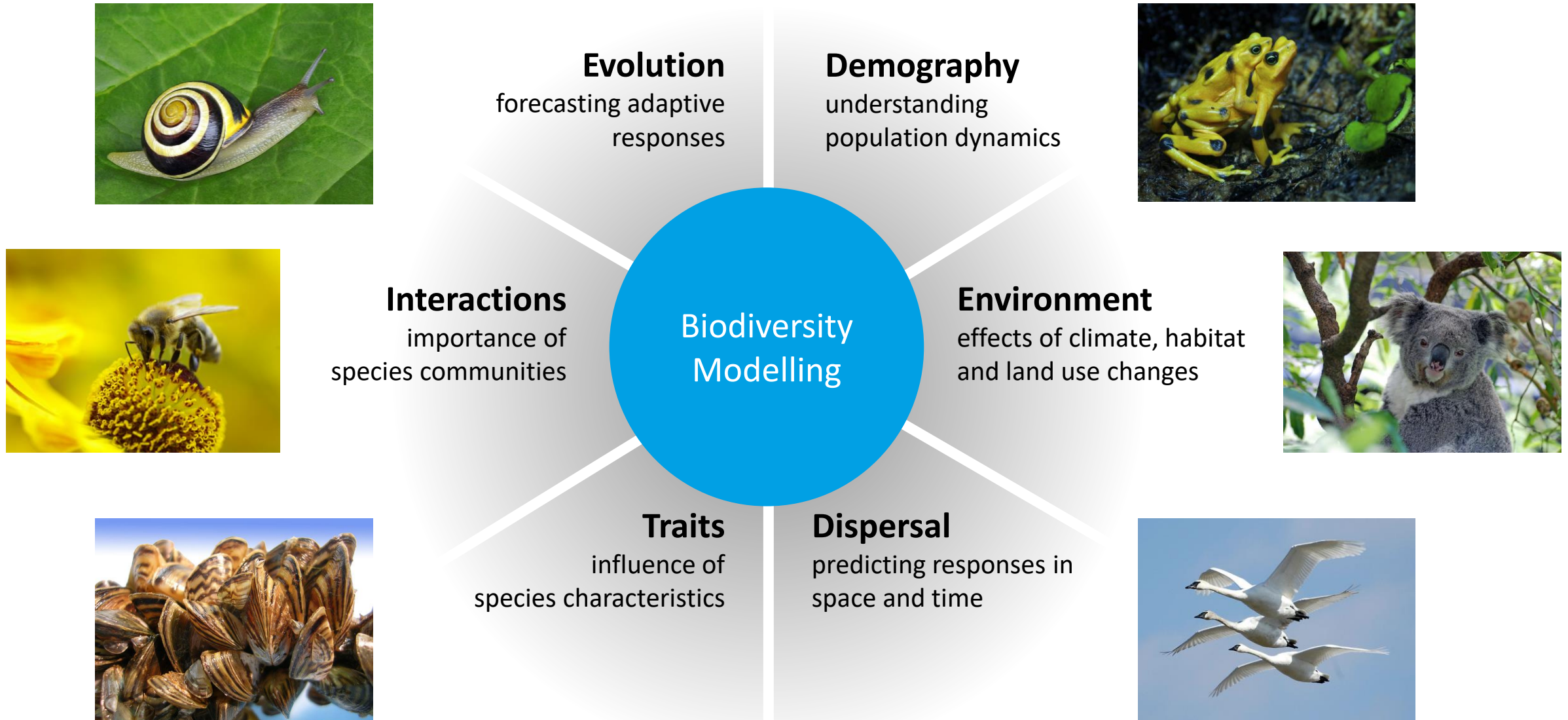
innovation in training, outreach and engagement leveraging  
Australia's EcoScience infrastructures

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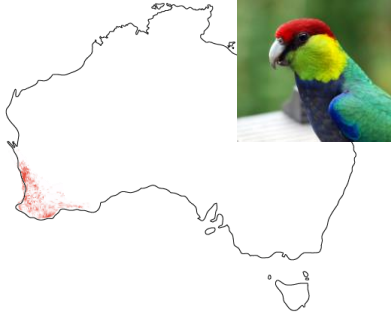


# Understanding and predicting changes in environmental systems



# Requires lots of data and analytical capacity

## Species data

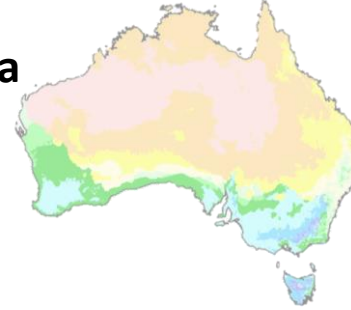


Presence / Absence / Abundance  
~1.6 million species catalogued  
~310,000 plants  
~1 million animals  
~80% not yet described

### Other facets of biodiversity

- Genetic diversity
- Species traits
- Functional units

## Climate and environmental data



Current climate: mean climate, bioclimatic indices, extreme events

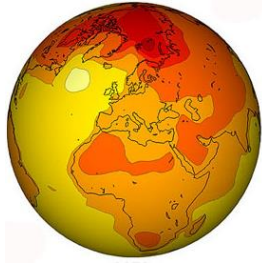
Land cover: natural vegetation, primary productivity, land use change

Soil, substrate

Topography, altitude

Hydrology: run-off, streams and lakes

## Future climate data



170+ plausible future climates

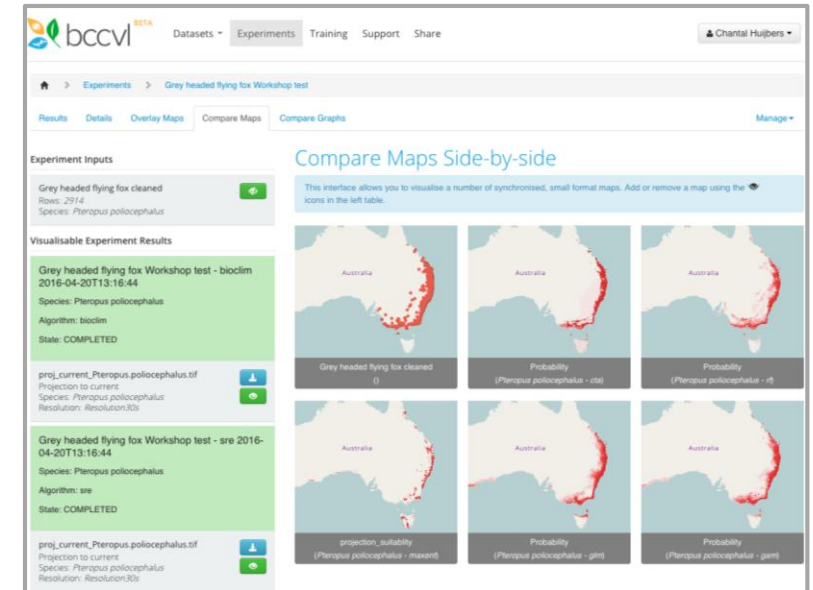
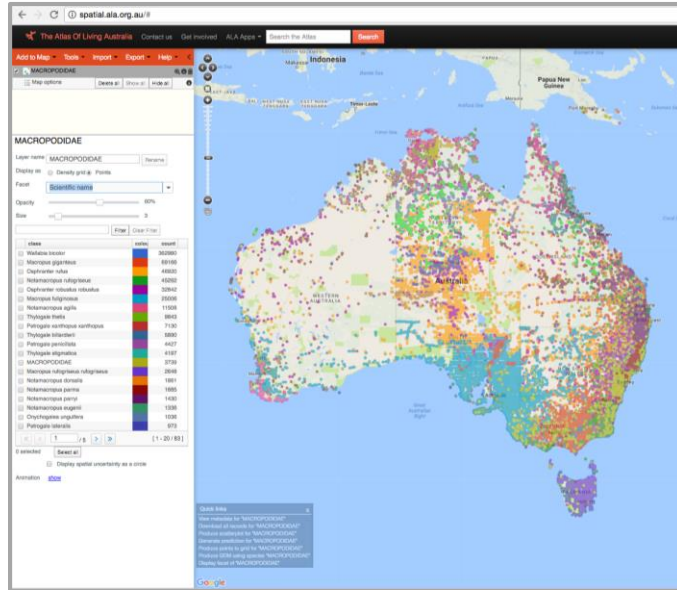
- 40+ global climate models
- 4 climate change scenarios

984 monthly time steps to 2100

Mean future climate, bioclimatic indices, extreme events

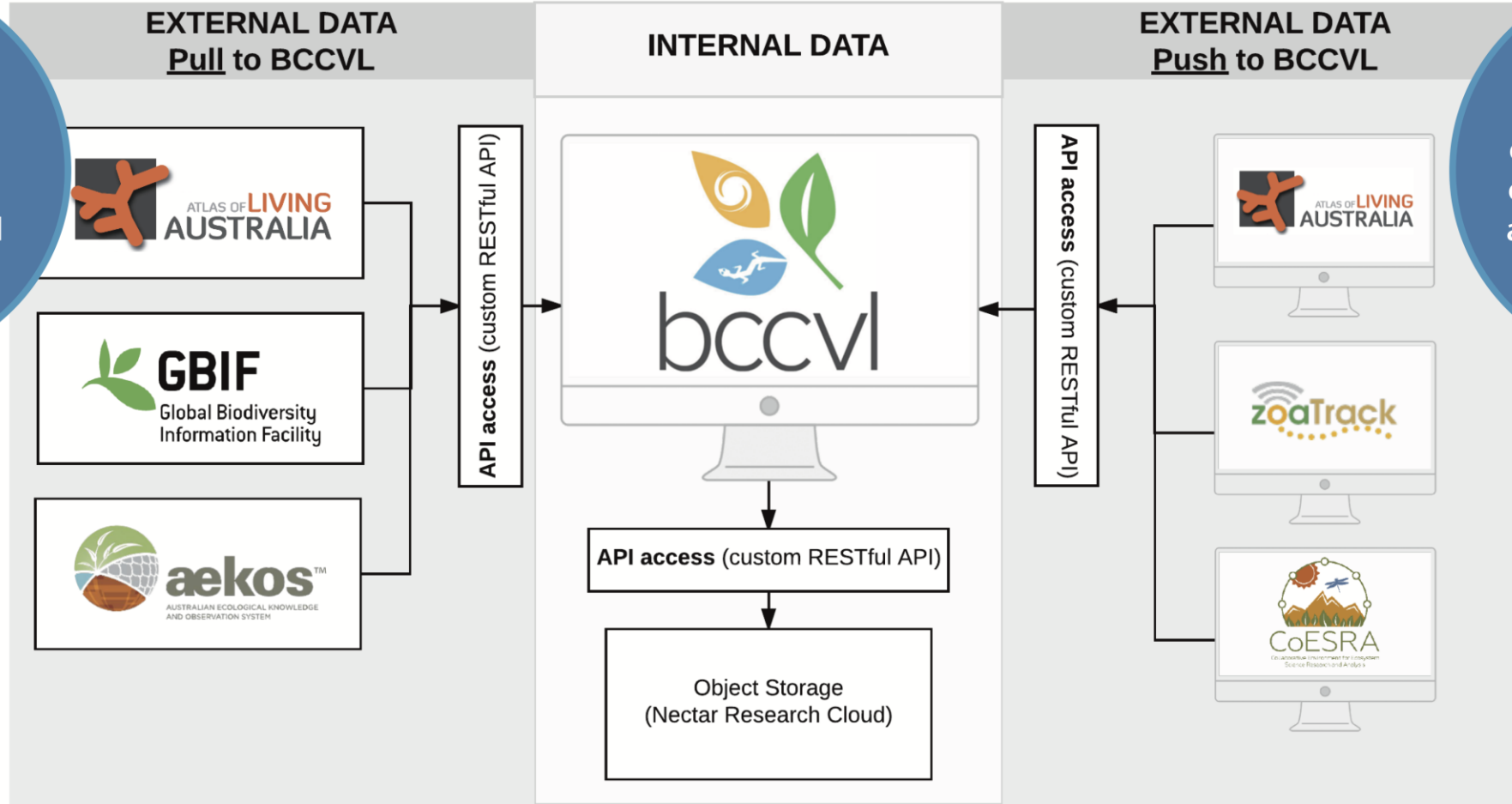
510 million x 1 km pixels

# EcoScience Infrastructure in Australia



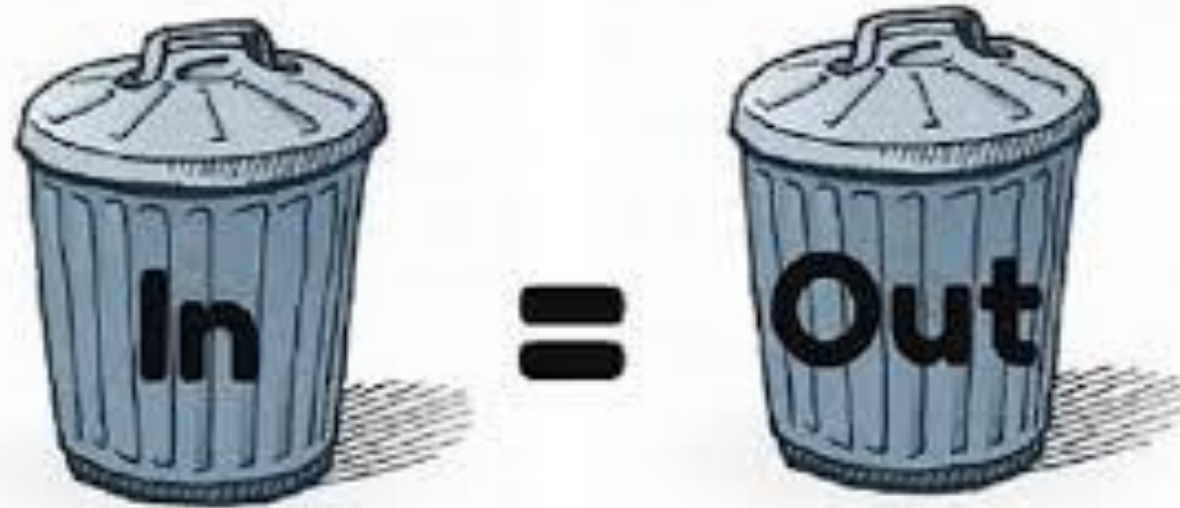
# EcoScience Infrastructure in Australia

Users can search and import external data from within the BCCVL data portal interface.

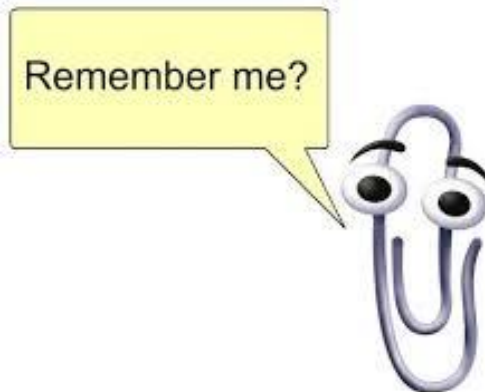


Users can search and prepare external data from other applications and push to BCCVL with one click.





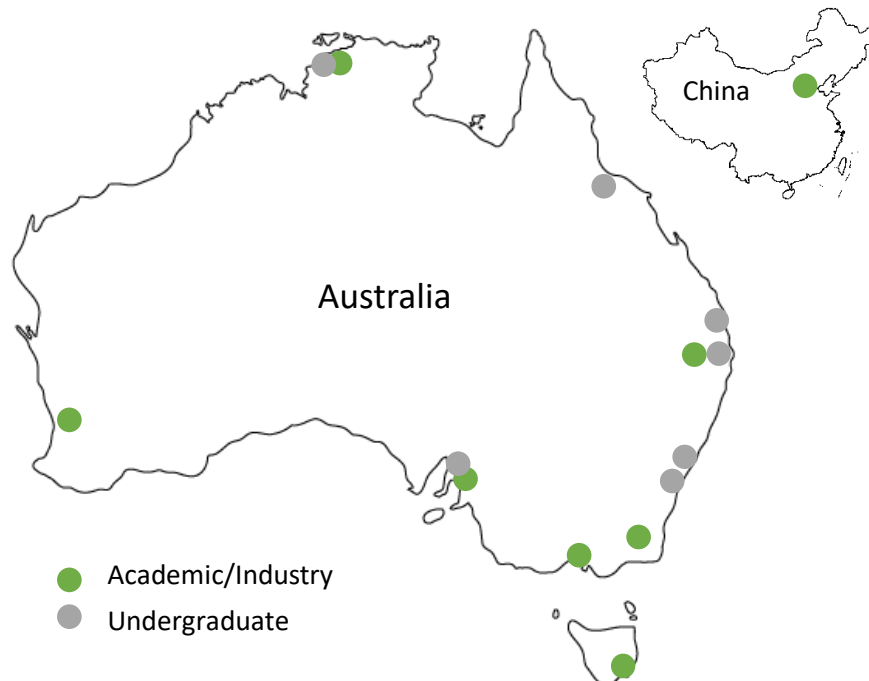
*How can we train and support our users to ensure sensible use of data and analytical tools?*



# Training and user engagement

## Workshops

- BCCVL & ALA workshop
- Undergraduate / Academic / Industry
- 24 workshops run (723 participants)



Brought to you by:

**FREE**

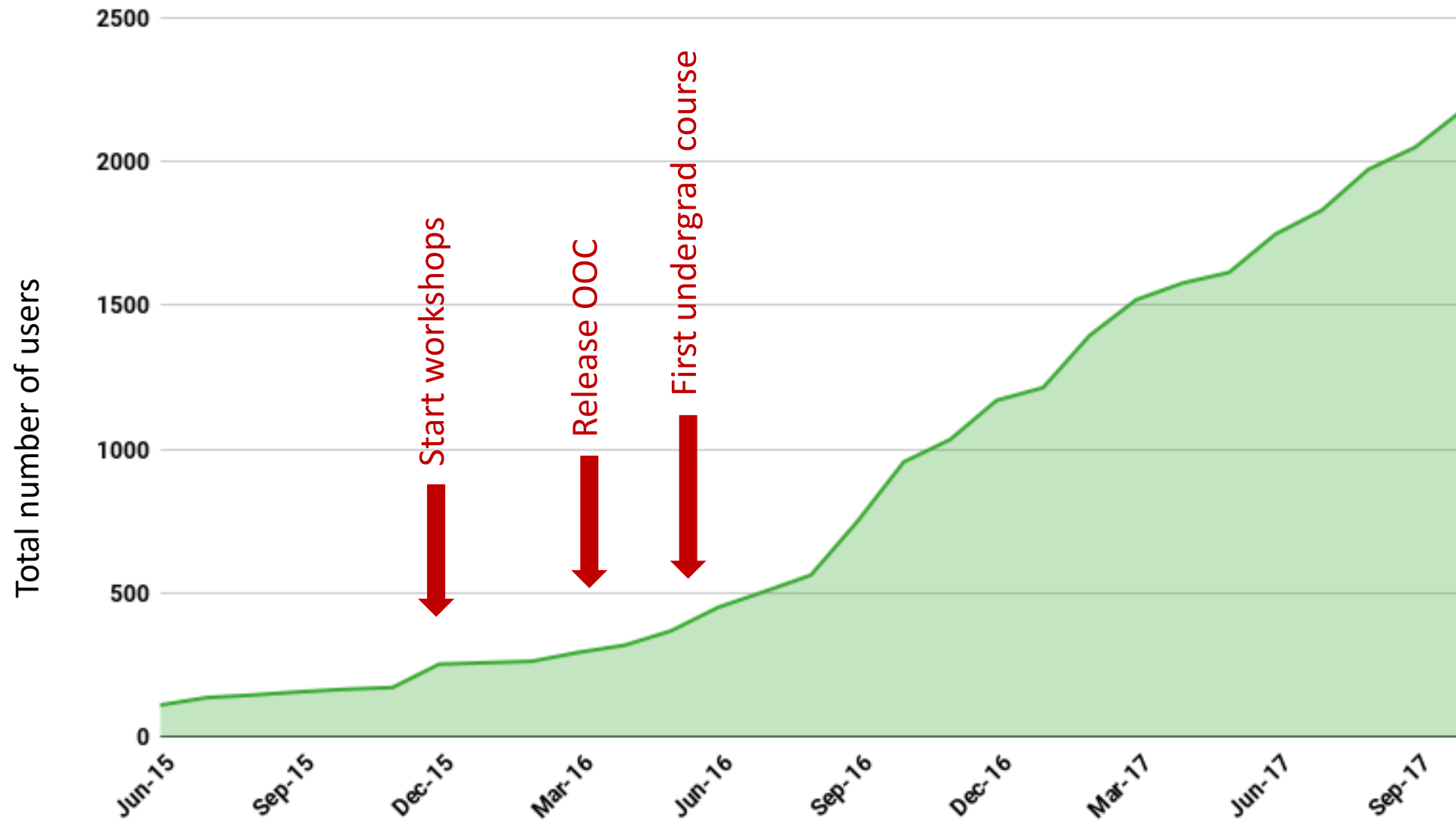
**WORKSHOP**

Innovative tools for mapping and modelling species distributions

### Learnings

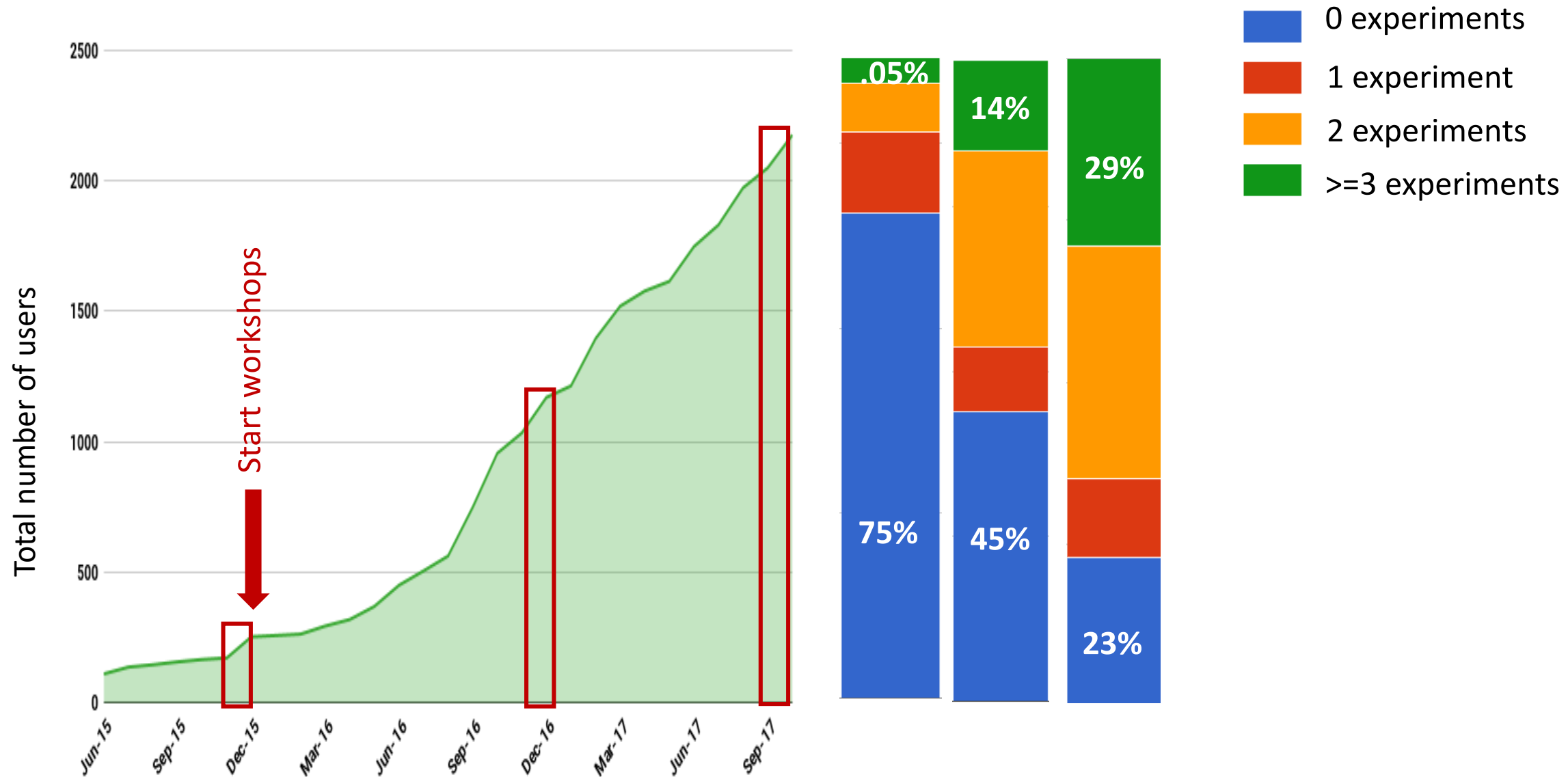
- |  |  |
|--|--|
| ✓ Ecological concept of modelling            | ✓ Biodiversity analysis                |
| ✓ What SDMs are and how they work            | ✓ Interpreting model results           |
| ✓ Data required for SDMs and its limitations | ✓ Climate impact modelling/projections |
| ✓ Taxa-environment relationships             | ✓ Climate data and emission scenarios  |

# BCCVL uptake





# BCCVL uptake



A photograph of a wooden boardwalk path leading through a lush green forest. The path is made of several wooden planks and is surrounded by dense green foliage and trees. The lighting is soft and natural, suggesting a daytime setting. The text "ECOEd" is overlaid in the center of the image in a large, white, sans-serif font.

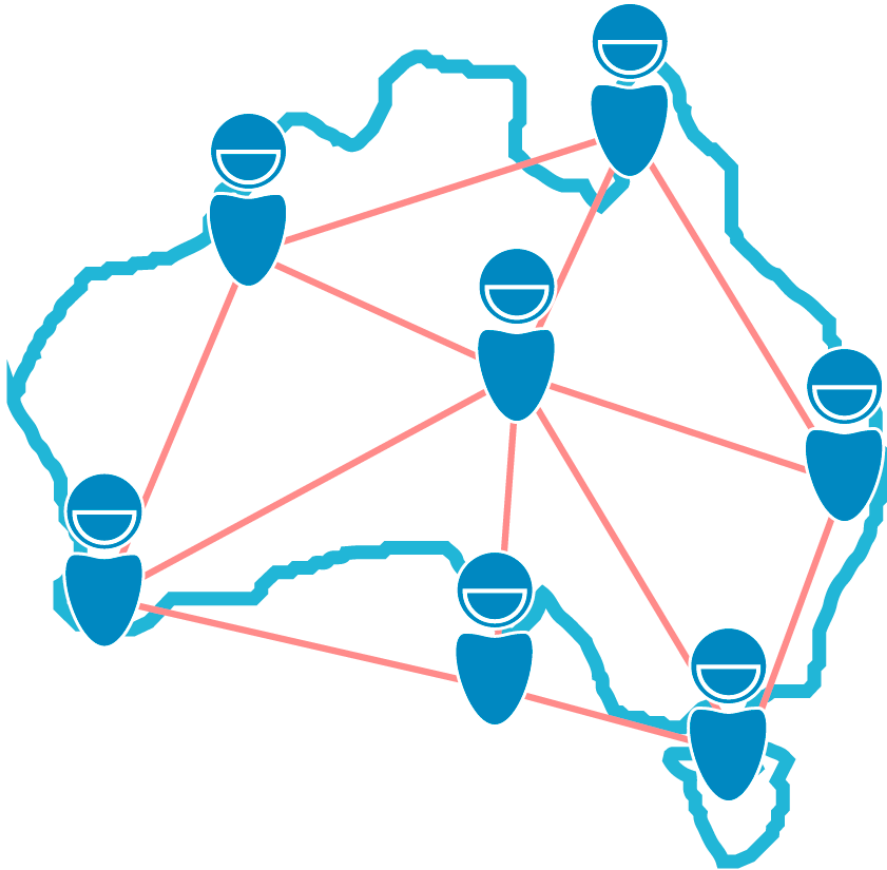
# ECOEd

Pathway to integrated EcoScience training

# Aims

- Build skills to deliver knowledge about data and analysis methods
- Provide a reference point for the environmental science community
- Develop a network of enthusiastic professionals
- Increase our reach and impact

# EcoEd Champions



- Enthusiastic communicators
- Deliver training in their institution and related organisations
- Act as a trusted advisor
- Feedback
- Exchange knowledge and ideas

- Assistance with training and curriculum integration
- Access to latest tools and knowledge
- Ability to influence data and development agendas
- Priority assistance on issues

# EcoEd Champions

What's in it for them?



# EcoEd Resources

## Australian flux sites



## Module 1 – The Spatial Portal

In this module, you will learn to navigate the basic components of the Atlas of Living Australia's (ALA) Spatial Portal (SP). This portal has been designed to serve the research community and has access to most of the data held in the ALA. The portal has a geographic focus, but also includes a range of visualization and analytical tools. The focus of this training is however on filtering data in the SP for applications such as SDMs using [bgcsl](#).

### Log In

1. Open your web browser (preferably Chrome)
2. Go to <http://www.ala.org.au> and click on *User Settings* at the top right of the window
3. If you are already registered, click on *Log in* and enter your *username* and *password*. If you are not registered, click on *register* and fill in the details to create an account. Registration is mandatory for the new SP. Registration and usage details are vital for the ALA to better serve the community.
4. From the ALA's home page, click on Browse mapping (bottom left of window) or go directly to the SP at <http://spatial.ala.org.au>.

## WORKSHOP

### Species Distribution Modelling & Climate Change Projections

## Species Distributions

## Champions Program

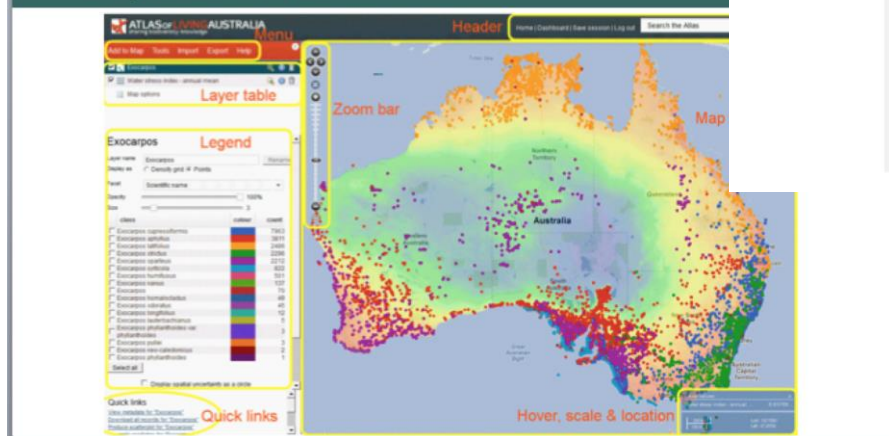
Topics addressed in this module

- What is species distribution modelling?
- How do we predict species distributions?
- Data: species data and environmental data
- Algorithms
- Model evaluation

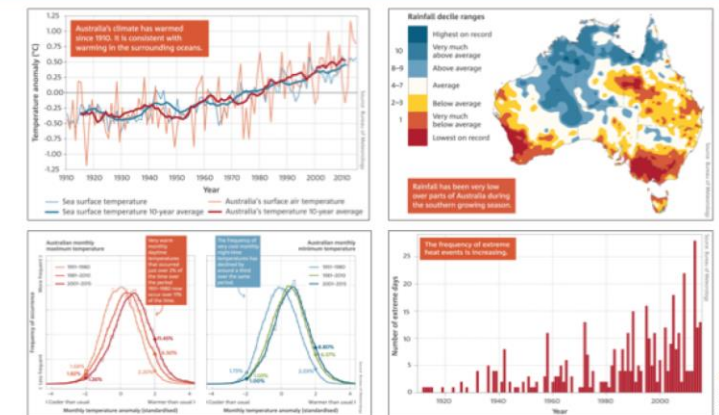
Relevant publications

- Beaumont LJ, Graham E, Duursma DE, et al. (2016) Which species distribution models are more (or less) likely to project broad-scale, climate-induced shifts in species ranges? *Ecological Modelling*, 342, 135-146. <http://www.sciencedirect.com/science/article/pii/S0304380016305221>
- Elith J, Graham CH, Anderson RP, et al. (2006) Novel methods improve prediction of species' distributions from occurrence data. *Ecography*, 29(2), 129-151. <http://onlinelibrary.wiley.com/doi/10.1111/j.2006.0906-7590.04596.x/abstract>
- Elith J & Leathwick JR (2009) Species distribution models: ecological explanation and prediction across space and time. *Annual Review of Ecology, Evolution, and Systematics*, 40(1), 677. <http://www.annualreviews.org/doi/full/10.1146/annurev.ecolsys.110308.120159>
- Franklin J (2010) Mapping species distributions: spatial inference and prediction. Cambridge University Press. [https://books.google.com.au/books/about/Mapping\\_Species\\_Distributions.html?id=CkshAwAAQBAJ&redir\\_esc=y](https://books.google.com.au/books/about/Mapping_Species_Distributions.html?id=CkshAwAAQBAJ&redir_esc=y)
- Guisan A & Zimmermann NE (2000) Predictive habitat distribution models in ecology. *Ecological modelling*, 135(2), 147-186.
- Guisan A & Thuiller W (2005) Predicting species distribution: offering more than simple habitat models. *Ecology letters*, 8(9), 993-1009. <http://www.sciencedirect.com/science/article/pii/S0304380005003549>
- Pearson RG (2010) Species' distribution modeling for conservation educators and practitioners. *Lessons in conservation*, 3, 54-89.

## The Spatial Portal



## Climate Change in Australia



# EcoEd Pilot outcomes

- 8 Champions from 6 institutions across Australia and NZ
- 2 full face-to-face training days
- Co-branded teaching material (presentation, workshop handout, teacher information)
- Guide Champions in re-delivery within their own institutions



# EcoEd Pilot outcomes

*Thanks again for the training in Adelaide. It was **invaluable** and there's good interest here at my university for learning more about the platforms.*



*Redelivering the content is just about practice - the how to guides and videos you guys have produced are **some of the best instructional material I've seen** or have needed to follow (and I do this a lot)*

*There is definitely a niche for this software at universities, at least at my university, especially **because the software is well-written, easy to use and addresses a very, very important ecological issue** :-) Also, once the universities understand that this tool will help them bring in more papers, their commitment will be sealed.*

*If more value was added to undergraduate degrees in the form of **providing practical data-mining and data-crunching skills** that lead to output (papers) which lead to more grants, then universities will see the benefits of programs like EcoEd.*

# Food for thought

- How do we measure success?
  - Re-delivery of workshops by Champions
  - Awareness
  - Integration in curriculum
- Is it cost-effective?
  - Intensive face-to-face training is needed to nurture Champions
  - Yes, if Champions redeliver training
  - Comparison to online training?
- Scalability
- Extension to industry?



# Moving forward

- EcoEd is key component of the EcoCloud RDC/DEVL skills program
- Engagement with other NCRIS facilities (expand resources)
- Connect with gov/industry to address their needs
- Nurture and encourage our Champions and train more Champions





# ECCOEd

Enabling a greater understanding of the natural world

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