Northern Australia Environmental Resources Hub Research Plan 2017- Attachment A

Project Number/ID	Project Name/Title	Project Summary	Project Leader	Lead Organisation	Approved Funding Research Plan Versions 1-4			Start Date	Completion Date	Status	Outputs
					NESP Funding* $	Total Other Contributions* $	Total Budget* $				
1.1	Identifying critical knowledge gaps in the understanding of environmental resources in northern Australia to better prioritise government investment	This project will identify knowledge gaps that are critical to addressing the Hub's research priorities and which align with the research needs of other research users across northern Australia. Using a highly collaborative process involving researchers and research users from the Department of the Environment, Department of Prime Minister and Cabinet and key stakeholders from northern Australia, research needs will be identified based on desktop reviews and through a series of regional meetings and workshops. This will lead to the development of joint research projects that address key Departmental, regional and local priorities. The collaborative approach adopted in this process is designed to foster a higher level of research adoption into policy and on ground action.	Professor Michael Douglas	University of Western Australia	450,000.00	450,000.00	**900,000.00**	1/07/2015	31/12/2018	Ongoing	Final report due 31 December 2018
1.2	Review of integrated models, frameworks and decision support tools to guide management and planning in northern Australia	There is an identified research need to develop and trial spatially explicit tools that can be used to guide planning and management decisions that support a mix of multiple uses and protected areas while maintaining environmental values. An important first step is to ensure that tools which are selected for development/trial suit end-user needs and can be feasibly developed with available resources. This project collated examples of modelling tools that have been used in northern Australia and elsewhere. It used insights from the literature, and from interviews with key stakeholders across Australia's north to create a document that summarises key characteristics of (broad categories of) different tools. Characteristics that were considered in the evaluation include: purpose/intended application of the tool and 'realms' considered (e.g. freshwater realms only, or including marine, social and economic realms), data requirements, types of output generated, research-user engagement, IT requirements and legacy, ease of use, transferability and adaptability. The project critically evaluated the characteristics of the different modelling tools to identify key strengths (so they can be enhanced) and weaknesses (so they can be improved). It also provided advice on how to choose which modelling tool is best suited to which purpose. In so doing, this project created a critical resource for those trying to identify and assess the suitability of particular tools in different contexts and/or trying to assess the feasibility of using, developing, and maintaining different types of tools to support decision makers into the future.	Professor Natalie Stoeckl	James Cook University	90,000.00	112,827.00	**202,827.00**	1/07/2015	30/06/2017	Completed	Stand-alone summary Final report Wrap-up factsheet
1.3.1	Critical water needs to sustain freshwater ecosystems and aquatic biodiversity in the Mitchell River	This project aims to improve our understanding of the critical flow needs to sustain freshwater ecosystems in the Mitchell River catchment and the implications of future land and water resource development. In particular, the project aims to predict the consequences of future development on important ecosystem linkages between the river and its flood-plain wetlands associated with flood flows, and to better understand other potential risks associated with likely changes to in-stream flow regimes.	Professor Stuart Bunn	Griffith University	905,600.00	2,533,704.00	**3,439,304.00**	1/06/2016	30/06/2020	Ongoing	Start-up fact sheet
1.3.2	Environmental water requirements for the Daly River, Northern Territory	The Daly River is a distinctive perennial system, supporting diverse turtle and fish assemblages, important recreational fisheries and is of great cultural significance to its Indigenous people. Increasing agricultural development in the Basin has been concomitant with increasing demand for its water resources. To enable sound decision making on sustainable development, this project will collate existing, and develop new critical flow-ecology relationships and water requirements for key environmental assets of the Daly River.	Associate Professor Alison King	Charles Darwin University	630,900.00	2,170,475.00	**2,801,375.00**	1/07/2016	30/06/2019	Ongoing	Start-up fact sheet Presentation
1.3.3	Environmental water requirements for the Fitzroy River, Western Australia	This project will determine the water requirements of key environmental assets of the Fitzroy River including the EPBCA listed Largetoothed Sawfish. This information will support water resource assessments and water planning processes including a future Water Allocation Plan for the Fitzroy River.	Professor Michael Douglas	University of Western Australia	1,080,200.00	1,509,107.00	**2,589,307.00**	1/06/2016	31/12/2020	Ongoing	Start-up factsheet
1.4	Contribution of rivers to the productivity of floodplains and coastal areas of the southern Gulf of Carpentaria	This project will examine: 1. the relative contribution of major southern Gulf of Carpentaria rivers to floodplain and coastal productivity, and key species that depends on the flow, and 2. predict the consequences of changes in flow regimes on flood-driven subsidies in specific rivers, and better understand other potential risks associated with these changes. This will provide key information needed for prioritising rivers for development as part of future water planning.	Professor Michelle Burford	Griffith University	851,600.00	2,794,426.00	**3,646,026.00**	1/07/2016	30/06/2019	Ongoing	Project update Start-up fact sheet
1.5	Indigenous water requirements: methods for the determination of Indigenous water requirements and incorporation into water planning in the Fitzroy Catchment, Kimberley	This research proposal will investigate the significance of water and waterbodies to Indigenous people of the Fitzroy River catchment where water use for agriculture is likely to increase. It will work closely with Indigenous communities to identify customary uses of water and waterways, reveal links between Indigenous values, practices and water regimes, and elicit knowledge as well as objectives for the future management of land and water resources. It will develop methods for the determination of Indigenous water requirements in ways that integrate with regional water and catchment management plans. Results will contribute to environmental management, improve water planning processes and enhance Indigenous capacity to influence allocation decisions, water policy and regional development solutions.	Associate Professor Sue Jackson	Griffith University	498,400.00	677,236.00	**1,175,636.00**	1/06/2016	1/06/2020	Ongoing	Start-up factsheet
1.6	Multi-objective planning in northern Australia: co-benefits and trade-offs between environmental, economic, and cultural outcomes	This project will demonstrate how to operationalise participatory, multi-objective catchment planning, by which stakeholders can collaboratively construct and assess the outcomes of alternative development and management scenarios (including identifying co-benefits and trade-offs between objectives). The project will produce a toolkit that can be used by stakeholders to guide multi-objective planning, including selecting, parameterising, and integrating spatially explicit tools and models. The project will develop the toolkit using the Fitzroy River catchment as a case study, but with the intention that it can be transferable to other areas in northern Australia and beyond.	Professor Bob Pressey	James Cook University	1,057,100.00	2,044,044.00	**3,101,144.00**	1/07/2016	31/12/2019	Ongoing	Scenario planning info sheet Start-up fact sheet

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2.1	Addressing management of waste and marine debris in remote Northern Australian communities including Cape York	The communities of remote Northern Australia face significant challenges in waste management. Conventional challenges include limited connectivity to regional centres, low public or private investment in waste management, high transport costs, intermittent seasonal access, a wet-dry climate that makes infrastructure maintenance particularly challenging and scaling-up waste and debris management to cover vast areas of un-serviced land and coastlines. It has been well documented that many coastal communities, particularly those in the Gulf of Carpentaria also have the additional burden of a large volume of rubbish from external sources such as shipping and foreign fishing washing up on remote beaches. This project took stock of existing work and where it has been applied in the North, assessed the effectiveness of waste management in a remote community where substantial work is being undertaken and reviewed the 'gaps' and next steps to value add to the local model. It also addressed the dual issues of transferability of waste management modelling and scaling-up by sharing the experiences and lessons learned in that site with a community in another part of the North in a participatory process to adapt the model to the second location. This 12 month phase included a desktop study and a case study examining two communities with contrasting experience in active waste management that will value add to current success in one place, create a plan for another and identify issues and potential solutions in scaling up the activities over the sparsely populated and poorly serviced northern coastal area	Melissa George	North Australian Indigenous Land and Sea Management Alliance Limited (NAILSMA)	100,000.00	65,288.00	**165,288.00**	1/07/2015	31/12/2016	Completed	Final report Wrap-up fact sheet
2.2	Mapping to underpin management of littoral rainforests	This project produced fine-resolution mapping of the location of the critically endangered Littoral Rainforest & Coastal Vine Thickets of Eastern Australia community between Townsville and Cooktown (Wet Tropics bioregion) and the current and projected future threats to its persistence and condition from the impacts of sea-level rise, storm surge and extreme weather events. The project then used an adaptation pathway framework to assess and prioritise management options that explicitly consider the dynamic nature of the community and future change regimes. The research addressed key gaps in our understanding of where, when and what management action is required to ensure the continued provision of ecosystem services and functions from Littoral rainforest and provided a robust scientific-underpinning to support EPBC recovery planning regionally and nationally.	Dr Helen Murphy	CSIRO	100,000.00	128,602.00	**228,602.00**	1/07/2015	30/06/2016	Completed	Presentation Wrap-up fact sheet Final report Data: Mapping of current and projected storm surge and inundation associated with extreme events, and projected sea-level rise across the study area
2.3	Weed invasion, fire and ecosystem failure: catchment scale scenario modeling to improve planning and management	This project will: (i) collate existing information on impacts of land transformation and model the likely scenarios of changes in ecosystem function over the next 30 years in the Darwin and Daly regions. We will use this information to model future fire behaviour and impacts on ecosystem function and predict potential ecosystem failure to support improved planning and management practices; (ii) develop and test remote sensing methods to detect areas of high biomass grass invasions across the northern Australian savannas. The methods will be developed and tested in consultation with the Department of the Environment and Energy with the aim of developing a mapping approach at a scale, reliability and cost suitable for monitoring in the Department's ERF draft savanna fire management determinations.	Dr Natalie Rossiter-Rachor Professor Samantha Setterfield	Charles Darwin University University of Western Australia	789,214.00	1,823,932.00	**2,613,146.00**	1/06/2016	30/06/2020	Ongoing	Start-up fact sheet
2.4	Support for an Emissions Reduction Fund carbon sequestration methodology: dead organic matter dynamics in semi-arid savannas	This project will provide data to support parameterisation of a carbon sequestration methodology for regions prioritised by NESP. This work will be conducted in consultation with staff of the Land Sector Abatement Branch of the Department of the Environment. The Savanna Burning Emissions Abatement methodology under the carbon farming initiative has been adopted across 140 000 km2 of northern Australia. Taking account of the carbon sequestered in dead organic matter under the same activity could significantly increase the accountable greenhouse gas benefit of these activities. Currently there is insufficient data to develop a robust, defendable methodology in the semi-arid savannas.	Dr Garry Cook	CSIRO	187,000.00	175,600.00	**362,600.00**	1/07/2016	30/06/2018	Ongoing	Start-up fact sheet
2.5	Defining metrics of success for feral animal management in northern Australia	This project will determine the impact of feral pigs, horses and cattle across aquatic systems in the context of regional and local feral animal control, local aspirations and government priorities. The project will also evaluate metrics used to assess how well control measures work in mitigating threats to aquatic ecosystems. These outcomes will be communicated using a reporting system, here for the Archer River Basin, which compares investment in control with consequent impacts on environmental values	Dr Justin Perry	CSIRO	814,200.00	1,274,748.00	**2,088,948.00**	1/06/2016	31/03/2020	Ongoing	Start-up fact sheet
2.6	Guidelines for the management of threats to savanna riparian zones	This project uses four complementary case studies to develop practical guidelines for the management of savanna riparian zones. Riverbank (or riparian) zones are vital elements of the savanna landscape. Their contribution to biodiversity, cultural values and the economy is disproportionate to the small area they occupy. However, they are highly vulnerable to the effects of disturbances such as weed invasion, fire and the change in land use such as irrigated agriculture. As these threats increase, there is a growing need for guidelines for the management of savanna riparian zones.	Professor Samantha Setterfield	University of Western Australia	1,046,200.00	1,479,587.00	**2,525,787.00**	1/06/2016	30/12/2020	Ongoing	Start-up fact sheet
3.1	A method for identifying high-priority areas in northern Australia for threat abatement and species recovery investments	To help address the decline in northern Australia's biodiversity, this project, in collaboration with research-users, brought together key stakeholders with interest and expertise in threatened ecosystems and species in northern Australia to develop a detailed design for a multi-year, cutting-edge research project. The larger project will produce comprehensive data, models, and guidelines for threat abatement and restoration of the North's biodiversity. This short-term project involved two workshops: an inception workshop with end-users and other stakeholders; and a technical design workshop to identify detailed methods for compilation of data, modelling, and prioritisation.	Professor Bob Pressey	James Cook University	50,000.00	185,321.00	**235,321.00**	1/07/2015	30/06/2016	Completed	Wrap-up fact sheet
		This project aimed to improve understanding of the role of predators, specifically feral cats, in small mammal declines across northern Australia. Building on a project commenced under NERP in 2013, the responses of small mammal									Wrap-up fact sheet

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3.2	Investigating the role of feral cats in small mammal declines in Kakadu National Park	populations to predator (cat and dingo/dog) exclusion were experimentally evaluated at sets of paired fenced and unfenced sites in Kakadu National Park. The densities of cats and dingoes were estimated in the surrounding landscape using camera traps, and their prey evaluated through scat analysis. The findings informed management responses to address mammal declines in Kakadu National Park specifically and northern Australia more generally.	Dr Graeme Gillespie	Northern Territory Department of Land Resource Management	130,000.00	318,715.00	**448,715.00**	1/07/2015	30/06/2016	Completed	Final report Data: Fauna records from the project are available via the NT Fauna Atlas
3.3	Prioritising threatened species and threatening processes across northern Australia	To help address the decline in northern Australia's biodiversity, this project will produce a best-practice approach to guiding management actions across northern Australia that abate threats to, and promote recovery of, threatened species. It will involve working closely with key stakeholders to bring together diverse sources of data and expertise, and to synthesise and develop best available mapping of threatened species and threatening processes, and provide practical approaches to interpreting project outputs for prioritisation, policy, and day-to-day decision-making.	Dr Anna Pintor	James Cook University	437,800.00	1,310,594.00	**1,748,394.00**	1/07/2016	30/09/2019	Ongoing	Data: SDMs and hotspot maps are available to ERIN and other stakeholders Metadata link Start-up fact sheet
3.4	Responses of mammal fauna and cats to fire management in Kakadu and northern savanna environments	This project will develop evidence to guide management priorities to help recover threatened mammals in monsoonal northern Australia, especially in relation to fire and feral cats. The team will compile and analyse data on the occurrence of cats, native mammals, and fire to evaluate landscape-scale relationships. It will also contribute to the analysis and documentation of responses of native reptiles and mammals to cat-exclusion at established fenced sites in Kakadu National Park.	Dr Graeme Gillespie	Northern Territory Department of Land Resource Management	390,000.00	2,109,986.00	**2,499,986.00**	1/04/2016	1/09/2019	Ongoing	Scientific paper Scientific paper
4.1	Remote environmental monitoring in northern Australia: scoping key research needs	Environmental monitoring in northern Australia is challenged by significant logistical, financial and skills-based constraints. These issues can lead to constrained monitoring programs with poor power to track environmental change or to provide data in a useful format for end-users. A number of new technologies including detection sensors, eDNA and airborne remote sensing, have recently emerged that may prove useful in overcoming some of these constraints. Using desktop reviews and workshops, this scoping study brought together relevant experts and managers to explore and prioritise key research needs in the development and refinement of appropriate tools for improving environmental monitoring in remote areas. The study gathered information about decision making and policy requirements for monitoring in northern Australia. The study also explored the barriers and potential solutions to successful implementation in remote locations, including data storage, management and access systems.	Associate Professor Alison King	Charles Darwin University	100,000.00	161,718.00	**261,718.00**	1/07/2015	30/06/2016	Completed	Wrap-up fact sheet Final report Start-up fact sheet
4.2	Current status of the methods and techniques used to estimate temporal changes in soil carbon	This research project reviewed the current state of knowledge on measurement and modelling methods and techniques for estimation of soil carbon and soil carbon stock change in northern Australia. We held meetings between key researchers and policy makers with interests in estimating soil carbon and soil carbon stock change. The result is an assessment of the applicability and cost of current and proposed methods and techniques in the context of soil carbon levels and the response of soil carbon to changes in management practices as they occur across north Australia. Recommendations are provided on future research directions to improve cost-effective methods for northern Australia to assist in informing the National Greenhouse Gas Inventory with regard to carbon stock changes and thereby enabling a potentially greater range of model based and potentially fully modelled carbon sequestration methodologies under the Emissions Reduction Fund.	Associate Professor Samantha Setterfield	Charles Darwin University	100,000.00	170,798.00	**270,798.00**	1/07/2015	31/12/2016	Ongoing	Scientific paper in preparation
4.3	Northern Australia eDNA program - revolutionising aquatic monitoring and field surveys in tropical waters	All organisms constantly shed DNA into their environment. This DNA is termed environmental DNA (eDNA). Capture and analysis of eDNA (in soil or water samples) is proven as a highly efficient and sensitive method to detect the presence of a wide range of species without actually requiring physical capture, or sighting of the organisms themselves. eDNA field sampling can involve as little as collecting water samples and subsequent laboratory analyses. Consequently, the method offers the potential for research and monitoring programs to be conducted rapidly, at lower cost, across a large array of locations, and to involve the participation of non-specialists. This project will develop eDNA technology, and trial field programs, for an array of species of conservation and management significance.	Professor Damien Burrows	James Cook University	570,000.00	802,950.00	**1,372,950.00**	1/01/2017	31/12/2019	Ongoing	Start-up factsheet
4.4	Assessing the Gulf of Carpentaria mangrove dieback	In early 2016, extensive dieback of mangrove forests was recorded along the southern and western Gulf of Carpentaria coastline. Landsat analysis suggests that 7,400 hectares of mangrove forest suffered dieback over a relatively short and synchronous time period around November 2015, along a >1,000km wide front from Karumba in the east to Limmen River in the west. Recent field visits to a limited range of affected sites suggest that a relatively low percentage of trees have recovered and most are dying/dead. This is the largest event of natural dieback of mangroves ever recorded in the world. This project will provide a survey, description and analysis of the extent of the dieback across its range, as well as examining patterns of dieback. The assessment will include training and participation of local Indigenous ranger groups in mangrove assessment and monitoring methods, as well as providing recommendations for recovery, potential intervention, future monitoring and further studies. A synthesis workshop will also be held to present the findings of the assessment to a wide audience.	Dr Norm Duke	James Cook University	200,000.00	259,850.00	**459,850.00**	1/01/2018	31/12/2019	Ongoing	Scientific paper Start-up fact sheet Report
5.1	Research priorities for IPAs across northern Australia	Indigenous Protected Areas (IPAs) constitute >40% of Australian's National Reserve System, protecting biodiversity, ecosystem services, cultural and community values that are vital to Australian societies and of national significance. In collaboration with IPA managers, government, non-government and research stakeholders across the north, this project undertook desktop reviews, interviews and engaged in workshops to provide an assessment of the research priorities for northern Australia's IPAs. Particular attention was focused on research needs that underpin Indigenous peoples' goals and issues for participation in environmental management. The results of the project contributed to the development of a multi-year research plan to address these priorities.	Dr Ro Hill Ms Melissa George	CSIRO North Australian Indigenous Land and Sea Management Alliance Limited (NAILSMA)	150,000.00	172,068.00	**322,068.00**	1/07/2015	30/06/2016	Completed	Key findings Project summary Final report: Economic values and Indigenous Protected Areas across northern Australia

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		Reviews, interviews and workshops were also used to qualitatively identify core social/ economic/ cultural benefits associated with IPA's, and to identify ways in which IPA managers, government and non-government stakeholders could use information about those benefits in decision making contexts. This enabled researchers to identify appropriate methods for quantifying (or otherwise assessing) those benefits, so that a multi-year research project which focuses on the social cultural and economic benefits of IPAs can be developed.	Professor Natalie Stoeckl	James Cook University							Wrap-up fact sheet Final report: Research priorities for Indigenous Protected Areas aross northern Australia
5.2	Identifying lessons learned from the incorporation of Top End Indigenous fire knowledge into fire management, to inform the incorporation of Indigenous knowledge in fire management and carbon abatement planning nationally	This project evaluated if and how Indigenous fire knowledge (IK) has been used in Top End (Kimberly, Arnhem Land and Cape York) fire projects. Interviews and workshops involving key Indigenous fire managers and partners (Traditional Owners, NGOs, scientists and government agencies) were combined with a literature review to: a) Document the successes and challenges associated with the different approaches used to share IK with western science, and to translate IK and historical purposes of Indigenous fire into contemporary fire management activities b) Report on different perspectives, experiences and lessons learned from the incorporation and translation of IK into fire management c) Identify the institutional, social, cultural and other factors that enable or constrain the incorporation of IK into fire management goals and activities. The resulting insights were synthesised into a report summarising key existing lessons, that informed protocols that can be used to guide the incorporation of IK in fire management and carbon abatement programs.	Dr Cathy Robinson	CSIRO	165,000.00	168,146.00	**333,146.00**	1/07/2015	30/06/2016	Completed	Presentation Wrap-up fact sheet Final report Start-up fact sheet Reporting back on NT discussions Reporting back on Kimberly discussions Report on the fire management forum Case study
5.3	Multiple benefits and knowledge systems of ILMPs – economic perspectives	There are numerous environmental benefits associated with Indigenous Land management projects/programs (ILMPs) which include, but are not limited to Indigenous Protected Areas (IPAs) and working on country (WOC). More recently, numerous social and economic benefits of ILMPs have also been recognised, but few of those benefits have been quantified. This could lead people to under invest in ILMPs; it also makes it difficult to determine which types of ILMPs are likely to generate greatest socioeconomic and environmental benefit. This project will provide quantified, comparable data about the social, cultural and economic benefits of different types of ILMPs. In doing so, it will generate information that will: - support continued and improved funding to support Indigenous people working on country; - better guide investments towards ILMPs that effectively deliver most benefit in different contexts.	Professor Natalie Stoeckl	James Cook University	490,800.00	577,982.00	**1,068,782.00**	1/02/2016	1/03/2019	Ongoing	Project update Policy note Start-up fact sheet Scientific paper Scientific paper Scientific paper JCU Research Online
5.4	Knowledge brokering for Indigenous land management	To support improved ILM knowledge adoption and land-use decision-making, this project will undertake active co-research, partnering with Indigenous people in the Fitzroy catchment (WA) and in the Northern Territory, to design and test culturally tailored knowledge brokering methods and tools, and the sharing of these through a pan-northern Indigenous knowledge network. The project will deliver three broad outputs: the tailored knowledge brokering tools, the knowledge network, and the diagnosis of the conditions under which knowledge brokering can improve Indigenous adaptive management of environmental assets.	Ms Melissa George Dr Ro Hill	North Australian Indigenous Land and Sea Management Alliance Limited (NAILSMA) CSIRO	985,000.00	880,815.00	**1,865,815.00**	1/07/2016	31/03/2020	Ongoing	Report summary Report Presentation: Biosphere stewardship - reflections from indigenous governance systems and ethics of care and reciprocity Presentation: The role of communities and indigenous knowledge for stewardship across scales Presentation: Knowledge brokering with Indigenous land managers to support informed decisions Scientific paper Start-up fact sheet
5.5	Indigenous natural resource management in Kakadu National Park	This project will identify and undertake research projects involving Indigenous natural resource management in Kakadu National Park. Component 1 is a collaborative process to identify and develop action-research projects involving Binninj/Mungguy, Hub researchers and Kakadu National Park staff. It will identify a number of targeted research projects that are a priority for Binij/Mungguy, address NESP NAER Hub priorities, and support the Kakadu Plan of Management. In Component 2, priority research projects will be undertaken as part of Research Plans v2 and v3. Component 3 will review and apply collective lessons to broaden and deepen engagement of Binij/Mungguy in core KNP work.	Professor Michael Douglas	University of Western Australia	740,400.00	668,800.00	**1,409,200.00**	1/06/2016	31/12/2020	Ongoing	Start-up fact sheet