

Ella Bay Development, Far North Queensland  
Expression of Interest in Conducting Research:

**Research Topic:**

**Environmental impacts of Ella Bay Development access and internal roads, design of strategies to mitigate road impacts on adjacent habitats and internal corridors, and monitoring of road mitigation strategies.**

**Research Team**

<u>Name</u>	<u>Positions</u>	<u>Qualifications</u>
<b>Dr Miriam Goosem</b>	Research Fellow School of Environmental and Earth Science, James Cook University, Cairns	PhD, Environmental Science, James Cook University
<b>Prof Steve Turton</b>	Executive Director, JCU/SCIRO Tropical Landscapes Joint Venture, James Cook University, Cairns	PhD, Geography, James Cook University
<b>Dr Catherine Pohlman</b>	Postdoctoral Research Fellow, School of Environmental and Earth Science, James Cook University, Cairns	PhD, Environmental Science, James Cook University
<b>Dr Robyn Wilson</b>	Research Officer, School of Environmental and Earth Science, James Cook University, Cairns	PhD, Environmental Science, James Cook University
<b>Mr Les Searle</b>	Research Officer School of Environmental and Earth Science, James Cook University, Cairns	BSc, GIS, Computer Science, James Cook University BAppSc, Surveying, Queensland Institute Technology
<b>Mr Peter Byrnes</b>	Research Officer School of Environmental and Earth Science, James Cook University, Cairns	PhD candidate, Environmental Science, James Cook University, BSc (Hons), Environmental Science

**Background and research questions:**

The Ella Bay Development will involve the upgrade of the existing access to Ella Bay or construction of alternative access. It will also require the construction of roads within the site of a variety of widths and expected traffic loads that will divide important wildlife movement corridors within the site. The Ella Bay Intergrated Resort Proposal Environmental Impact Statement (2007) states that:

“A key aspect of the conservation/mitigation measures is the protection of fauna movement corridors and habitat”.

To achieve these conservation measures, one critical aspect will require the incorporation of best practice environmental road design with respect both to the final access road and the internal roads. Research into the design and operation of these best practice roads is necessary to achieve the best possible outcomes.

The James Cook University School of Earth and Environmental Science road ecology team has the greatest expertise in research into rainforest road impacts and mitigation of impacts in Australia (and globally) with respect to rainforests (see references), being a proven research provider in this field to the Queensland Department of Main Roads and the Wet Tropics Management Authority through the Rainforest CRC and the JCU/CSIRO Tropical Landscapes Joint Venture and the Marine and Tropical Sciences Research Facility. The team also has expertise in best practice with respect to powerline access. The team will work in close collaboration with the postdoctoral cassowary research at the site to be undertaken by Mr Les Moore. We have expertise in research into habitat quality and faunal connectivity issues with respect to restoration priorities; road impacts including: roadkill; faunal movements; road edge effects on microclimate, vegetation and fauna; disturbance from traffic noise, headlights and vehicle movements, barrier effects of roads; invasions of weeds and alien fauna along roads; and mitigation strategies to minimize these impacts. Team members with expertise in rainforest roadside rehabilitation and road pollution can be included if required.

The research will:

1. Examine habitat quality of the remnant and riparian vegetation on site and within and adjacent to the access road footprint with respect to microclimate, vegetation and habitat for selected wildlife groups.
2. Review road design in terms of best practice literature from around the world and within the Wet Tropics and provide advice with respect to best environmental practice with regards design, construction and operation to achieve the smallest environmental footprint possible and to allow wildlife movements, both of the cassowary and other fauna.
3. Monitor wildlife mortality, edge effects and aspects of faunal connectivity both prior to and after road upgrade and construction.

### **Aims and objectives**

1. To examine the existing habitat quality of remnant and riparian vegetation within the site and adjacent to the access road proposals with respect to vegetation quality and habitat quality and habitat connectivity for selected faunal groups using remote sensing, GIS and field truthing techniques.
2. To provide recommendations and maps regarding restoration priorities for faunal habitat connectivity within the site from the habitat quality assessment.
3. To review best practice road design principles in terms of the roads required for access to the development and within the site itself, with particular emphasis on the faunal habitat connectivity elements identified above with the aim of recommending mitigation strategies that will reduce impacts including fencing and wildlife crossing structures.
4. To examine current and potential road mortality and edge, barrier and disturbance effects, such as traffic noise, along the current access road that will inform the incorporation of road upgrade designs that minimize these impacts.
5. To examine representative populations of faunal groups other than the cassowary (which is already the subject of detailed research) that might require the incorporation of mitigation strategies to minimize road mortality and barrier effects, such as endangered frogs and terrestrial and arboreal species of mammals and other herpetofauna.
6. To monitor mitigation strategies once installed.

7. To continue monitoring of impacts including edge and disturbance effects, wildlife movements, mortality, during operational phase of development.

## Methodology

The project will use methods established over the past 10 years to examine road impacts and mitigation strategies, habitat quality and connectivity issues.

1. Road mortality will be monitored on selected transects.
2. Edge effects adjacent to road clearings will be examined using traverse measurements of microclimate parameters including light, temperature, humidity, soil moisture and soil temperature and possibly diurnal measurement of some of these parameters. Vegetation parameters can be examined on transects parallel to the clearing and, where necessary, movements of animals can be monitored using mark and recapture of animals captured in Elliot, cage and pit traps, or radio-tracking as required.
3. Habitat quality parameters are examined using a combination of satellite and/or aerial photograph interpretation, GIS mapping and modeling, and field truthing. GIS is then used to delineate priority rehabilitation areas.
4. Disturbance by traffic noise and head and streetlights can be monitored using specialized noise and light measuring equipment already available in our laboratory.
5. Mitigation structures are monitored using a combination of sand or marble dust tracking, radiotracking, remotely-triggered photography and mark recapture techniques.
6. Corridor use by selected wildlife groups are evaluated using observational techniques, including spotlighting, bird and herpetofaunal observations and mark recapture techniques.

## Outcomes

Expected outcomes include:

1. Literature review detailing potential impacts and recommended mitigatory strategies.
2. Maps of vegetation and habitat quality and recommended restoration priorities and reports detailing the information gained.
3. Report detailing road mortality and edge effects and potential disturbance parameters along current road access prior to upgrade.
4. Reports detailing monitoring of mitigatory strategies.
5. Reports describing monitoring of impacts during operational phase of development.

## Funding

<i>Activity</i>	<i>Funding Requirements</i>	<i>Source of Funding</i>
Review of potential impacts and mitigatory strategies (first months of project)	Research Officer, Academic A, 2 months \$15,000	Ella Bay Research Fellow – JCU \$3,000
Road mortality monitoring (first year of project, then again one year after project construction and again when fully operational)	Research Officer, Academic A, 1 day/wk \$15,800/yr Travel to site \$6,000	Ella Bay Equipment – JCU Research Fellow – JCU \$3,000
Edge effect study – microclimate and vegetation, initial (first year of project, then again one year after	Postdoctoral Fellow, Academic A, 15% of full-time, \$12,000	Ella Bay Equipment – JCU (\$35,000)

construction and again when fully operational)	Research assistant, 15% of full-time, \$8,000 Travel to site \$3,000	
Edge effect study – fauna (first year of project, then again one year after construction and again when fully operational)	Research Officer, Academic A, 5 days/month, 6 months, \$14,000 Travel to site and accommodation \$6,000	Ella Bay Research Fellow – JCU \$18,000 Equipment – JCU - \$8,000
Mitigatory Strategy monitoring (once construction completed)	Research Officer, Academic A, 1 day/week \$15,800/yr Travel to site \$6,000	Ella Bay Equipment – JCU Equipment – Ella Bay \$8,000
Disturbance by noise and headlights (first year of project, then again when fully operational)	Research Officer, Academic A, 2 months, \$15,000 Research Officer, Academic A, 2 months, \$15,000	Ella Bay Equipment – JCU (\$15,000)

## References

### Journal Articles and Book Chapters:

- Goosem, M. (2007). Rethinking road ecology. In “Living in a dynamic tropical forest landscape”. (Eds. N. Stork and S. Turton). Chapter 35. Blackwell Publishing, Oxford, UK. (in press).
- Laurance, W.F. and Goosem, M. (2007). Impacts of habitat fragmentation and linear clearings on Australian rainforest biota. In “Living in a dynamic tropical forest landscape”. (Eds. N. Stork and S. Turton). Chapter 24. Blackwell Publishing, Oxford, UK. (in press).
- Dawe, G. and Goosem, M. (2007). Vehicle noise attenuation through tropical rainforest at ground and lower canopy levels: distance penetrated by noise disturbance. *Journal of Environmental Management* (accepted, in revision).
- Pohlman, C., Turton, S. and Goosem, M. (2007). Edge effects of linear canopy openings on tropical rainforest understory microclimate. *Biotropica* **39**, 62-71.
- Lawson, T., Goosem, M. and Gillieson, D. (2007). Rapid assessment of habitat quality in riparian rainforest vegetation. *Pacific Conservation Biology* (in press).
- Lawson, T., Gillieson, M. and Goosem, M. (2007). Assessment of riparian rainforest vegetation change for management and restoration. *Geographical Research* (in press).
- Goosem, M., Weston, N. and Bushnell, S. (2006). Effectiveness of rope bridge arboreal overpasses and faunal underpasses in providing connectivity for rainforest fauna. In: Proceedings of the 2005 International Conference on Ecology and Transportation, edited by C.L. Irwin, P. Garrett and K.P. McDermott. Raleigh, NC:Center for Transportation and the Environment, North Carolina State Uni.
- Goosem, M. (2004). Linear infrastructure in tropical rainforests: mitigating impacts on fauna of roads and powerline clearings. In “Conservation of Australia’s forest fauna”. (Ed. Lunney, D.), Royal Zoological Society of NSW, Mosman, NSW pp 418-434.
- Goosem, M. (2003). Effectiveness of East Evelyn faunal underpasses. In “Proceedings of the National Environment Conference, 2003” (Eds. Brown, R. and Hanahan, C.) pp 200-205.
- Turton, S. and Goosem, M. (2002). Weeds of linear clearings through rainforest. In “Weeds of Rainforest and Associated Ecosystems” (Ed. Grice, A.C. and Setter, M.J.), Rainforest CRC, pp 70-71.
- Goosem, M. (2002). Effects of tropical rainforest roads on small mammals: fragmentation, edge effects and traffic disturbance. *Wildlife Research* **29**,1-13.
- Goosem, M. (2001). Effects of tropical rainforest roads on small mammals: inhibition of crossing movements. *Wildlife Research* **28**, 351-364.
- Goosem, M., Izumi, Y. and Turton, S. (2001). Efforts to restore habitat connectivity for an upland tropical rainforest fauna: A trial of underpasses below roads. *Ecological Mgmt and Restoration* **2**, 196-202.
- Goosem, M. W. (2000). Effects of tropical rainforest roads on small mammals: edge changes in community composition. *Wildlife Research* **27**, 151-163.

- Goosem, M.W. (2000). Impacts of roads and powerline clearings on rainforest vertebrates with emphasis on ground-dwelling small mammals. PhD thesis. James Cook University. 313 pp + Appendices.
- Goosem, M. W. (1997). Internal fragmentation: the effects of roads, highways and powerline clearings on movements and mortality of rainforest vertebrates. In "Tropical Forest Remnants: Ecology, Management and Conservation of Fragmented Communities". (Eds. Laurance, W. F. and Bierregaard, R. O. Jr.) pp 241-255. University of Chicago Press, Chicago.
- Goosem, M. W. and Marsh, H. (1997). Fragmentation of a small mammal community by a powerline corridor through tropical rainforest. *Wildlife Research*, **24**, 613-629.

### Relevant Reports:

- Pohlman, C.L., Goosem, M., 2007, *The Effects of severe Tropical Cyclone Larry on Rainforest Vegetation and Understorey Microclimate Adjacent to Powerlines, highways and Streams in the Wet Tropics World Heritage Area of Northeastern Queensland*. Marine and Tropical Sciences Research Facility and the School of Earth and Environmental Sciences, James Cook University. Report prepared for Powerlink Queensland.
- Dawe, G. and Goosem, M. (2007). Noise disturbance along highways – Kuranda Range Upgrade Project. Report to Queensland Department of Main Roads, March 2007. Rainforest CRC. 133pp. (in review).
- Wilson, R. and Goosem, M. (2007). Vehicle headlight and streetlight disturbance to wildlife – Kuranda Range Upgrade Project. Report to Queensland Department of Main Roads, January 2007. 67pp. (in revision).
- Chester, G., Goosem, M., Cowan, J., Harriss, C. and Tucker, N. (2006). Roads in tropical forests – best practice guidelines. Report to Queensland Department of Main Roads, May 2006. Rainforest CRC. 132pp. (in QDMR review).
- Goosem, M. (2006). Frog status, threats and mitigation of highway impacts – Kuranda Range upgrade project. Report to the Queensland Department of Main Roads, September 2006. Rainforest CRC, Cairns 85pp + Appendices.
- Turton, S. and Pohlman, C., 2005, *Vegetation and Connectivity Under the Proposed Kuranda Range Road Bridges (follow-up report)*. Rainforest CRC, Cairns. Report prepared for the Department of Main Roads.
- Turton, S. and Pohlman, C., 2004, *Vegetation and Connectivity Under the Proposed Kuranda Range Road Bridges: an Evaluation of the Impacts of the Bridges on Vegetation Structure and Faunal Connectivity*. Rainforest CRC, Cairns. Report prepared for the Department of Main Roads.
- Goosem, M. (2005). Wildlife Surveillance Assessment Compton Road Upgrade 2005. Report to Brisbane City Council. April 2005. Rainforest CRC, 67pp.
- Goosem, M. (2004). East Evelyn Underpass Monitoring Project. Report to Queensland Department of Main Roads, June 2004. Rainforest CRC. 15pp.
- Goosem, M., Harriss, C., Chester, G., Tucker, N. (2004). Kuranda Range: Applying Research to Planning and Design Review. Report to Department of Main Roads. April 2004. Rainforest CRC. 66pp.
- Chester, G., Harriss, C. and Goosem, M. (2004). Kennedy Highway, Kuranda Range Proposed Upgrade: Assessment of Net Adverse Impacts. Report to the Department of Main Roads. May 2004. Rainforest CRC. 84pp.
- Goosem, M. and Turton, S. (2002). Weed incursions along roads and powerlines in the Wet Tropics of Queensland World Heritage Area: Potential of remote sensing as an indicator of weed infestations. Report to the Wet Tropics Management Authority. August 2002.
- Goosem, M. and Weston, N. (2002). Under and over. *Wildlife Australia*, **39**, 34-37.
- Goosem, M.W. and Turton, S. (2000). Impacts of roads and powerlines on the Wet Tropics World Heritage Area. Stage II Report, July 2000. Report to the Wet Tropics Management Authority and Cooperative Research Centre for Rainforest Ecology and Management. 210 pp
- Goosem, M.W. and Turton, S. (1999). Monitoring the effects of roads and powerlines in the Wet Tropics World Heritage Area. Stage I. Report to the Wet Tropics Management Authority and Cooperative Research Centre for Rainforest Ecology and Management. 110pp.

**Appendix 1: Short Curriculum Vitae's of the Research Team**

<b>PERSONAL DETAILS</b>	<p>Name: <b>Miriam Winifred GOOSEM</b></p> <p>Address: Research Fellow, School of Environmental and Earth Sciences James Cook University Cairns Campus PO Box 6811 Cairns QLD 4870</p> <p>Contact Details: (07) 40421467(w) (07) 40342608 (h) (07) 40421284 (Facsimile) EMail: Miriam.Goosem1@jcu.edu.au</p> <p>Date of Birth: 6 April 1957</p>
<b>ACADEMIC QUALIFICATIONS</b>	<p><b>Ph.D, Environmental Science, James Cook University, 2000</b> <i>Impacts of roads and powerline clearings on movements and mortality of rainforest vertebrates with emphasis on ground-dwelling small mammals.</i></p>
<b>RESEARCH INTERESTS</b>	<p>My PhD concerned the impacts of roads and powerline clearings on movements and mortality of rainforest wildlife and this has remained a focus of my research career. In the past 10 years, the variety of impacts examined has expanded to include edge effects on vegetation and microclimate and the invasion by weeds and the impacts of disturbance such as traffic noise, traffic movements and streetlights and headlights. In the past 8 years we have also examined a range of strategies for mitigating a variety of road impacts. Our research team of research officers, students and I have received more than \$1,000,000 funding to examine the impacts of roads and powerline clearings and the mitigation of those impacts in a variety of aspects of applied ecology in rainforest and adjacent habitats including:</p> <ul style="list-style-type: none"> <li>• Barrier effects on rainforest wildlife including terrestrial and arboreal mammals and herpetofauna</li> <li>• Edge effects on rainforest wildlife including terrestrial and arboreal mammals and herpetofauna</li> <li>• Road mortality of vertebrates on rainforest highways</li> <li>• Mitigation of barrier effects on wildlife including terrestrial and arboreal mammals and herpetofauna</li> <li>• Mitigation of edge effects on wildlife including terrestrial mammals and herpetofauna</li> <li>• Use of road underpasses and canopy bridges over roads by a variety of rainforest fauna to mitigate barrier effects and road mortality</li> <li>• Impacts of traffic noise on rainforest birds and frogs</li> <li>• Penetration of diurnal and nocturnal traffic noise into rainforest</li> </ul>

## PUBLICATIONS

- Impacts of headlights and streetlights on rainforest fauna and penetration distance of headlight disturbance
- Net adverse impacts of highways
- Design and review of highway impacts and mitigatory strategies
- Edge effects in rainforest microclimate, vegetation and floristics adjacent to highways, minor roads and powerline clearings
- Mitigating edge effects on microclimate, vegetation and floristics adjacent to powerline clearings
- Invasion of weeds along roads and powerline clearings
- Invasion by feral animals along roads and powerline clearings
- Reducing weed invasions along roads and powerline clearings
- Vegetation and habitat quality in riparian and remnant vegetation and faunal connectivity through agricultural and urban landscapes
- Provision and monitoring of revegetated corridors to encourage wildlife to use road underpasses and to cross powerline clearings
- Use of road mortality and species sighting data to delineate safe corridors for wildlife and sites to apply mitigatory strategies for mortality
- Edge effects of powerline clearings on sclerophyll forest microclimate and vegetation
- Effects of linear clearings such as roads and powerline clearings on the impact of Severe Tropical Cyclone Larry
- Preparation of best practice manual for road design, maintenance and operation in rainforest

### Articles in Refereed Journals and Book Chapters

- Goosem, M. (2007).** Rethinking road ecology. In "Living in a dynamic tropical forest landscape". (Eds. N. Stork and S. Turton). Chapter 35. Blackwell Publishing, Oxford, UK. (in press).
- Laurance, W.F. and **Goosem, M. (2007).** Impacts of habitat fragmentation and linear clearings on Australian rainforest biota. In "Living in a dynamic tropical forest landscape". (Eds. N. Stork and S. Turton). Chapter 24. Blackwell Publishing, Oxford, UK. (in press).
- Dawe, G. and **Goosem, M. (2007).** Vehicle noise attenuation through tropical rainforest at ground and lower canopy levels: distance penetrated by noise disturbance. *Journal of Environmental Management* (accepted, in revision).
- Pohlman, C., Turton, S. and **Goosem, M. (2007).** Edge effects of linear canopy openings on tropical rainforest understory microclimate. *Biotropica* **39**, 62-71.
- Lawson, T., Goosem, M. and Gillieson, D. (2007).** *Rapid assessment of habitat quality in riparian rainforest vegetation. Pacific Conservation Biology (in press).*
- Lawson, T., Gillieson, M. and **Goosem, M. (2007).** Assessment of riparian rainforest vegetation change for management and



## PUBLICATIONS

- restoration. *Geographical Research* (in final revision).
- Goosem, M.,** Weston, N. and Bushnell, S. (2006). Effectiveness of rope bridge arboreal overpasses and faunal underpasses in providing connectivity for rainforest fauna. In: Proceedings of the 2005 International Conference on Ecology and Transportation, edited by C.L. Irwin, P. Garrett and K.P. McDermott. Raleigh, NC:Center for Transportation and the Environment, North Carolina State University.
- Goosem, M. (2004). **Linear infrastructure in tropical rainforests: mitigating impacts on fauna of roads and powerline clearings.** In “**Conservation of Australia’s forest fauna**”. (Ed. Lunney, D.), **Royal Zoological Society of NSW, Mosman, NSW pp 418-434.**
- Goosem, M. (2003).** Effectiveness of East Evelyn faunal underpasses. In “Proceedings of the National Environment Conference, 2003” (Eds. Brown, R. and Hanahan, C.) pp 200-205.
- Turton, S. and **Goosem, M. (2002).** Weeds of linear clearings through rainforest. In “Weeds of Rainforest and Associated Ecosystems” (Ed. Grice, A.C. and Setter, M.J.), Rainforest CRC, pp 70-71.
- Goosem, M. (2002).** Effects of tropical rainforest roads on small mammals: fragmentation, edge effects and traffic disturbance. *Wildlife Research* **29**,1-13.
- Goosem, M. (2001).** Effects of tropical rainforest roads on small mammals: inhibition of crossing movements. *Wildlife Research* **28**, 351-364.
- Goosem, M.,** Izumi, Y. and Turton, S. (2001). Efforts to restore habitat connectivity for an upland tropical rainforest fauna: A trial of underpasses below roads. *Ecological Management and Restoration* **2**, 196-202.
- Goosem, M. W. (2000).** Effects of tropical rainforest roads on small mammals: edge changes in community composition. *Wildlife Research* **27**, 151-163.
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- Goosem, M. W. (1997).** Internal fragmentation: the effects of roads, highways and powerline clearings on movements and mortality of rainforest vertebrates. In “Tropical Forest Remnants: Ecology, Management and Conservation of Fragmented Communities”. (Eds. Laurance, W. F. and Bierregaard, R. O. Jr.) pp 241-255. University of Chicago Press, Chicago.
- Goosem, M. W.** and Marsh, H. (1997). Fragmentation of a small mammal community by a powerline corridor through tropical rainforest. *Wildlife Research*, **24**, 613-629.
- Selected Reports, Popular Articles and Other Publications*
- Pohlman, C. and **Goosem, M. (2007).** The effects of severe tropical cyclone Larry on rainforest vegetation and microclimate adjacent to powerlines, highways and streams in the

- WetTropics World Heritage Area of northeastern Queensland. Report to Powerlink, Marine and Tropical Sciences Research Facility, James Cook University, Cairns. 40pp.
- Dawe, G. and **Goosem, M. (2007)**. Noise disturbance along highways – Kuranda Range Upgrade Project. Report to Queensland Department of Main Roads, March 2007. Rainforest CRC. 133pp. (in QDMR review).
- Wilson, R. and **Goosem, M. (2007)**. Vehicle headlight and streetlight disturbance to wildlife – Kuranda Range Upgrade Project. Report to Queensland Department of Main Roads, January 2007. 67pp. (in revision).
- Chester, G., **Goosem, M.**, Cowan, J., Harriss, C. and Tucker, N. **(2006)**. Roads in tropical forests – best practice guidelines. Report to Queensland Department of Main Roads, May 2006. Rainforest CRC. 132pp. (in QDMR review).
- Goosem, M. (2006)**. Frog status, threats and mitigation of highway impacts – Kuranda Range upgrade project. Report to the Queensland Department of Main Roads, September 2006. Rainforest CRC, Cairns 85pp + Appendices.
- Goosem, M. (2005)**. Wildlife Surveillance Assessment Compton Road Upgrade 2005. Report to Brisbane City Council. April 2005. Rainforest CRC, 67pp.
- Goosem, M. (2004)**. East Evelyn Underpass Monitoring Project. Report to Queensland Department of Main Roads, June 2004. Rainforest CRC. 15pp.
- Goosem, M.**, Harriss, C., Chester, G. and Tucker, N. **(2004)**. Kuranda Range: Applying Research to Planning and Design Review. Report to the Department of Main Roads. April 2004. Rainforest CRC. 66pp.
- Chester, G., Harriss, C. and **Goosem, M. (2004)**. Kennedy Highway, Kuranda Range Proposed Upgrade: Assessment of Net Adverse Impacts. Report to the Department of Main Roads. May 2004. Rainforest CRC. 84pp.
- Goosem, M.** and Turton, S. **(2002)**. Weed incursions along roads and powerlines in the Wet Tropics of Queensland World Heritage Area: Potential of remote sensing as an indicator of weed infestations. Report to the Wet Tropics Management Authority. August 2002.
- Goosem, M.** and Weston, N. **(2002)**. Under and over. *Wildlife Australia*, **39**, 34-37.
- Goosem, M.W.** and Turton, S. **(2000)**. Impacts of roads and powerlines on the Wet Tropics World Heritage Area. Stage II Report, July 2000. Report to the Wet Tropics Management Authority and Cooperative Research Centre for Rainforest Ecology and Management. 210 pp
- Goosem, M.W.** and Turton, S. **(1999)**. Monitoring the effects of roads and powerlines in the Wet Tropics World Heritage Area. Stage I. Report to the Wet Tropics Management Authority and Cooperative Research Centre for Rainforest Ecology and Management. 110pp.

## Specialist Fields of Expertise

- Negotiation of Data License agreements on behalf of clients
- Implementation of GIS systems
- Acquisition of data using GPS, aerial photography and satellite imagery
- Image analysis
- Data provision and integration
- Provision of Mapping Services
- Implementation of ANZLIC compliant Data Directory Systems
- Information Management Reviews and Advice
- Provision of Information Management and Mapping training

## Specialist knowledge areas:

- Remote sensing and GIS Delivery of information products using data from multiple custodians.
- Large scale aerial photography mosaics
- Software design, development and support
- Web technologies
- Intellectual Property, Privacy and Freedom of Information issues
- Licensed to perform cadastral surveys by Surveyors Board of Queensland

**Name: Leslie Eric Searle**

**Date of Birth:** 6 March 1953

**Personal Address:** PO Box 189R, REDLYNCH 4870

## Contact details

**Phone:** 61 7 4042 1695

**Mobile:** 0414 827 610

**E-mail:** Les.Searle@jcu.edu.au

## Academic Qualifications

- 1993 - B.Sc. (Computer Science, Geography) - James Cook University
- 1991 - Train the Trainer - North Queensland TAFE
- 1985 - Licensed to perform cadastral surveys - Queensland Surveyors Board
- 1979 - B.App.Sc.(Surveying) - Queensland Institute of Technology

## Professional Affiliations

- Spatial Sciences Institute, Australia
- Australian Spatial Information Business Association
- Far North Queensland GIS User Group
- Cairns Regional Economic Development Association

## Other Training

- In-house management training within the Queensland Department of Natural Resources
- Continuing Professional Development seminars organised through the Spatial Science Institute

## Professional Experience

### **May 2005 to Present: Research Officer, James Cook University, Cairns**

- During this time, I have been employed as a Research Officer funded by Tropical Savannas CRC. I collaborated in a research project investigating the changing tree/grass balance in tropical savannas. This has involved research into existing data archives, development of a website, fieldwork to collect environmental data, analysis of satellite imagery and interpretation of aerial photography.

### **July 2003- May 2005: Research Officer (Part time), James Cook University, Cairns**

- During this time, I lectured in environmental remote sensing and tutored in GIS. I collaborated in a research project investigating use of high-resolution satellite imagery to assess road canopy cover.

### **May 2000-Present: Partner, Searle Consulting NQ, Cairns**

- During this time, I was self-employed as a surveying and mapping consultant. I established the business with an emphasis on digital mapping, aerial photography and satellite imagery.
- I also lectured part time in environmental remote sensing at James Cook University since 2002.

### **August 1997-May 2000: Regional Information Services Coordinator, Queensland Department of Natural Resources, Cairns**

- During this time, I was employed as the Regional Information Services Coordinator. This involved the coordination of both Information Technology and Spatial Information activities within the region.
- I was the chairperson of the Regional Information Technology Steering Committee. This is an interdepartmental sub-committee of the Regional Managers Forum that fosters cooperation in the area of Information Technology between departments for their mutual benefit.
- I chaired the regional IT committee that coordinates the provision of IT services within the region.
- I chaired the regional Spatial Information committee that coordinates spatial information activities within the region.
- I was 1 of 5 Regional Information Coordinators within the department. The Regional Information Coordinators are responsible for the regional implementation of departmental policies and priorities. They also contribute a regional perspective in the formulation of departmental policies and priorities.
- I was a regional representative on the Departmental Natural Resource Information Management Board (NRIM). This board meets monthly to consider the strategic activities of the department regarding Natural Resource Information. The board considers the administrative issues associated with integration of Natural Resource Information data sets.
- I was a regional representative on the Departmental Web Reference Group. This group comprised of senior managers within the department who meet monthly to consider the strategic issues associated with the use of web technologies in delivering core business objectives.

- I represented the department on the board of the Herbert Resource Information Centre. This is a collaborative joint venture between CSR, Canegrowers, Herbert Productivity board, CSIRO, Hinchinbrook shire and DNR.
- I was the regional representative for the Queensland Spatial Information Infrastructure Strategy secretariat.
- I am an active member of the executive of the Far North Queensland GIS User group (FUNGIS).
- I am a member of the Cairns IT Enterprises (CITE). This is an IT industry group with membership from private companies, TAFE, James Cook University and state government. The group seeks to promote the local IT industry.

**November 1996-August 1997: District Operations Manager (Land Services), Queensland Department of Natural Resources, Cairns**

- During this time, I was employed as the District Operations Manager (Land Services). This involved the supervision of 80 staff undertaking Surveying and Mapping, Land Titling, State Land Administration, Valuation and Aboriginal Liaison activities.

**August 1991-November 1996: Regional Operations Manager (Titling/Information), Queensland Department of Lands, Cairns**

- During this time, I was employed as the Regional Operations Manager (Titling/Information). This involved supervising 3 surveyors, 5 cartographers, 2 planning officers and 14 administrative staff undertaking tenure history investigations, native title liaison and valuation administration.

**September 1990-August 1991 Queensland Division of Information, Townsville**

- During this time, I was employed as a Surveyor Division 1.

# PETER BYRNES

## PERSONAL DETAILS

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Home Address: 12 Loeven Street, Cairns, QLD 4870.

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Mobile Phone Number: 0409 343525.

Email: [Peter.Byrnes@jcu.edu.au](mailto:Peter.Byrnes@jcu.edu.au)

Date Of Birth: 17<sup>th</sup> October, 1977.

Awards, Certificates, Memberships: Member Golden Key National Honour Society, Student Member Ecological Society of Australia and New Zealand (ESA), Student Member Association for Tropical Biology and Conservation (ATBC), Member Australian Geographic Society.

Licences and Tickets: Open Manual Drivers Licence, Speed Boat Licence, Marine Radio Licence, First Aid Certificate, Open Water Diving Certificate.

## PUBLICATIONS

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- 2005 Ecological Society of Australia (ESA) Oral Presentation  
Title: "Roads and medium-sized, ground-dwelling rainforest mammals: effects on movement and health."
- 2005 Rainforest CRC Conference Poster  
Title: "Roads and Mammal Movement: the barrier effect."
- 2005 TESAG Conference Poster  
Title: "The Effect Of Roads on Mammal Movement."
- 2004 Rainforest CRC Conference Poster  
Title: "Do Roads Affect the Movement of Rainforest Mammals in the WTWHA?"
- 2004 TESAG Conference Poster  
Title: "Why Did The Musky Cross The Road?"

## EDUCATION

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2003-Present James Cook University Cairns, QLD

- PhD (Environmental Science).

Topic: "Impact of roads on medium-sized, ground-dwelling rainforest mammals in the Wet Tropics World Heritage Area."

Utilised drift fences and large wire cage traps to capture target mammal species. Animals were marked and weighed, and body morphometric measurements taken to calculate a condition index. They were then tracked using the spool-and-line technique to determine their movements in relation to roads and responses to traffic noise.

2002 James Cook University Cairns, QLD

- B.Sc.Hons. (Environmental Science) First Class Honours awarded.

Topic: "Use of roads and powerline corridors by feral animals."

Utilised sand traps, infra-red triggered digital cameras and transect surveys to detect signs of feral animal presence on roads and powerline corridors in

Wooroonooran National Park, near Innisfail, QLD.

1999-2001 James Cook University Cairns, QLD

- B.Sc. (Environmental Science), zoology minor.

1995-1997 Central Queensland University Rockhampton, QLD

- B.App.Sc. (Biology), specialising in microbiology and aquatic biology.

## EXPERIENCE

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2004-2007 James Cook University Cairns, QLD

*Volunteer Field Assistant*

- Trapping and handling small mammals.
- Recording and measuring traffic noise.
- Recording microclimate data.
- Setting up dendrometer bands on trees.

2006 Aus. Canopy Crane Company Cape Tribulation, QLD

*Research Technical Officer*

- Assisted with research on insect diversity and distribution, including trap clearing and insect sorting.
- Established rainforest sampling grid for plant biomass study.
- Maintained remote site, including cleaning, mowing and other basic maintenance activities.
- Administration including updating of site safety documents and general site information documents, booking of researcher accommodation and scheduling fuel delivery and site maintenance activities.

2003-2006 James Cook University Cairns, QLD

*Subject Tutor*

- Prepared tutorials for 2<sup>nd</sup> and 3<sup>rd</sup> year environmental science subjects.
- Ran tutorials, including presentations to class and encouraging class discussions.
- Group leader for subject field trips.

## Brief Curriculum Vitae

**Name:** Dr Catherine L. Pohlman  
**Address:** School of Earth and Environmental Sciences,  
James Cook University,  
P.O. Box 6811,  
Cairns, QLD 4870 Australia  
**Home Address:** 4/33 Rutherford Street, Yorkey's Knob QLD 4878 Australia  
**Phone:** + 61 + (0) 7 4042 1696 (b/h), +61+ (0) 7 4055 7978 (a/h)  
**Fax:** + 61 + (0) 7 4042 1284  
**Email:** Catherine.Pohlman1@jcu.edu.au  
**Date of Birth:** 26<sup>th</sup> October 1978

**Qualifications:** *PhD* (James Cook University, 2007)  
*BSc (Hons)* (The Australian National University, 2001)

### **Research:**

I am currently employed as a Postdoctoral Fellow at the Australian Tropical Forest Institute, James Cook University, where I am studying the effects of Severe Tropical Cyclone Larry on vegetation damage and microclimate in rainforest adjacent to clearings for powerlines and highways and near the edges of streams, following the damage caused to my PhD sites by the cyclone. I am also undertaking research to examine the effects of powerline clearings on microclimate and vegetation structure and composition in dry sclerophyll forest on the outskirts of the Wet Tropics World Heritage Area of northeastern Australia. The study uses specialised microclimate measuring equipment to examine the diurnal light, temperature, humidity, soil moisture and soil temperature regimes at varying distances from the edge of a powerline clearing at Davies Creek and also examines vegetation parameters along transects parallel to the clearing to examine potential impacts of large linear clearings on sclerophyll forest.

During my PhD at James Cook University ("The edge effects of natural and artificial linear canopy openings on rainforest understorey microclimate and tree seedling dynamics" under the supervision of Professor Stephen Turton, Dr Miriam Goosem and Professor David Gillieson), I undertook research to examine the effects of clearings for powerlines and highways, as well as natural canopy openings above streams, on the understorey microclimate and vegetation community of rainforest in the Palmerston Area of the Wet Tropics World Heritage Area of northeastern Australia. Traverse and diurnal measurements of microclimate parameters were examined, together with vegetation characteristics and floristics of all rainforest trees, shrubs and herbs at a very fine spatial scale.

### **Publications:**

#### **Academic Papers:**

Pohlman, C.L., Turton, S.M. and Goosem, M., 2007, Edge Effects of Linear Canopy Openings on Rainforest Understorey Microclimate. *Biotropica*, 39: 62 – 71.

Pohlman, C.L., Nicotra, A.B. and Murray B.R., 2005, Geographic range size, seedling ecophysiology and phenotypic plasticity in Australian *Acacia* species. *Journal of Biogeography*, 32: 341 – 351.



## **Reports:**

Pohlman, C.L., Goosem, M., 2007, *The Effects of severe Tropical Cyclone Larry on Rainforest Vegetation and Understorey Microclimate Adjacent to Powerlines, highways and Streams in the Wet Tropics World Heritage Area of Northeastern Queensland*. Marine and Tropical Sciences Research Facility and the School of Earth and Environmental Sciences, James Cook University. Report prepared for Powerlink Queensland.

Turton, S. and Pohlman, C., 2005, *Vegetation and Connectivity Under the Proposed Kuranda Range Road Bridges (follow-up report)*. Rainforest CRC, Cairns. Report prepared for the Department of Main Roads.

Turton, S. and Pohlman, C., 2004, *Vegetation and Connectivity Under the Proposed Kuranda Range Road Bridges: an Evaluation of the Impacts of the Bridges on Vegetation Structure and Faunal Connectivity*. Rainforest CRC, Cairns. Report prepared for the Department of Main Roads.

## **Unpublished Manuscripts:**

Pohlman, C.L., 2006, *Internal fragmentation in the rainforest: edge effects of highways, powerlines and watercourses on tropical rainforest understorey microclimate, vegetation structure and composition, physical disturbance and seedling regeneration*. Unpublished PhD thesis, James Cook University.

Pohlman, C.L., 2000, *A comparative ecophysiological study of range size variation in Australian Acacia species*. Unpublished Honours thesis, the Australian National University.

## **Academic Papers in Preparation:**

Pohlman, C.L., Goosem, M. and Turton, S.M., in prep., Effects of Severe Tropical Cyclone Larry on rainforest vegetation and understorey microclimate near roads, powerlines and streams. In preparation for submission to a special edition of *Austral Ecology*.

Pohlman, C.L., in prep., Is physical disturbance to the plant community elevated in tropical rainforest adjacent to powerlines, highways and streams? In preparation for submission to *Perspectives in Plant Ecology, Evolution and Systematics*.

# CURRICULUM VITAE – Dr Robyn Wilson

## Current Positions

- Research Fellow – James Cook University
  - Highway Overpass Project
- Vocational Educational Instructor – Mareeba Agricultural College, Queensland
  - Conservation and land management course, Kowanyama

## Previous positions

- Centre Director – Centre for Rainforest Studies
- Lecturer – James Cook University
  - Environmental Science
- Research Officer – James Cook University
  - Coordination, development and preparation of a 'Visitor Monitoring System' for the Wet Tropics World Heritage Area

## Qualifications

- Ph.D. in Tropical Ecology (2000), James Cook University, Queensland
- M.Sc. (1993), James Cook University, Queensland
- Grad.Dip.Ed., (1985), University of Melbourne, Victoria
- B.Sc. (1984), Central Queensland University, Queensland

## Relevant voluntary positions

- Conference committee for ESA – Cairns
- Mabi 5b recovery group committee

## Research interests

- Movements of arboreal and terrestrial mammals in relation to linear barriers
- Penetration of road light from headlights and streetlights over and through rainforest and fauna that are affected
- Strategies used by mammals in a changing environmental climate
- Indigenous peoples and resource management

## International links

- School for Field Studies, Costa Rica
- Forestry Department, University of Arizona – Prof. David Patton
- Musashi Institute of Technology, Japan – Prof. Hiromi Kobori

## Recent collaborations

- Dr Tracy Farrell, School for Field Studies, USA
  - Five Year Research Plan for Centre for Rainforest Studies, Queensland

## Research grants and consultancies

- International Mycology Conference (Aug. 2006)
  - Fungi survey, Wet Tropics
- Blue Pool, Daintree, Douglas Shire Council (2005)
  - Biophysical assessment of Blue Hole
- Musashi Institute of Technology, Yokohama, Japan (2003, 2004)
  - rainforest ecology, restoration and natural regeneration
- Australian Airport Pty Ltd. (AAL), Garbutt Airport, Townsville (2000)
  - control of waterbirds at the Garbutt Airport, Townsville

## Guest Speaker

- Probus, Pupuke Group, North Shore City, New Zealand. July 2006
- Tree Kangaroo and Mammal Group, Queensland. April 2005
- Tropical Rainforest of Queensland, Mi-Tech University, Yokohama, Japan 2003
- Tropical Agroforestry Ecology and Management, JCU 2002
- Australian Ecotourism & Wildlife Tourism Management, JCU 2002.
- Australian Tropical Mammals, JCU 2001
- Protected Area Management, JCU 2001
- School for Field Studies, Atherton Tablelands, Queensland, Nov 2001, and March 2002
- Far North Queensland Tour Operators Executive, June 2002
- Trees for the Evelyn and Atherton and Tablelands (TREAT), Yungaburra, Queensland, 2001
- Belalong Field Research Centre, Brunei. April 2000.
- Society for Growing Australian Plants, Atherton Tablelands, March 1999.
- Historical Society, Malanda, 1997
- Queensland Ornithological Society Inc., Rockhampton, 1995
- Capricorn Coast Conservation Society, Yeppoon, Queensland. 1995.
- Siemens Science Summer School, CQU, Queensland. January 1995.

## Publications

Wilson, R. F., Marsh, H. and Winter, J. 2007. Importance of canopy connectivity on home range and movements of the rainforest arboreal ringtail possum, *Hemibelideus lemuroides*. *Wildlife Research* (in press).

Wilson, R. F. (2007). A future for Musky Rat-Kangaroos, *Hypsiprymnodon moschatus*, in a warmer, drier climate? *Memoirs of Queensland Museum* (submitted).

Wilson, R. F. 2006. Why did the cyclone cross the road? *Wildlife Australia Magazine*.

Wilson, R. F. 2002. Measuring and monitoring impacts of visitation and use in the Wet Tropics World Heritage 2001/2002: Case Studies – Biophysical Assessment. Cooperative Research Centre for Tropical Rainforest Ecology and Management, Cairns.

Wilson, R. F., Turton, S.M., Bentrupperbäumer, J.M., Reser, J.P. and Curtis, I. 2002. Development of a Visitor Monitoring System for the Wet Tropics World Heritage. Cooperative Research Centre for Tropical Rainforest Ecology and Management, Cairns.

Wilson, R.F. (1999). Possums in the spotlight. *Nature Australia*. 26: 34-41.

Wilson, R.F. (1997). Temporal and spatial variation in the distribution and abundance of the Magpie Goose, *Anseranas semipalmata*, in the Rockhampton Region of the Queensland coast. *Aust. Wildl. Research*. 24: 347-357.

Wilson, R.F. (1992). Censuses and Breeding records of the Magpie Goose, *Anseranas semipalmata*, on the coastal wetlands of central Queensland. *Corella*. 16 (4):119-123.

Kanowski, J., Felderhof, L., Newell, G., Parker, T., Schmidt, C., Wilson, R. and Winter, J. W. (2001). 'Community survey of the distribution of Lumholz's Tree-kangaroo on the Atherton Tablelands, north-east Queensland.' *Pacific Conservation Biology* 7: 79-86.