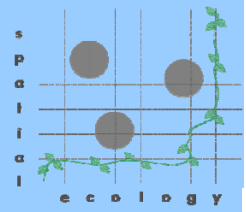




# Spatial and Quantitative Applied Ecology



The spatial and quantitative applied ecology group at the University of Queensland uses empirical data, theory, statistical and mathematical models to solve ecological problems across terrestrial, marine and aquatic environments and local, landscape and global scales. General areas of interest include:

- **Applied population ecology** for pests, weeds, diseases, harvested species and threatened species
- **Decision theory** for conservation and environmental management, including monitoring and conservation planning
- **Marine conservation and resource management**
- **Saving the planet**

The Spatial and Quantitative Applied Ecology group is a lab of about 45 people. We have several Australian Research Council grants at any one time and funding from a wide variety of pure and applied sources. Each year we publish about 50 peer reviewed papers. Our interests are very broad and we welcome visitors. We are located at the [St Lucia](#) campus of the University of Queensland, Australia.

We have active partnerships and advisory roles with: environmental non-government organisations (ENGOs), federal, state and local government and through managing the Commonwealth environmental research facility: Applied Environmental Decision Analysis (AEDA). Our work has extensively influenced management and policy for: vegetation clearing, habitat restoration, climate adaptation, market-based instruments, conservation funding allocation, invasive and threatened species, biosecurity, marine and terrestrial reserve design, spatial prioritisation, monitoring and performance evaluation. We are involved in specialised training and teaching at all levels.

**Publications** – recent and [coming soon](#) (email author e.g. [j.carwardine@uq.edu.au](mailto:j.carwardine@uq.edu.au)):

Buckley Y.M. et al. 2007. Disturbance, invasion and re-invasion: managing the weed-shaped hole in disturbed ecosystems. *Ecology Letters* 10:809-817.

Carwardine J. et al. 2008. Cost-effective priorities for global mammal prioritization. *PNAS* (in press)

Firn J. et al. 2008. Managing beyond the invader: manipulating disturbance of natives simplifies control efforts. *Journal of Applied Ecology* (in press).

Game E.T. et al. 2008. Should we protect the weak or the strong? Risk, resilience and the selection of marine protected areas. *Conservation Biology* (in press).

Joseph, L.N. et al. 2008. Evaluating costs, benefits and probability of success for threatened species management: a project prioritisation protocol. *Conservation Biology* (in press).

McAlpine C.A. et al. 2007. Modeling the Impact of Anthropogenic Land Cover Change on Australia's Regional Climate. *Journal of Geophysical Research Letters*. 34, L22711.

McDonald-Madden, E. et al. 2008. Subpopulation triage: How to allocate conservation effort among populations. *Conservation Biology* 22:656-665

Richardson A.J. et al. 2008. Ocean Science: Under-resourced, under threat. *Science* 320: 1294-1295

Rhodes, J.R. et al. 2008. Regional variation in habitat-occupancy thresholds: a warning for conservation planning. *Journal of Applied Ecology* 45: 549-557

Wilson KA, Underwood EC, Morrison SA, et al. 2007. Conserving biodiversity efficiently: What to do, where, and when *PLoS Biology* 5: 1850-1861

**Oxford University Press book**, coming late 2008: Moilanen, A., Wilson, K.A. and Possingham, H.P. 2008. Spatial conservation prioritisation: Quantitative methods and computational tools .

## Key web links:

[www.uq.edu.au/spatialecology](http://www.uq.edu.au/spatialecology)  
[www.aeda.edu.au](http://www.aeda.edu.au)  
<http://www.ecology.uq.edu.au/>  
<http://www.uq.edu.au/marxan/>

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## Can't find what you require?

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 Brisbane QLD 4072 Australia



## Principal Researchers



**Dr Yvonne Buckley**

**Interests:** Population dynamics of invasive plants, their interactions with the ecological communities they invade and management strategies.

ARC Research Fellow & Senior lecturer, School of Integrative biology, UQ.

E-mail: [y.buckley@uq.edu.au](mailto:y.buckley@uq.edu.au)



**Dr Clive McAlpine**

**Interests:** Tropical forest fragmentation and its impacts on biodiversity. Wildlife management and modelling. Forest mapping and monitoring using remote sensing.

Lecturer, School of Geography, Planning and Architecture, UQ

E-mail: [c.mcalpine@uq.edu.au](mailto:c.mcalpine@uq.edu.au)



**Dr Anthony Richardson**

**Interests:** Impacts of climate change on marine systems; Ecosystem modelling; Plankton and fish ecology; Statistical

analysis of large biological datasets.

Senior Lecturer in Mathematics, School of Physical Sciences at UQ, Research Scientist at CSIRO Marine and Atmospheric Research.

E-mail: [ajr@maths.uq.edu.au](mailto:ajr@maths.uq.edu.au)



**Professor Hugh Possingham**

**Interests:** Conservation planning/ reserve design, population dynamics and ecological theory, decision theory for conservation biology and bird ecology.

ARC Federation Fellow, Director of AEDA and the UQ Ecology Centre; Professor of Mathematics & Ecology, School of Integrative Biology and School of Physical Sciences, UQ.

E-mail: [h.possingham@uq.edu.au](mailto:h.possingham@uq.edu.au)



**Dr Kerrie Wilson**

**Interests:** Conservation planning and prioritisation. Climate change impacts and carbon economies. Vulnerability and scenario analysis.

ARC Research Fellow and Senior Lecturer, School of Integrative Biology, UQ.

E-mail: [k.wilson2@uq.edu.au](mailto:k.wilson2@uq.edu.au)

## Key Research Themes and people



To find members of the Spatial Ecology lab and their current research focus view: <http://www.uq.edu.au/spatialecology/sel-people>.

### Theme 1: Decision theory for conservation and environmental management

**Conservation planning:** Our research is very extensive and includes Conservation Resource Allocation, Conservation Planning Theory, algorithms (including Marxan) and case studies.

**Conservation Resource Allocation:** We have developed a new approach for allocating funds between priority regions for conservation to achieve the biggest 'bang for a conservation buck'.

**Optimal monitoring:** Focus on measuring appropriate indicators to deliver cost-efficient monitoring of threatened, harvested and invasive species.

**Uncertainty and Decision Making:** We are at the forefront of developing and applying new methods for making decisions in the face of uncertainty. We use methods including Information-gap decision theory, Bayesian statistics and stochastic dynamic programming.

**People:** Clive McAlpine, Hugh Possingham, Kerrie Wilson, Maria Beger, Madeleine Bottrill, Josie Carwardine, Lucinda Douglass, Deborah Faria, Richard Fuller, Eddie Game, Hedley Grantham, Carmen Hains, Christine Hosking, Takuya Iwamura, Lindsay Kircher, Carissa Klein, Liana Joseph, Jeremy Bourgoin, Jonathan Rhodes, Simon Linke, Eve McDonald-Madden, Sam Nicol, Rocio Ponce Reyes, Will Probert, Daniel Segan, Romola Stewart, Judit Szabo, Oscar Venter, James Watson, Matt Watts, Jessie Wells and Howard Wilson.

### Theme 2: Ecological and mathematical modelling

**Population Viability Analysis:** Our research examines ways to deal with critical issues in conservation such as minimum population sizes, optimal landscape configurations and decision-making in management.

**Spatial Population Dynamics:** We focus on both applied and theoretical research such as landscape ecology, metapopulation theory, maximising metapopulation persistence in a conservation planning framework, modelling dispersal mechanisms, using genetic data to understand dispersal mechanisms and invasive species.

**Statistical Ecology:** We utilise multi-level mixed effects models to analyse complex spatially hierarchical and longitudinal studies and to work out the spatial scale at which significant variation lies.

**Theoretical Population Ecology:** Our research centres on testing and developing mathematical methods for modelling populations, including harvested, threatened and invasive species.

**People:** Yvonne Buckley, Hugh Possingham, Peter Baxter, Kelsey Dahl, Eve McDonald-Madden, Judit Szabo, Nikki Sims, Jessie Wells, Satu Ramula, Hiroyuki Yokomizo, Adam Dinsdale, Shaun Coutts and Jennifer Finn.

### Theme 3: Ecological systems and populations

**Disease ecology:** Research includes the epidemiology of the chytrid fungus of frogs and the effect of Devil Facial Tumour Disease (DFTD) on the population dynamics and population genetic structure of the Tasmanian devil (*Sarcophilus harrisii*).

**Invasive species:** A diversity of research includes optimal monitoring for the control of invasive vertebrates, understanding the basic ecology of weeds and modelling weed incursions.

**Marine ecology:** Research includes marine reserve design, impacts of climate change, distribution mapping of marine organisms and fisheries management.

**Vegetation ecology:** Our research includes aspects of conservation, biodiversity, biotic interactions, biogeography, climatology, mathematical and statistical modelling, population biology, restoration ecology and economic and social issues.

**Wildlife management:** Our study species include Kangaroos, koalas, wallabies, fisheries, Tasmanian Devils and many bird species and assemblages.

**People:** Anthony Richardson, Clive McAlpine, Yvonne Buckley, Hugh Possingham, Sarah Butler, Peter Baxter, Maria Beger, Michiala Bowen, Chris Brown, Scott Burgess, Shaun Coutts, Adam Dinsdale, John Dwyer, Jennifer Finn, Eddie Game, Hedley Grantham, Gunnar Keppel, Shelly Lachish, Martine Maron, Eve McDonald-Madden, Kris Murray, Bronwyn Price, Lucy Robinson, Jonathan Rhodes, Satu Ramula, Oliver Robertson, Justin Ryan, Leonie Seabrook, Andrew Smith, Romola Stewart, Danielle Shanahan, Nikki Sims, Bob Sutherherst, Jessie Wells and Alice Yeates.