



Blue Mountains World Heritage Institute

2010 Research Prospectus

Introduction

The Blue Mountains World Heritage Institute (BMWHI) was established in 2004 as an independent not-for-profit organisation to broker and facilitate research and community engagement that supports the conservation and management of the Greater Blue Mountains World Heritage Area (GBMWA). The Greater Blue Mountains was added to the World Heritage List in 2000 and comprises eight national parks covering over one million hectares. The Institute's members include government agencies with responsibilities for management of the area (and adjacent areas), and universities.

The key research areas for the Institute reflect those identified in the 2009 Strategic Plan for the GBMWA:

- Integrity of the protected area
- Biodiversity
- Geodiversity
- Water catchment protection
- Cultural heritage (Aboriginal and non-Aboriginal)
- Landscape, natural beauty and aesthetic values
- Sustainable development

These research areas are covered in more detail in the BMWHI Research Strategy 2009-2012¹. This Research Prospectus presents a prioritised list of the 'Top 15' projects (Table 1) for the GBMWA. A key document feeding into this prospectus was a NSW Department of Environment, Climate Change and Water (DECCW) Research and Monitoring Inventory prepared for the Blue Mountains Region in 2009, based on Plans of Management and other management documents. The BMWHI Research Strategy acknowledges that a 'whole of system' approach is needed for environmental problems to be effectively addressed. The Institute is committed to research that supports the long-term ecological sustainability of the WHA, and that includes ecological, socio-cultural, political and economic dimensions. However, this Prospectus has evolved from discussion between BMWHI and its partners (and stakeholders) in 2009/2010 to find out their specific research priorities in (or adjacent to) the World Heritage Area for the next few years. While focusing largely on issues *within* the World Heritage Area, it recognises it is also important to address the 'edge' relationships.

Table 2 presents further projects prioritised for research but not included in the Top 15, as these are not considered to have the urgency of the Table 1 projects. In Table 1 it will be seen that only five of the seven categories have been selected *at this stage* to be put in the 'Top 15'. This reflects the input from our research partners while developing the Prospectus, and at this stage sustainable development and water catchments are not present in Table 1. This is likely to change in future as the Top 15 are updated. Table 2 covers a much wider group of research projects and thus covers all seven research categories.

¹ <http://www.bmwhi.org.au/docs/BMWHI-RESEARCH-STRATEGY.pdf>

The BMWHI Research Prospectus will be regularly reviewed, and we urge all those interested in the ecologically sustainable future of the WHA to suggest research ideas that may broaden the Prospectus.

How to use the Prospectus

The intention is that this Prospectus will provide a useful guide to researchers, and particularly research students and supervisors, in selecting research topics that would assist in filling knowledge gaps about the World Heritage Area and inform adaptive management of this valuable area. Some of these categories are quite general. It is therefore envisaged that supervisors of student projects would suggest *specific* PhD topics under these categories, which the Institute would then discuss with partners in regard to top-up scholarships. The Institute's priority is to seek top-up scholarships for those projects in Table 1. Projects lend themselves to PhD, Masters or Honours level, or as research projects carried out by university researchers. The Institute's guidelines about top-up scholarships are available on our website².

Explanations relating to the projects

The majority of the Table 1 projects are *biodiversity* projects, reflecting the key biodiversity importance of the World Heritage Area, for which reason it was listed. Key project themes relate to threatened species, fire and climate change. Projects in the geodiversity, cultural heritage and natural beauty categories (Table 1) address the need to build the knowledge base relating to those values of the World Heritage Area for which it was originally nominated, but for which it was not dedicated (in part due to lack of supporting information). The Australian government has indicated a willingness to renominate the area for these values. Further research on these values would therefore be important in the proposed renomination of the Greater Blue Mountains as World Heritage under these values (as supported by the Greater Blue Mountains World Heritage Advisory Committee).

² <http://www.bmwhi.org.au/docs/BMWHI-Top-Up-Guidelines.pdf>



Table 1. 'Top 15' research projects

Research category	Project	Significance	Relevance under other strategic documents
INTEGRITY OF PROTECTED AREA	Assess threats to the WHA and analyse land use nearby in terms of researching how to reduce these threats	The WHA is not an island and is affected by adjacent land management. Threats need to be assessed and research is needed to determine compatible management of adjacent lands, and how a 'buffer' can be created around the WHA to assist in its conservation.	State Plan Priority E4; DECC Corporate Plan Goal 3; PWG Strategic Plan Goal 6; PWG Protected Areas Climate Change Statement & Action Plan: PA 1: Build the Protected Area System
B I O D I V E R S I T Y	Baseline surveys	Undertake comprehensive gap analysis and develop baseline biodiversity surveys for flora and fauna in the WHA	This is a key biodiversity monitoring role already carried out by DECCW. However, research projects such as PhDs can answer specific questions relating to biodiversity. A recent ARC Linkage project 'Managing Ecosystem Change' provides a basis for further work, as it has compiled all existing datasets.
		Study of decline of particular bird species (e.g. Gang Gang) in the Blue Mountains	This decline could be an important indicator of ecosystem change for a variety of reasons (e.g. climate change)
	Threatened species	Undertake systematic surveys and monitoring for threatened species. This may focus on population distribution, dynamics and habitat requirements.	This is an important threatened species strategy. It is essential that these are undertaken within a framework that defines what the data is needed for in terms of management.
		Investigate issues regarding policy emphasis on 'threatened species recovery' versus overall ecosystem health and resilience. Assess success levels of recovery plans.	This debate is of key strategic importance. To what extent should policy focus on threatened species as opposed to the viability of biodiversity as a whole? This is complicated by the need to plan to manage the WHA under climate change conditions.
		Which threatened species in WHA are stable (or increasing) and which are in decline	This is key knowledge that managers should have, and which needs to be monitored over time
			State Plan Priority E4; DECC Corporate Plan Goal 2; PWG Strategic Plan Goal 1
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	Dingo management - ecosystem role and management conflicts	Dingoes serve an important role in the World Heritage Area, being the top carnivorous predator. The importance of top carnivores has received international recognition recently (e.g. wolves in North America and tigers in India). The knowledge base regarding the ecosystem role of the dingo is limited. Top carnivore important in controlling feral cats and foxes and thus protecting mid-range marsupials.	State Plan Priority E4; DECC Corporate Plan Goal 2 & 3; PWG Strategic Plan Goal 1; Wild Dog Policy: Recommendation 44
Fire	Analyse and determine the relationship between the distribution of threatened species and fire history.	Increased bushfire under climate change conditions could impact on threatened species. While some research has been done in this area, more is needed.	State Plan Priority E4; DECC Corporate Plan Goal 2; PWG Strategic Plan Goal 1
	Investigate impacts of prescribed burning on vegetation composition and structure utilising existing data. Establish long-term monitoring sites, including monitoring of ecotones to measure the rate of expansion or reduction of the size of vegetation communities	Fire in the WHA is a key research interest. Prescribed burning is required to protect life and property, however there is a need to monitor how this effects the composition and structure of plant communities (and associated gradational ecotones)	State Plan Priority E4; DECC Corporate Plan Goals 2 & 3 PWG Strategic Plan Goals 1 & 4
Climate change	Investigate the effects of climate change on reserve systems to increase the knowledge base about species response (and adaptation) to climate change. Projects would aim to assess and mitigate threats, and to identify future management priorities.	The effect of climate change on the WHA is a key research area. In particular we need to know how species and ecosystems may respond to warming temperatures, how they may migrate and adapt to various climate scenarios.	State Plan Priority E4; DECC Corporate Plan Goal 1
	Examine the impacts of climate change on hanging swamps.	The endangered ecological community of upland swamps in the Blue Mountains is under threat from projected temperature increases. Some modelling for this has already been done through BMWHI but more research is needed to inform adaptive management.	State Plan Priority E4; DECC Corporate Plan Goal 1
Introduced species	Identify the impact of existing and emerging pest species (flora and fauna) on World Heritage values	Emerging pest species need further research, partly as new species are still invading but also in light of climate change which can expand potential habitat	State Plan Priority E4; DECC Corporate Plan Goal 2 & 3; PWG Strategic Plan Goal 1; Pest Policy

Geodiversity	Investigate and assess the significance of the geodiversity values of the GBMWA against State, National and World Heritage listing criteria, and seek formal recognition as appropriate. Develop education programs.	This is a key value for which the WHA was nominated, but was not declared - in part due to lack of documentation of known research. Along with research, there is a concomitant need for education about the value of geodiversity.	State Plan Priority E8 and R4; PWG Strategic Plan Goal 10
Cultural Heritage	Investigate, record and assess the significance of the cultural heritage values of the GBMWA against State, National and World Heritage listing criteria.	This is a key value for which the WHA was nominated but was not declared - in part due to lack of documentation of known research. This is important as much new material has come to light since the original nomination.	State Plan Priority E8; DECC Corporate Plan Goal 3; PWG Strategic Plan Goal 3
Landscape and natural beauty	Research, record and assess the significance of the natural beauty and aesthetic values of the GBMWA against State, National and World Heritage listing criteria	This is a key value for which the WHA was nominated but was not declared - in part due to lack of proper documentation of known research.	State Plan Priority E8; DECC Corporate Plan Goal 3; PWG Strategic Plan Goal 5

Table 2. Additional research projects

BMWHI category	Project
Integrity of protected area	Assess existing reserved areas and suitable non-reserved land not within the GBMWA for potential addition
	Investigate the establishment of a Greater Blue Mountains Biosphere Reserve to encourage compatible management of lands adjoining the WHA
	Research to maximise 'deliverables' for managers that follow up on the ARC project "Managing for Ecosystem Change in the GBMWA".
	Use system science to research ecological integrity of the WHA. How do we reduce 'edge effects' and improve ecological integrity and long-term viability?
	Research a 'survival strategy' of the WHA and its surrounds through integrating management such as connectivity, compatible land use, TCM etc
	Research integrated strategies and tools to help support adaptive management e.g. defining 'thresholds of concern'
Biodiversity	Study of all, some, or major groups of the WHA eucalypts in relation to distribution, biology and impacts of changing climate
	Research flowering phenology and nectar production of eucalypts across the WHA and how they may be affected by climate change
	Carbon balance in WHA ecosystems and how this may be affected by climate change and increased fire
	Productivity (net primary productivity) of ecosystems in the WHA and how this may change with climate change and increased fire
	Nutrient cycling within ecosystems in the WHA and how this may be affected by climate change
	Document the history of changing flora and fauna within the WHA over time
	Undertake a retrospective study of all biological research in WHA (showing good quality longitudinal studies and shorter studies)
	Investigate control of invasive weeds (e.g. swamps) using fire regimes and periodicity
	Research how ridge-top vegetation communities in the WHA (especially endangered ecological communities) respond to climate change (e.g. decline in rainfall, increase in evaporation, stronger storm events, increased fire)
	Undertake research into White Box Endangered Ecological Community (EEC) and other eucalypt EECs in the WHA.
	Research the effect of climate change on vegetation on mountain tops in the WHA. Does it have anywhere to go and can it get there?
	Research threats to woodland birds in the WHA, and their use as indicators.
	Survey quoll population dynamics, distribution and density. Assess the risk of foxes and fox baitings to quolls through comparative studies on baited versus non-baited areas.
	Research the ecological impacts of feral cats in the WHA
	Research the effect of the WHA as an adjacent large natural area on the long-term viability of the Regent Honeyeater . Does the WHA assist migration routes, emergency feeding sites etc?

	Ascertain whether Booroolong Frogs persist within BM NP focusing on rocky west-flowing creeks.
	Undertake targeted surveys for rare frogs, including Stuttering Frog, Booroolong Frog, Littlejohn's Tree Frog, Green Tree Frog and Green and Golden Bell Frog .
	Undertake regular monitoring of Regent Honeyeater, Swift Parrot and Black-chinned Honeyeater, Turquoise Parrot, Diamond Firetail and Hooded Robin in known localities and targeted surveys of additional areas
	Study the Gang Gang Cockatoo as an indicator of environmental change
	Survey of Grose River for Macquarie Perch and Grayling fish species
	Investigate impacts of wildfire on Stuttering Frog habitat in Wollemi NP.
	Upgrade fire history records (using GIS) for each vegetation community for the period since the last fire, and investigate the influence of fire history on vegetation community structure and composition.
	Analyse the relationship between prescribed fires and their effect on the behaviour of wild fires.
	Investigate and model likely influence of climate change on fire behaviour.
	Investigate the effectiveness and adequacy of fire suppression strategy. Assess costs and environmental impacts.
	Undertake systematic surveys to ascertain abundance and distribution of pest animals, and to identify impacts on native fauna. Select priority species. Develop a program for comprehensive NPWS staff workshops and interviews with the PMO. Develop a system for systematic record keeping.
	Map distribution and identify impacts of feral goats and feral deer in Wollemi NP.
	Map distribution of St John's Wort and identify high, medium and low density areas. Identify priority areas for control and assess control options
	Study of the net ecological benefit of the Emirates Resort in the Wolgan valley, adjacent to WHA
	Investigate causes of non- <i>Phytophthora</i> dieback in WHA and determine early indicators
	Research the 'One Health' project - to better understand the patterns of disease in our flora and fauna and to mitigate the risks and impacts of disease emergence and spread.
Geodiversity	Undertake research regarding the occurrence of volcanic geomorphological features in the WHA. Analyse the relationship between geomorphology and fire history.
	Undertake baseline surveys and investigate the ecology of karst systems in the WHA. Develop an ongoing monitoring program.
	Research the geomorphology of pagodas and slot canyons in the WHA
	Research the sedimentation of Colo River – status, history and causes
	Soil formation and erosion in WHA and how this may be affected by climate change and more frequent fire events
Water Catchment Protection	Collate monitoring information for mining and analyse impacts of past A whole-system approach is needed for environmental problems to be effectively addressed mining in WHA and present mining adjacent to WHA.
	Change in stream sedimentation and aquatic biodiversity in response to fire changes
	Hydrology of upland swamps in the World Heritage Area
	Investigate the impact of longwall mining on water quality, water quantity, ecological integrity and cultural heritage.

	Stormwater devices – assessment of what works (Hons?)
	Use of Water Sensitive Urban Design in urban area adjoining the WHA
	Impact of urban stormwater systems on water quality of WHA
Cultural Heritage	Undertake systematic surveys for Aboriginal Rock Art (paintings and petroglyphs) in the WHA in conjunction with Aboriginal Traditional Custodians
	Undertake baseline research into Aboriginal cultural heritage in new additions to the NPWS estate that are proposed to be added to WHA.
	Undertake further research into historic shale oil mines, huts and associated structures in WHA
	Study historic convict sites in the WHA – map and assess protection (Hons or Msc?)
	Research the history of the conservation movement and the evolution of conservation thinking regarding the WHA and surrounds
Sustainable Development	Research a higher level regulatory approach in local planning to protect the adjacent lands next to the WHA
	Research the 'Native Agro- Forestry and Bio-Energy Project' for the Central Tablelands
	Research the 'Community and household bushfire awareness and preparedness - a Blue Mountains study' project
	Develop a decision support tool to improve upland swamp viability
	Research how visitor use to the WHA can financially benefit adjacent local councils
	Develop a comprehensive program for monitoring and analysing visitor numbers through establishing spot checks at picnic areas and lookouts, and traffic counters at entry points in order to determine sustainable visitation.