

**Paper to inform Canberra Nature Park (nature reserves); Molonglo River  
Corridor (nature reserves) and Googong Foreshores Investigation**

**Research: Existing and Potential**

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**Contributors**

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Compiled by the Office of the Commissioner for Sustainability

## Current research

Site/location	Author/researchers and Year	Studies/reports
Mulligans Flat – Gorooyarroo	Prof David Lindenmayer, Prof Iain Gordon, Dr Sue McIntyre. Invertebrate research with Dr Saul Cunningham and Dr Heloise Gibb 2005-2010	Innovative enhancement and management of threatened temperate woodlands for improved biodiversity conservation.
Mulligans Flat – Gorooyarroo	Prof Iain Gordon, Dr Sue McIntyre, Dr Saul Cunningham 2011-2014	Reintroduction of ecosystem engineers as a woodland restoration tool
Mulligans Flat – Gorooyarroo	ARC Future Fellowship 2011 2014	Understanding grassy woodlands as whole ecosystems
Mulligans Flat – Gorooyarroo Woodland Experiment	Dr Philip Barton current	Carrion biodiversity experiment
Mulligans Flat – Gorooyarroo	Professor James Trappe – Oregon State University (Visiting Fellow at CSIRO Sustainable Ecosystems current	Fungi
Mulligans Flat – Gorooyarroo	Dr Peter Milburn (ANU) current	Bird banding project
Mulligans Flat – Gorooyarroo	Victoria Bennett – PhD current	Brown tree creeper reintroductions
Mulligans Flat – Gorooyarroo	Sarah Goldin – PhD current	Micro environments created by deadwood in woodlands
Mulligans Flat – Gorooyarroo	Philip Barton – PhD 2010	Invertebrates on deadwood in woodlands
Nature reserves	Kathy Eyles current	Social Perspectives of Nature Reserves and Developing

		Urban Areas
Goorooyarro	Brett Howland 2010	Estimating kangaroo densities at Goorooyarro
Mulligans Flat – Goorooyarro	Paul Killey 2010	Quantifying deadwood in woodlands
Mulligans Flat – Goorooyarro	Bart Schneemann	Litter production in woodlands
Mulligans Flat – Goorooyarro	Charles Lowson	Litter production in woodlands
Mulligans Flat – Goorooyarro	Andrew Palmer	Beetles and deadwood in woodlands
Mulligans Flat – Goorooyarro	Daniela Carnovale 2010	Soil Function in a yellow box scattered tree environment
Woodland	Karen Stagoll – PhD current	Woodland birds in Molonglo/urban areas (including boundaries with nature reserves)
Woodland	Laura Rayner – PhD current	Conservation of woodland birds in the ACT
	PhD To commence	Maintenance of hollow bearing trees in urban developments including assessing the effectiveness of nesting boxes in replacing hollow bearing trees
	PhD/Honours To commence	Rehabilitation of ground storey plant diversity in woodlands into propagation of understorey herb species that have become uncommon in Box –Gum woodlands
ACT and region	Manning, A. D., Shorthouse, D. J., Stein, J. L., Stein, J. A. 2010	Technical Report 21:Ecological Connectivity for Climate Change in the ACT and surrounding region
ACT and region	Philip Gibbons and Chris McElhinny	Estimating the pre-European structure of woodland

		ecosystems
Googong	<ul style="list-style-type: none"> <li>• Eddy, D. (2009)</li>   <li>• ACTEW</li>   <li>• Taws, N., and Rowell, A. (2008)</li> <li>• R&amp;P<sup>1</sup> (from 2009)</li> </ul>	<ul style="list-style-type: none"> <li>• Googong Foreshores Grassland and Woodland Vegetation Survey and Mapping. - .</li> <li>• Murrumbidgee to Googong Water Transfer. Environmental Assessment (NSW) and Draft Environmental Impact Statement (ACT)</li> <li>• Vegetation Mapping of Googong Foreshores.</li>   <li>• Bi-annual inspection for <i>Rutidosia leptorrhynchoidea</i>. This information has been incorporate in the National Recovery Plan.</li> <li>• Annual monitoring of vegetation sites as part of a kangaroo grazing project.</li> </ul>
Black Mountain	<ul style="list-style-type: none"> <li>• Purdie, R. (1972-present)</li> <li>• Jones, D. (2001)</li>   <li>• COG</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring of fire regeneration.</li> <li>• Assessment of diversity and distribution of orchid species including Aranda and Bruce Ridge.</li> <li>• Bird diversity and distribution study</li> </ul>
Dunlop	<ul style="list-style-type: none"> <li>• R&amp;P (from 2009)</li>   <li>• Billing, J. (2006)</li> </ul>	<ul style="list-style-type: none"> <li>• Annual monitoring of vegetation sites as part of a kangaroo grazing project.</li> <li>• Kangaroo grazing project.</li> </ul>
Goorooyaroo	<ul style="list-style-type: none"> <li>• Tideman, C. (2003)</li>   <li>• Macintyre S (2008)</li> <li>• Milburn P (2008-present)</li>   <li>• Manning A (2009)</li> <li>• Trappe, J (2009)</li> </ul>	<ul style="list-style-type: none"> <li>• Systematic survey of flora and fauna at selected site to determine post fire recovery.</li> <li>• Grazing research.</li> <li>• Bird diversity and abundance.</li> <li>• Small mammal diversity and abundance</li> <li>• Fungi diversity and abundance.</li> </ul>

<sup>1</sup> Department of Territory and Municipal Services, Research and Planning section

	<ul style="list-style-type: none"> <li>• Carnovale, D (2009)</li> <li>• Goldin S (2008-present)</li> <li>• R&amp;P (2010)</li> <li>• R&amp;P (from 2009)</li> <li>• COG<sup>2</sup></li> <li>• R&amp;P (2010)</li> </ul>	<ul style="list-style-type: none"> <li>• Soil organisms.</li> <li>• Soil collections</li> <li>• Vegetation mapping and management</li> <li>• Annual monitoring of vegetation sites as part of a kangaroo grazing project.</li> <li>• Bird diversity and distribution study.</li> <li>• Mapping of <i>Allocasuarina verticillata</i></li> </ul>
Mulligans Flat	<ul style="list-style-type: none"> <li>• ANU</li> <li>• R&amp;P (2010)</li> <li>• COG</li> </ul>	<ul style="list-style-type: none"> <li>• Woodlands study</li> <li>• Vegetation mapping and management.</li> <li>• Bird diversity and distribution study.</li> </ul>
Mullanggari	<ul style="list-style-type: none"> <li>• R&amp;P annual (from 2009)</li> <li>• R&amp;P (2001)</li> <li>• Billing, J. (2006)</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring of vegetation sites as part of a kangaroo grazing project.</li> <li>• Grassland Earless Dragon surveys.</li> <li>• Kangaroo grazing project.</li> </ul>
Gungaharra	<ul style="list-style-type: none"> <li>• R&amp;P (from 2009)</li> <li>• Billing, J. (2006)</li> </ul>	<ul style="list-style-type: none"> <li>• Annual monitoring of vegetation sites as part of a kangaroo grazing project.</li> <li>• Kangaroo grazing project.</li> </ul>
Crace	<ul style="list-style-type: none"> <li>• R&amp;P (from 2009)</li> <li>• R&amp;P (2001)</li> <li>• Billing, J. (2006)</li> </ul>	<ul style="list-style-type: none"> <li>• R&amp;P annual (from 2009) monitoring of vegetation sites as part of a kangaroo grazing project.</li> <li>• Grassland Earless Dragon and Striped Legless Lizard surveys.</li> <li>• Kangaroo grazing project.</li> </ul>
Kama	<ul style="list-style-type: none"> <li>• R&amp;P (from 2009)</li> <li>• COG</li> </ul>	<ul style="list-style-type: none"> <li>• Annual monitoring of vegetation sites as part of a kangaroo grazing project</li> <li>• Bird diversity and distribution study.</li> </ul>
Molonglo River Corridor	<ul style="list-style-type: none"> <li>• ACT Planning and Land Authority</li> </ul>	<ul style="list-style-type: none"> <li>• Strategic Assessment of the proposed Molonglo Valley development.</li> </ul>

<sup>2</sup> Canberra Ornithological Group

	<ul style="list-style-type: none"> <li>• R&amp;P (from 2009)</li> </ul>	<ul style="list-style-type: none"> <li>• Vegetation Mapping of the Molonglo River Corridor.</li> </ul>
Callum Brae	<ul style="list-style-type: none"> <li>• R&amp;P (from 2009)</li> <li>• Billing, J. (2006)</li> </ul>	<ul style="list-style-type: none"> <li>• Annual monitoring of vegetation sites as part of a kangaroo grazing project.</li> <li>• Kangaroo grazing project.</li> </ul>
Jerrabomberra West	<ul style="list-style-type: none"> <li>• Various researchers (1994-present)</li> <li>• R&amp;P (from 2009)</li> </ul>	<ul style="list-style-type: none"> <li>• Grassland Earless Dragon surveys.</li> <li>• Annual monitoring of vegetation sites as part of a kangaroo grazing project.</li> </ul>
Jerrabomberra East	<ul style="list-style-type: none"> <li>• Various researchers (1994-present)</li> <li>• R&amp;P (from 2009)</li> </ul>	<ul style="list-style-type: none"> <li>• Grassland Earless Dragon surveys.</li> <li>• Annual monitoring of vegetation sites as part of a kangaroo grazing project.</li> </ul>
Majura/Ainslie	<ul style="list-style-type: none"> <li>• R&amp;P</li> <li>• COG</li> <li>• Pennay M (2008)</li> <li>• Buckmaster T (2008)</li> <li>• R&amp;P (2010)</li> </ul>	<ul style="list-style-type: none"> <li>• Vegetation Mapping and management.</li> <li>• Bird diversity and distribution study.</li> <li>• Microbat surveys.</li> <li>• Small mammal surveys.</li> <li>• Mapping of <i>Allocasuarina verticillata</i></li> </ul>
Mount Taylor	<ul style="list-style-type: none"> <li>• Jones S (1996)</li> <li>• COG</li> <li>• R&amp;P</li> <li>• R&amp;P (2010)</li> </ul>	<ul style="list-style-type: none"> <li>• Surveys for Striped Legless Lizard</li> <li>• Bird diversity and distribution study.</li> <li>• Abundance of <i>Swainsona recta</i>.</li> <li>• Mapping of <i>Allocasuarina verticillata</i></li> </ul>
Mugga Mugga Nature Reserve	<ul style="list-style-type: none"> <li>• Hannah Brickhill (Honours), Philip Gibbons (ANU) and Tony Arthur (CSIRO)</li> </ul>	<ul style="list-style-type: none"> <li>• Impacts of the European Rabbit on eucalypt regeneration</li> </ul>
Red Hill	<ul style="list-style-type: none"> <li>• R&amp;P</li> <li>• COG</li> <li>• R&amp;P (2010)</li> </ul>	<ul style="list-style-type: none"> <li>• Rutidosis surveys</li> <li>• COG Bird diversity and distribution study.</li> <li>• Mapping of <i>Allocasuarina verticillata</i></li> </ul>
Stirling Park	<ul style="list-style-type: none"> <li>• Catherine Ross, Amy Macris, James Pittock, Chris McElhinny and Philip</li> </ul>	<ul style="list-style-type: none"> <li>• Response of Button Wrinklewort to prescribed burning</li> </ul>

	Gibbons	
Tuggeranong Hill	<ul style="list-style-type: none"> <li>• R&amp;P (2010)</li> <li>• COG</li> </ul>	<ul style="list-style-type: none"> <li>• Mapping of Allocasuarina verticillata</li> <li>• Bird diversity and distribution study.</li> </ul>
Wanniassa Hills	<ul style="list-style-type: none"> <li>• R&amp;P (from 2009)</li> </ul>	<ul style="list-style-type: none"> <li>• Annual monitoring of vegetation sites as part of a kangaroo grazing project</li> </ul>
Natural Temperate Grasslands		<ul style="list-style-type: none"> <li>• Insects</li> </ul>
Natural Temperate Grasslands	<ul style="list-style-type: none"> <li>• Wendy Diamond</li> </ul>	<ul style="list-style-type: none"> <li>• Viability of Grassland earless Dragon (decline and collapse of species)</li> </ul>
Natural Temperate Grasslands	<ul style="list-style-type: none"> <li>• David Wong</li> </ul>	<ul style="list-style-type: none"> <li>• Pink-tail worm lizards</li> </ul>
Kangaroos	<ul style="list-style-type: none"> <li>• CSIRO – current till 2012</li> </ul>	<ul style="list-style-type: none"> <li>• Fertility research</li> </ul>
Cotter catchment	<ul style="list-style-type: none"> <li>• Greening Australia (2003-current)</li> </ul>	<ul style="list-style-type: none"> <li>• Restoring native vegetation in pine plantations post bushfire</li> </ul>
Revegetation sites (ACT & Region)	<ul style="list-style-type: none"> <li>• Greening Australia &amp; CSIRO (2003-2008)</li> </ul>	<ul style="list-style-type: none"> <li>• Resilience of restored vegetation communities to large scale disturbance by fire</li> </ul>
Revegetation sites (ACT & Region)	ANU & Greening Australia <ul style="list-style-type: none"> <li>• Rayner I (2010)</li> <li>• Schneeman B (2008)</li> <li>• Lawson C (2008)</li> <li>• Read Z (2008)</li> <li>• Fifield G (2006)</li> </ul>	<ul style="list-style-type: none"> <li>• Revegetation: density, structure, carbon, effect on soils, benefits to livestock</li> </ul>
Remnant vegetation and its protection and management (SE NSW)	Greening Australia, CSIRO & Department of Environment and Climate Change (2008)	<ul style="list-style-type: none"> <li>• What is the value of a fence?</li> </ul>
Bird diversity and abundance in revegetation (SE NSW)	Greening Australia & COG (2007)	<ul style="list-style-type: none"> <li>• Bringing back birds: A glovebox guide</li> </ul>
Grassland restoration (Canberra Airport)	Greening Australia (current)	<ul style="list-style-type: none"> <li>• Increasing the condition and extent of Natural Temperate Grasslands</li> </ul>

## Potential research projects

### **Institutionalising adaptive management**

A research program that pilots operational adaptive management<sup>3</sup> for Canberra Nature Park with the aim of making park management more cost-effective (so we can do more with the limited budget). That is, a system that requires some very simple indicators to be measured for each project, preferably within the existing financial management and reporting system used by the Department of Territory and Municipal Services. As an example, the cost of every weed control program would be recorded separately (e.g. by nature reserve), the methods of control used (e.g. glyphosate) and the date undertaken. Some simple indicators would be measured at the outset of each program (e.g. number of serrated tussock found in a given area or a fixed time-period of searching) and these same indicators measured again after each weed control program. This simple information would enable the Department of Territory and Municipal Services to (a) report on the effectiveness of its weed control program per dollar spent (b) compare weed control programs across nature reserves and (c) over time, identify the most cost-effective way to undertake weed control programs. A pilot adaptive management system could be established for a range of programs that represent a significant cost to the Department of Municipal Services and the pilot itself could be monitored to see if it is cost-effective.

### **Restoring the understorey**

There is a need to identify operationally feasible ways of restoring weedy understoreys in natural temperate grasslands and box gum grassy woodlands.

### **Reducing impacts in reserves at urban boundaries**

With an expanding urban footprint there is more urban development closer to the Canberra Nature Reserve. There are several important research questions that should be addressed that include:

1. how to design suburban gardens to reduce populations of hyper-aggressive bird species and invasive plant species
2. fire management at the urban-park interface
3. minimising landholder impacts in reserves (e.g. firewood collection, light, noise and encroachment)

### **Measuring Planning Success**

Environmental considerations affect many planning decisions however the environmental successes or otherwise have not been evaluated. Research on this issue would be timely.

### **Specific species/ecosystem projects could include:**

#### **Grassland Earless Dragon**

A project which investigates what is causing the decline in numbers of Grassland Earless Dragon.

#### **Pink-tailed Worm-lizard - *Aprasia parapulchella***

Impacts of development along the Molonglo River Corridor and relationship with other impacts such as fire, weeds, rock removal etc..

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<sup>3</sup> operational adaptive management' is defined as *the systematic process of continually improving management policies and practices by learning from the outcomes of operational programs* (ACT Government, 2006, Environmental Flow Guidelines page 42)



Impacts of fire

**Golden Sun Moth**

Habitat relationship with Chilean Needle Grass and converting these areas to grasslands

**Little Eagle**

Project to investigate habitat and conserving habitat for the little eagle

**Restoring landscapes**

Germination cubes and seed bank storages eg with the Botanic Gardens for particularly rare species in the ACT (seed bank insurance policy)

**Addressing Emerging Threats**

A project or projects identifying potential impacts on biodiversity in CNP such as European wasp, Myrtle rust, feral deer.