

# CURRICULUM VITAE

Helen May REGAN

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## Research Interests

I work predominantly on the characterisation and treatment of epistemic and linguistic uncertainty in ecology and conservation biology. I have applied Monte Carlo techniques, dependency bounds convolution, interval analysis and fuzzy set theory to a variety of problems. These include: calculation of global extinction rates; individual-based population models for Australian plants; the treatment of vagueness in the IUCN categories; the calculation of soil screening levels for contaminants; and contaminant exposure models for food webs. I am currently working on developing and testing methods for classifying conservation status and estimating risk.

<http://www.nceas.ucsb.edu/~regan/>

## University Education

1993 – 1999

*Institution:* The University of New England, Armidale, NSW 2351, Australia.  
*Enrolment:* **PhD in Mathematics**  
*Research Area:* Symplectic integration of Hamiltonian Partial Differential Equations

1988 - 1992

*Institution:* Latrobe University, Bundoora, Vic 3083, Australia.  
*Enrolment:* **Bachelor of Science (Hons)**  
*Major:* Applied Mathematics  
Graduated with First Class Honours in April 1993.

## Career History

### Starting January 2003

*Employer:* San Diego State University  
Ecology Program, Biology Department  
*Position:* **Assistant Professor**

### December 2000 – present

*Employer:* National Center for Ecological Analysis and Synthesis  
University of California Santa Barbara  
735 State St, Suite 300, Santa Barbara, CA 93101, USA  
*Position:* **Postdoctoral Research Fellow**

### June 1999 – November 2000

*Employer:* Applied Biomathematics,  
100 North Country Road, Setauket, New York 11733, USA.  
*Position:* **Research Scientist**

### May 1997 – April 1999

*Employer:* School of Botany,  
The University of Melbourne, Parkville, Vic 3052, Australia.  
*Position:* **Research Fellow**

### August 1996 - March 1997

*Employer:* Chemistry Department  
Macquarie University, Sydney, NSW 2109, Australia.  
*Position:* **Numerical Analyst**

### Feb 1992 - June 1996

*Employer:* Mathematics Department  
The University of New England and LaTrobe University.  
*Position:* **Mathematics Teaching Assistant**

## Scholarships and Awards

April 1997 Postdoctoral Fellowship Award at the Centre for Mathematics and its Applications,  
The Australian National University, Canberra, ACT (declined).  
Jan 1993 Australian Postgraduate (Research) Award (with Stipend) for studies towards a PhD  
at the University of New England.  
Dec 1991 Summer Vacation Scholarship in mathematics at Latrobe University.

## Teaching Experience

*Environmental Risk Assessment:* (The University of Melbourne 1998, 1999) Coordinator and lecturer.

Topics covered: risk perception; quantitative risk assessment; ecotoxicology; exposure pathways; fate and transport models; Monte Carlo methods; treatment of uncertainty in exposure models; and population modeling.

Decision Theory: (The Central Institute for Higher Tibetan Studies, Sarnath, India 1999; The University of Melbourne 1998; University of Tasmania 2000) Coordinator and lecturer. Topics included: basic framework; decisions under certainty, ignorance and risk; Bayes's Theorem; utility theory; applications in conservation biology; paradoxes; fuzzy logic; fuzzy decision theory.

Population Modeling: (The University of Melbourne 1998, 1999; University of California Santa Barbara 2001) Guest lecturer for the courses: Flora of Victoria; Landscape Ecology and Management; and Conservation Biology. Topics covered: individual-based models, applications to endangered Australian plant species, population management.

Tutoring/Demonstrating (Latrobe University and the University of New England 1992–1996)

- 1st year Pure Mathematics: Calculus, Algebra, Set Theory, Probability Theory, Differential Equations;
- 1st year Discrete Mathematics;
- Mathematics and Statistics for the Biological Sciences and Rural Science Mathematics;
- 2nd year Multivariable Calculus;
- 3rd year Computational Mathematics.

Kids Do Ecology: (Monroe Elementary School, Santa Barbara, CA 2001)

“Scientist in the classroom” for the Kids Do Ecology Program administered by the National Center for Ecological Applications and Synthesis, University of California Santa Barbara. I taught grade 5 students stochastic individual-based population modeling of Californian condors and conservation management of endangered species.

## **Computing Skills**

In my research, I have adopted the following programming environments, packages and libraries on UNIX workstations and PCs: the C programming language; FORTRAN ('77 and '90); NAG routines; MATLAB; MAPLE; TURBO PASCAL; REDUCE; Dimsym; AUTO; FASTFLO; GNUPLOT; LaTeX; Ramas Metapop; Ramas Risk Calc; Crystal Ball; MINITAB; HTML.

## **Workshops and Consultation**

- 2002 Reviewer for the U.S. Fish and Wildlife Service Revised Proposal for Critical Habitat for 47 Plant Species on the Island of Hawaii; Federal Register Vol. 67, No. 102, pp. 36968-37106.
- 2001/2002 Member of the working group ‘Systematic Conservation Planning and the California Continuing Resource Investment Strategy Project (CCRISP)’ at the National Center for Ecological Analysis and Synthesis, University of California Santa Barbara, CA (ongoing).
- 2000/2002 Member of the working group ‘Review of Forest Service species viability assessment processes’, at the National Center for Ecological Analysis and Synthesis, University of California Santa Barbara, CA.
- 2000 Invited speaker: ‘Workshop on Using the IUCN Red List as an Indicator of Biodiversity Trends’ in Port Jefferson, New York.
- 2000 Invited speaker at workshop: ‘Improvements in Applications of Models in Ecological Risk Assessment: Workshop on Model Evaluations’, sponsored by American Chemistry Council, in Fairmont Hot Springs Resort, Montana.

- 2000 Member of the working group ‘Developing and testing methods for classifying species conservation status and estimating risk’, at the National Center for Ecological Analysis and Synthesis, University of California Santa Barbara, CA (ongoing).
- 1999 Invited speaker at workshop: ‘Beyond Point Estimates: Risk Assessment Using Interval, Fuzzy and Probabilistic Arithmetic’ at the 1999 Annual Meeting of the Society for Risk Assessment, in Atlanta, GA.
- 1999 Consultant for Forestry Tasmania, Australia. Conducted a population risk assessment and presented workshop on the forest management and conservation of a threatened carnivorous land snail in north west Tasmania.
- 1998 Panelist for Industrial Risk Management seminar, Environmental Futures Forum, September 21 and 22, organised by the Victorian Environmental Protection Authority, held at the University of Melbourne, Australia.
- 1998 Consultant for the Cooperative Research Centre (CRC) for Catchment Hydrology (Australia). Presented two workshops in fuzzy decision theory. Developed spreadsheet-based software for ranking funding allocation for projects using multi-criteria decision making methods.
- 1998 Invited speaker at workshop: ‘Tools for Population Viability Analysis’ at the Society for Conservation Biology Annual meeting in Sydney, Australia.

## **Student Supervision**

### **Graduate level:**

1997/1998 Andrew Bearlin (School of Botany, The University of Melbourne). “A stochastic model for seagrass (*Zostera mulleri*) in Port Phillip Bay, Victoria, Australia”.

1998 Naomi Tootell (Department of Mathematics and Statistics, The University of Melbourne). “*Xanthorrhoea resinifera*: an individual-based stochastic population model”.

## **Administrative Duties**

Graduate and undergraduate student consultation; Environmental Science/Secondary School Liaison Officer; Parent Orientation Program Leader; budget management; course advisor for undergraduate students; Deputy Safety Officer; supervision of students participating in the 1998 Singapore/University of Melbourne Exchange Program; NCEAS Eco-Lunch seminar series organizer.

## **Visiting Scholarships**

- September 2000 School of Philosophy, University of Tasmania, Australia. Guest lecturer for the course ‘Choice, Risk and Decision’. Collaborative research with M. Colyvan.
- January 1999 Visiting scholar at the Central Institute for Higher Tibetan Studies in Sarnath, India. Lectured a course on decision theory and supervised students in the Tibet-Tasmania Partnership Program.

## Peer Review

Reviewer for:

*Conservation Biology*

*Ecology*

*Risk Analysis*

*Natural Resource Modeling*

*IEEE Transactions on Systems, Man, and Cybernetics*

## Membership in Professional Societies

Society for Conservation Biology

Ecological Society of America

Australian Mathematical Society

## Publications

### Refereed Papers

Regan, H.M., H.R. Akçakaya, S. Ferson, K.V. Root, S. Carroll and L.R. Ginzburg. Treatments of uncertainty and variability in ecological risk assessment of populations. *Human and Ecological Risk Assessment* (in press).

Regan, H.M. and T.D. Auld. Using Population Viability Analysis for Management of an Endangered Australian Shrub, *Grevillea caleyi*. In H.R. Akçakaya, M.A. Burgman, O. Kindvall, P. Sjogren-Gulve, J. Hatfield, and M. McCarthy (eds.), *Developing models for conservation and management using RAMAS GIS*, (in press).

Regan, H.M., T.D. Auld, D. Keith and M.A. Burgman. The effects of fire and predators on the long-term persistence of an endangered shrub, *Grevillea caleyi*. *Biological Conservation* (in press).

Regan, H.M., B.K. Hope, and S. Ferson. An analysis of uncertainty in a food web exposure model. *Human and Ecological Risk Assessment*, (in press).

Regan, H.M. Von Neumann stability analysis of symplectic integrators applied to Hamiltonian PDEs. *Journal of Computational Mathematics* (in press).

Taylor, R.J., T.J. Regan, H.M. Regan, M.A. Burgman and K. Bonham. Impacts of plantation development, harvesting schedules and rotation lengths on the rare snail *Tasmaphena lamproides* in northwest Tasmania: a population viability analysis. *Forest Ecology and Management* (in press).

Elith, J., M.A. Burgman and H.M. Regan. Mapping epistemic uncertainty and vague concepts in predictions of species' distribution. *Ecological Modelling* (in press).

Regan, H.M., B.E. Sample, and S. Ferson. Deterministic and Probabilistic Ecological Soil Screening Levels for Wildlife. *Environmental Toxicology and Chemistry*, **21**(4):882–890, 2002.

Regan, H.M., M. Colyvan, and M.A. Burgman. A taxonomy and treatment of uncertainty for ecology and conservation biology. *Ecological Applications*, **12**(2):618–628, 2002.

Regan, T.J., H.M. Regan, K. Bonham, R.J. Taylor, and M.A. Burgman. Modelling the impact of timber harvesting on a rare carnivorous land snail (*Tasmaphena lamproides*) in northwest Tasmania, Australia. *Ecological Modelling*, **139**:253–264, 2001.

Colyvan, M., H.M. Regan, and S. Ferson. Is it a crime to belong to a reference class?, *The Journal of Political Philosophy*, 9(2):168-181, 2001.

Reprinted in H. Kyburg and M. Thalos (eds.) *Probability is the Very Guide of Life*, Open Court, Chicago (in press).

Regan, H.M. Population Models: Individual-Based, in R.A. Pastorok, S.M. Bartell, S. Ferson, and L.R. Ginzburg (eds.) *Ecological Modeling in Risk Assessment: Chemical Effects on Populations, Ecosystems and Landscapes*, Lewis Publishers, Boca Raton FL., pp. 65-82, 2001.

Akçakaya, H.R. and H.M. Regan. Population Models: Metapopulations, in R.A. Pastorok, S.M. Bartell, S. Ferson, L.R. Ginzburg (eds.) *Ecological Modeling in Risk Assessment: Chemical Effects on Populations, Ecosystems and Landscapes*, Lewis Publishers, Boca Raton FL., pp. 83-95, 2001.

Regan, H.M., R. Lupia, A.N. Drinnan and M.A. Burgman. The currency and tempo of extinction. *The American Naturalist*, Vol. 157, No. 1, 1–10, January 2001.

Regan, H.M., and M. Colyvan. Fuzzy Sets and Threatened Species Classification, *Conservation Biology*, Vol. 14, No. 4, 1197–1199, August 2000.

Regan, H.M., M. Colyvan and M.A. Burgman. A Proposal for Fuzzy IUCN Categories and Criteria, *Biological Conservation*, Vol. 92, No. 1, 101–108, 2000.

Bearlin, A.R., M.A. Burgman, and H.M. Regan. A Stochastic Model for Seagrass (*Zostera muelleri*) in Port Phillip Bay, Victoria, Australia, *Ecological Modelling*, **118**:131–148, 1999.

Stiles, P.J. and H.M. Regan. Transient Cellular Convection in Electrically Polarized Colloidal Suspensions, *Journal of Colloid and Interface Science*, 202(2), pp. 562–565, 1998.

### **Submitted papers**

Regan, H.M., S. Ferson, and D. Berleant. Equivalence of five methods for bounding uncertainty. *International Journal of Approximate Reasoning* (in revision).

Pastorok, R.A., H.R. Akçakaya, S. Ferson, and H.M. Regan. Role of ecological modeling in risk assessment. *Human and Ecological Risk Assessment* (in revision)

Bartell, S.M., R.A. Pastorok, H.R. Akçakaya, H.M. Regan, S. Ferson and C. Mackay. Realism and relevance of ecological models used in chemical risk assessment. *Human and Ecological Risk Assessment* (in revision)

### **Manuscripts in preparation**

Tootell, N., H.M. Regan, D.A. Keith, and M. Tozer. Dynamics of disease and fire: an individual-based model of the grass tree *Xanthorrhoea resinifera*. *Ecological Applications* (in prep.)

Mace, G., M.A. Burgman, M. Ruckleshaus, D.A. Keith, H.M. Regan. Setting priorities for recovery: a framework for environmental decisions (in prep.)

Regan, H.M., et al. A guide to setting bounds on parameters for threatened species classification. (in prep.)

### **Technical Reports and Conference Proceedings**

Regan, H.M., A. Rawlinson, D.A. Keith, T.D. Auld and M.A. Burgman. Population viability analysis for *Grevillea caleyi*, *Epacris stuartii* and *E. barbata*. Pages 53–71 in *Plant Population Viability Analysis Case Studies for Environment Australia*. Project FN-37. Report by the School of Botany, University of Melbourne, to Environment Australia. 1998.

Regan, H.M., M. Colyvan and M.A. Burgman. Dealing with Vagueness in Threatened Species Classification, in R. N. Dave and T. Sudkamp (eds.), *Proceedings of the 18th International Conference of the North American Fuzzy Information Processing Society: Real World Applications of Fuzzy Logic and Soft Computing*, IEEE, Piscataway, NJ, 685–694, 1999.

Regan, T.J., K. Bonham, H.M. Regan, R. Taylor, D. Tuson and M.A. Burgman. Forest Management and Conservation of *Tasmaphena lamproides* in North West Tasmania: Use of Population Viability Analysis to Evaluate Management Options, 52pp. Report to Forestry Tasmania, July 1999.

Regan, H.M. Individual-based models, in Exponent, Applied Biomathematics, and The Cadmus Group Inc. (eds.) *Improvements in Applications of Models in Ecological Risk Assessment: Evaluation of Ecological-Effects Models*, Report to the American Chemistry Council, Arlington, Virginia, 2000.

Andelman, S.J., S. Beissinger, J. Cochrane, L. Gerber, P. Gomez-Priego, C. Groves, J. Haufler, R. Holthausen, D. Lee, L. Maguire, B. Noon, K. Ralls, and H.M. Regan. Report of the NCEAS working group to evaluate methods for conducting viability assessments under the National Forest Management Act. 2001.

Regan, H.M., F. Davis, S.J. Andelman, G. Greenwood, M. Beyeler, P. Dangermond, D. Hickson, M. Hoshovsky. Report of NCEAS/CCRISP Workshop on Terrestrial Biodiversity Conservation Criteria. A report to The Resources Agency of California and CCRISP. 2001.

Regan, H.M., F. Davis, S.J. Andelman, G. Greenwood, P. Dangermond, D. Kelley, J. Loux, W. Rash, R. Standiford, B. Stewart, E. Vink. Report of NCEAS/CCRISP Workshop on Agricultural Lands Conservation Criteria. A report to The Resources Agency of California and CCRISP. 2001.

Regan, H.M., F. Davis, S.J. Andelman, P. Dangermond, S. Gergel, M. Glickfeld, E. Pert, P. Stine, D. Stoms. Report of NCEAS/CCRISP Workshop on Aquatic Biodiversity Conservation Criteria. A report to The Resources Agency of California and CCRISP. 2001.

Regan, H.M., Rash, W., Loux, J., Frost, W., Greenwood, G., Jolley, L., Standiford, R., Rayburn, R., Keithley, C., Vink, E., Saving, S., Stewart, W. Report of NCEAS/CCRISP Workshop on Forest Lands Conservation Criteria. A report to The Resources Agency of California and CCRISP. 2001.

Regan, H.M., M. Glickfeld, H. Barnett, J. Loux, P. McCarty, R. Doyle, P. Edelman, D. Kamradt, P. Beier, C. Luke, S. Denzler, J. Woodbury, C. Miller, R. Dinno, P. Dangermond, J. Metz, M. Angle,

G. Greenwood, T. Scott, F. Davis, M. Beyeler, R. Rayburn. Report of NCEAS/CCRISP Workshop on Urban Open Space Conservation Criteria. A report to The Resources Agency of California and CCRISP. 2002.

Regan, H.M., M. Glickfeld, H. Barnett, J. Loux, P. McCarty, P. Dangermond, J. Metz, R. Rayburn, J. Yandoh, J. Faridi, B. Collett, R. Gerrard, K. Demetrak, D. Duran, E. Haok, R. Murray, D. North. Report of NCEAS/CCRISP Workshop on Conservation Criteria for Destination Type Recreation in Rural California. A report to The Resources Agency of California and CCRISP. 2002.

Davis, F., H.M. Regan, S.J. Andelman, M. Beyeler, P. Dangermond, G. Greenwood, D. Hickson, M. Hoshovsky. Choosing Assessment Units for State and Regional Conservation Planning. A report to The Resources Agency of California and CCRISP, 2001.

### **Conference Presentations**

Regan, H.M., B.K. Hope, and S. Ferson. Treatment of uncertainty in ecological screening levels for wildlife, (abstract) in *The Ecological Society of America 87th Annual Meeting, Volume of Abstracts*, Tucson, AZ, USA, August 2002.

Regan, H.M., F. Davis, S.J. Andelman, and D. Stoms. The use of decision-making tools in systematic conservation planning, (abstract) in *Society for Conservation Biology, 16th Annual Meeting, Volume of Abstracts*, Canterbury, U.K., July 2002.

Regan, H.M., T.D. Auld, D.A. Keith, and M.A. Burgman, Using population models for conservation management of an endangered Australian plant, *Grevillea caleyi*, (abstract) in *Science for Plant Conservation: An International Conference for Botanic Gardens, Volume of Abstracts*, Dublin, Ireland, July 2002.

Regan, T.J., D.A. Keith, H.M. Regan, and M. Tozer, A population viability analysis for a long lived perennial: *Xanthorrhoea resinifera*, (abstract of poster) in *Science for Plant Conservation: An International Conference for Botanic Gardens, Volume of Abstracts*, Dublin, Ireland, July 2002.

Stoms, D., F. Davis, C. Costello, S. Andelman, and H.M. Regan. A methodological framework for the California Legacy Project, (abstract) in *International Association for Landscape Ecology, 17<sup>th</sup> Annual Meeting, Volume of Abstracts*, Lincoln, Nebraska, 2002.

Regan, H.M., S.J. Andelman, M.A. McCarthy, and M.A. Burgman. How precautionary are we? The impact of uncertainty on threatened species classifications, (abstract) in *Society for Conservation Biology, 15th Annual Meeting, Volume of Abstracts*, Hilo, Hawaii, 2001.

Regan, H.M., B.K. Hope, and S. Ferson. Small chances and fat chances: setting the context for probabilistic analysis of a food-web model, (abstract) in *Risk Analysis in Industry and Government: Volume of Abstracts of the Society for Risk Analysis Annual Meeting*, Washington D.C., 2000.

Keith, D.A., M. Tozer, N. Tootell, and H.M. Regan. Population change in long-lived plants: a 10-year demography of *Xanthorrhoea resinifera*, (abstract of paper) in *ESA99: Annual Meeting of the Ecological Society of Australia, Volume of Abstracts*, Fremantle, Western Australia, 1999.

Sample, B.E., H.M. Regan, S. Ferson, R. Pastorok, M. Butcher, P. Rury, A.D. Little, R. Rytí, J. Bascietto, and S. Ells. Ecological Soil Screening Levels for wildlife: development and comparison

of deterministic and probabilistic approaches, (abstract of poster) in *Society for Environmental Toxicology and Chemistry, 20th Annual Meeting, Volume of Abstracts*, Philadelphia, 1999.

Ferson, S., J.A. Cooper, H.M. Regan and M. Butcher. Beyond point estimates: risk assessment using interval, fuzzy and probabilistic arithmetic, (abstract) in *The Future of Risk in the 21st Century: Volume of Abstracts of the Society for Risk Analysis Annual Meeting*, Atlanta, 1999.

Regan, H.M., R. Lupia, A.N. Drinnan, and M.A. Burgman. Mass extinction or mass hysteria: dealing with uncertainty in the past and present, (abstract of paper) in *The Future of Risk in the 21st Century: Volume of Abstracts of the Society for Risk Analysis Annual Meeting*, Atlanta, 1999.

Regan, H.M. and S. Ferson. Measurement Error and Threshold Uncertainty in Classifying Biological Species for Conservation, (abstract of paper) in *The Future of Risk in the 21st Century: Volume of Abstracts of the Society for Risk Analysis Annual Meeting*, Atlanta, 1999.

Regan, H.M., D.A. Keith, T.D. Auld and M.A. Burgman. Population Viability Analysis of *Grevillea caleyi*, (abstract of paper) in *12th Annual Meeting of the Society for Conservation Biology, Volume of Abstracts*, Macquarie University, Sydney, 1998.

Colyvan, M. and H.M. Regan. A Proposal for Fuzzy IUCN Categories and Criteria, (abstract of paper) in *12th Annual Meeting of the Society for Conservation Biology, Volume of Abstracts*, Macquarie University, Sydney, 1998.

Regan, H.M., M.A. Burgman, T.D. Auld and D.A. Keith. Population models of even-aged plant cohorts, (abstract of paper) in *1998 World Conference on Natural Resource Modeling, Volume of Abstracts*, Hobart, 1998.

Regan, H.M. and M.A. Burgman. Extinction rates: a fuzzy approach, (abstract of paper) in *ESA97: Annual Meeting of the Ecological Society of Australia, Volume of Abstracts*, Charles Sturt University, Albury, 1997.

Regan, H.M. Symplectic Integration of Hamiltonian PDEs: An Alternative Approach, (abstract of paper) in *ANZIAM97: 32nd Australasian Applied Mathematics Conference, Volume of Abstracts*, Masterton, New Zealand, 1997.

### **Invited Seminars**

2002 National Marine Fisheries Service, Seattle, WA, USA

2001 San Diego State University, CA, USA

2001 University of California Santa Barbara, CA, USA

2000 University of Tasmania, Hobart, TAS, Australia

1999 University of Melbourne, VIC, Australia

1998 University of Melbourne, VIC, Australia

1996 Latrobe University, Melbourne, VIC, Australia

1996 The Australian National University, Canberra, ACT, Australia

1996 University of New England, Armidale, NSW, Australia