



MESSAGE FROM THE DIRECTOR

Welcome to the July edition of the CEBRA newsletter. It has been a busy start to the year with many projects nearing completion and a significant research agenda well underway.

From the 2013 projects, Project 1302A - Evaluation of Arrival Pathways and Species Distribution Models, is now complete and the final report nearly ready. This project recommended a new approach to spatial modelling for terrestrial and marine environments that will require the development of new methods and new approaches to acquiring data.

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This led to an exciting project that is currently underway; Project 1402B - Tools for Species Distribution Modelling for Surveillance. One of the challenges researchers and land managers face when planning for and dealing with invasive species is the lack of data about how the species will react in the local environment. This project aims to create a tool that will help policy makers and land managers make defensible, science-based assumptions.

We are very fortunate to have CSIRO Scientist Simon Barry and Australian Research Council Future Fellow, Dr Jane Elith, collaborating with CEBRA on this project. Jane specialises in species distribution modeling and has recently been recognised by Thomson Reuters as a highly cited researcher, putting her in the top 1% of cited researchers globally.

This recognition not only reflects the growing interest in spatial distribution modeling, but also does much to enhance the reputation and reach of the work of CEBRA.

Our relationship with New Zealand’s Ministry for Primary Industries continues to drive research collaboration. The latest example of this is Project 1402C - Estimation of National-Level Farm Demographic Data for Preparedness of Highly-Infectious Livestock Disease Epidemics.

CEBRA is excited to be collaborating closely with our New Zealand counterparts on this project to improve understanding of national herd disease levels and inter-farm transmissions.

CEBRA and the Department of Agriculture have also enjoyed a close working relationship; having completed 13 workshops over the last 7 months in support of Project 1304B - Handling Uncertainty in the Risk-Return Resource Allocation (RRRA) Model. The workshops have been critical in eliciting specific data from the accumulated experience and observations of Department staff. CEBRA has been supported by the company Bayesian Intelligence, based at Monash University, who have worked on identifying a tractable and effective uncertainty analysis. This work is complete and the methods are being trialled this month. We can look



forward to reporting on these in the next newsletter.

Thank you again to all the committed staff, researchers and collaborators, and I look forward to a busy few months ahead.

Mark Burgman

Managing Director, Centre of Excellence for Biosecurity Risk Analysis

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PROJECT SNAP SHOT

1304A: COST-EFFECTIVE SURVEILLANCE FOR FOOT-AND-MOUTH DISEASE



The project is halfway through its two year funding period. We have constructed a very useful, detailed bioeconomic model for optimal 'early detection' measures against a possible FMD incursion using different surveillance protocols.

Contrary to expectations, results show that the value of bulk-milk testing for the early detection of FMD, even in the dairy regions of Victoria, is not cost effective at any reasonable parameter values. Enhanced passive surveillance measures (e.g., educational programs, on-farm training, etc.) appear to be a much more promising and cost-effective approach, nicely underscoring the importance of the work on enhanced passive surveillance done by Animal Health Australia.

PROJECT UPDATE

The following CEBRA research projects have been confirmed for 2014-2015:

Data Mining

- 1301A Data Mining to Improve Biosecurity Risk Profiling
- 1301B Analytical Assessment of Leakage Surveys
- 1401D Scoping Study: Data Profiling for Border Compliance
- 1401E Scoping Study: Entry Process Outcome in Aims

Spatial Analysis

- 1402A Development of a Marine Spatial Analysis Model for Improved Biofouling Risk Assessment
- 1402B Terrestrial Spatial Models
- 1402C Estimation of National-Level Farm Demographic Data for Preparedness of Highly-Infectious Livestock Disease Epidemics

Intelligence

- 1403A Intelligence Gathering and Analysis: International Biosecurity Intelligence System

Benefit Cost

- 1304A Cost-Effective Surveillance for Foot-and-Mouth Disease
- 1404C Testing Incentive-Based Inspection Protocols
- 1404D Using Decision Support Tools for Emergency Animal Disease Planning and Response (Vaccination and FMD Case Study)

Pathways

- 1305A Ornamental Fish Import Reform Surveillance Systems
- 1305B Plant-Product Pathways and the Continuous Sampling Plan
- 1405C Torres Strait Risk and Resource Allocation Project
- 1405D Illegal Logging Sampling Strategy
- 1405E Scoping Study: Use of Unmanned Aerial Vehicles for Biosecurity Surveillance, Incursions and Response



PROJECT IN FOCUS:

1402B: SPATIAL ANALYSIS TOOLS AND APPROACHES FOR SPECIES DISTRIBUTION MODELLING FOR SURVEILLANCE

At its core, risk management is about predicting the causes and impacts of an event and putting in place appropriate plans to mitigate and respond effectively to the risk.

Biosecurity risk management is highly complex and in predictive analysis requires adopting a number of assumptions about environmental factors, distribution rates and the likely impact of different containment strategies.

The more you understand the assumptions and likely behaviors the better prepared you can be and the more effective the management response.

In high security areas such as Australia, it is important to understand where invasive species could occur in landscape and how they are likely to be distributed.

Building this understanding is a critical part of planning for and managing our response to biosecurity risks.

There are many models that link the distribution of species with environmental variables, based on knowledge of their distributions in their native ranges or in areas to which they have spread and persisted. Many of these models were developed with applications other than invasive species mapping in mind. The different models have different strengths and weaknesses when applied to invasive species.

The fundamental objective of this project is to distil the main issues in choosing a modeling approach and provide protocols so that users can navigate



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their way in an informed manner. The project may recommend a subset of existing techniques or may develop novel modifications.

Working with a core group of statisticians and modellers the project team is seeking to provide policy makers and land managers with a clear pathway for defining candidate modelling approaches, for eliciting expert opinion, and for making consistent, informed decisions about methods suited to the application and problem at hand.

The project will also look at the choice of environmental data, how you collate the environment variables to apply to the distribution of a particular species, and then look at the applicability of that information.

And with so much research and literature out there, it is important through projects like this that we consolidate our understanding and help people to apply the tools we already have at our disposal to the given situation - rather than reinventing the wheel.

We look forward to this project informing confident; evidence based spatial analysis and decision-making.

If we can support responses based on improved understanding and data inputs; that will lead to more effective and efficient response efforts.

Simon Barry is leading the research team and Mark Burgman is the CEBRA project leader.

The project is also benefiting from the collaboration of Australian Research Council Future Fellow, Dr Jane Elith. Jane specialises in species distribution modeling and has recently been recognised by Thomson Reuters as a highly cited researcher, putting her in the top 1% of cited researchers globally.