



SAVING OUR SPECIES

Trait-based modelling of species communities using presence-only data

2018–19 annual report card

Summary

Action implementation	1 out of 1 research actions were fully or partially implemented as planned for the financial year
Total expenditure	\$12,000
Partners	University of Helsinki



Project name:

Trait-based modelling of species communities using presence-only data

Funding stream:

Science and research

Mixophyes carbinensis. Photo: Ian Renner

Trait-based modelling of species communities using presence-only data

Project description

Statistical modelling of species distributions and species communities is vital for informing management and conservation decisions. These models rely on data regarding where species have been observed to be present. The most widely available data comes in the form of presence-only data, which is a list of locations where species have been observed without information about where species were recorded absent or any sampling design. Such data presents challenges to species distribution models, which is why the ecological conclusions drawn from models involving presence-only data are limited.

Other methods such as those in the renowned HMSC (Hierarchical Modelling of Species Communities) package allow for prediction of species distributions and community composition by incorporating not only environmental predictors but also other factors known to impact species distributions such as traits, phylogeny, and species co-occurrences. Such rich analyses are currently unavailable for communities for which only presence-only data is available. This project aims to bridge that gap by incorporating presence-only data into the HMSC package, allowing for deeper and more well-informed analysis of species communities using presence-only data.

Target threatened species, communities, and threats

This project has broad application across numerous species and ecosystems. We are still developing the methodology via simulation, but our plan is to demonstrate the benefits using frogs. However, the methodology could incorporate other communities that are of ecological interest.

Outcomes or major successes

The main progress to report is the technical development of the proposed methodology to implement point process models into the hierarchical modelling of species communities (HMSC) framework. This technical development has largely taken place during three visits to Helsinki in May and September 2018 and April 2019. Originally, only two trips were planned, but the second trip was impeded by unexpected events concerning the collaborator who was the focus of that trip. Therefore, a third trip was planned in April 2019. This set back technical development, but the methodology is now nearly ready for testing.

To address this delay, we intend to use much of the remaining budget to buy out teaching duties so as to free up time to complete the testing and develop the methods paper and application.

Research communication and engagement

We have not undertaken any communication and engagement wholly related to the project this financial year, although we have included an overview of the project into three invited seminars given in 2019 at:

- the University of New South Wales on 22 March
- the Statistical Society of Australia, NSW branch seminar series on 15 May
- the Australian National University on 21 May.

Informal discussions at the University of Helsinki have led to interest in collaboration with Grenoble University and Yale University involving the developed methodology, as well as a workshop for showcasing the methods.

Planned communication and engagement for the 2019–20 financial year include:

- a methods paper describing the methodology incorporating point process models into HMSC
- an application paper
- a talk at the Australasian Region’s International Biometrics Society conference in December 2019
- a talk at the International Statistical Ecology Conference in June 2020.

Investment

Participant	Cash	In-kind
Department of Planning, Industry and Environment	\$12,000	

Research actions

Research action	Implemented as planned?
Data analysis and testing	Technical development took a little longer than anticipated, in part because a planned trip to Helsinki in September 2018 was less productive than anticipated because unexpected events involving the main collaborator impacted most of the trip. An additional trip in April 2019 has addressed this

Saving our Species 2018-19 annual report card for ‘Trait-based modelling of species communities using presence-only data’. For more information, refer to the specific strategy in the *Saving our Species* program.