TRaCK
Tropical Rivers and Coastal Knowledge

Indigenous engagement in the Tropical Rivers and Coastal Knowledge program:
A review of policies, strategies and research activities

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TRaCK – *Research to support river and estuary management in Northern Australia*

TRaCK brings together leading tropical river researchers and managers from Charles Darwin University, Griffith University, the University of Western Australia, CSIRO, James Cook University, Australian National University, Geoscience Australia, the Environmental Research Institute of the Supervising Scientist, Australian Institute of Marine Science, North Australia Indigenous Land and Sea Management Alliance, and the Governments of Queensland, the Northern Territory and Western Australia.

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Front cover images

Top: Some of the participants at the TRaCK Indigenous Forum held at Mount Carbine, in the Mitchell River catchment in November 2008. The forum was supported by TRaCK, NAILSMA and the Mitchell River Watershed Management Group and led to the formation of the Mitchell River Traditional Custodians Advisory Group.

Bottom left: Daisy Smith completing a household survey with Pippa Featherston (CSIRO) at Bayulu Community, Fitzroy Crossing, WA.

Bottom right: Wagiman Association members holding poster from the TRaCK Fish and Flows Project with two project team researchers, Michael Douglas (Charles Darwin University) and Sue Jackson (CSIRO).

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Contents

1.0 Introduction

1.1 Background

In recent years the Australian Government has been exploring the potential for long-term sustainable development in northern Australia. There is an historic opportunity to ensure that future development of the region takes place within a strategic and sustainable framework and that the widespread degradation of aquatic environments that has followed land use intensification elsewhere in Australia is not repeated in the north. Good policy and management of water resources must be underpinned by the best available evidence, however, it is widely acknowledged that the information available for northern Australia is limited and fragmented (see Pusey *et al.* 2011).

To improve the information base, over the past 5 years governments have invested in a number of initiatives focussed on northern Australia including: the *Tropical Rivers Inventory and Assessment Project*; the *North Australian Irrigation Futures Program*; the *North Australian Land and Water Taskforce*; the *North Australian Land and Water Futures Assessment* (which includes the *North Australian Sustainable Yields Project*) and several projects funded through the National Water Commission's Raising National Water Standards Program. The largest co-ordinated investment has been through the Tropical Rivers and Coastal Knowledge Research Hub (TRaCK).

TRaCK was conceived to provide the science and knowledge needed by governments, industries and communities to sustainably manage northern Australia's rivers and estuaries. TRaCK established a collaborative consortium of over 80 of Australia's most experienced tropical river and coastal scientists and secured over $20m to support 5 years of research (2006-2011). TRaCK also adopted strategies to build Australia's capability to manage tropical rivers and coasts by recruiting new staff and post graduate researchers. This has been a very effective way of building capacity, and to conduct an integrated program of research on a scale and level of coordination never seen before in river and coastal research in northern Australia (or indeed in many other regions).

TRaCK focussed on acquiring fundamental knowledge about the assets and values of tropical rivers and the ecosystem processes that underpin them. This involved broad-scale assessments of river types across the region and more detailed investigation in a small number of focus river systems, particularly in the Northern Territory (Daly, Darwin Harbour catchment), Queensland (Mitchell, Flinders) and Western Australia (Fitzroy). TRaCK devoted considerable effort to developing and sustaining essential partnerships with stakeholders, particularly Indigenous groups, and strengthening their capacity to engage in research and planning processes.

TRaCK has been very successful at improving the knowledge base for northern rivers and has developed new tools and approaches for cross-regional comparisons and integrated water planning and management. TRaCK's research has provided new perspectives on ecosystem processes and the societal value associated with rivers and has greatly improved regional

capacity and stakeholder engagement in research and water planning. The outcomes from TRaCK are already influencing water planning and management across the region (see for example Chan *et al.* (2010) , Pusey (2011) and Jackson *et al.* (2012) and the impact of the program will continue to increase as the outputs from projects are disseminated.

1.2 Aim of this report

The original TRaCK funding proposal acknowledged that Indigenous knowledge is vital to the management of northern Australia and that Indigenous people had rarely been effectively engaged in water resource management research (see also Jackson and O'Leary 2006). Furthermore that research investment had not been at a sufficient scale to fully address the multi-faceted challenges facing the remote north, including rapid Indigenous population growth and limited regional research capacity. The proposal envisaged that the suite of research projects would contribute to a broader national policy framework seeking to develop effective enterprise, governance and employment benefits for remotely based Indigenous communities. The involvement of NAILSMA (North Australia Indigenous Land and Sea Management Alliance) as a TRaCK partner was seen by funding bodies and participating research organisations as an asset for the program.

In response to the need to improve on past practice and address the historical legacy of neglect of Indigenous interests in research (Jackson and O'Leary 2006), TRaCK researchers set out to gain a much better understanding of Indigenous values and discussed ways to collaborate with Indigenous communities to ensure their research needs were addressed and that their knowledge contributed to TRaCK research projects. To that end, the TRaCK leadership developed and endorsed an Indigenous Engagement Strategy (IES; see Appendix A). The Strategy was developed at a workshop involving Indigenous participants in 2006. All projects were to report against the Strategy's objectives in their initial proposals and in subsequent milestone reports to funders. Implementation of the Strategy was given a high priority at all levels of TRaCK governance and constant attention was given to the strategy objectives by the TRaCK leadership throughout its first phase of operation.

In 2010, recognising that TRaCK had achieved a relatively high standard of Indigenous engagement (see Coutts 2011), the authors included a review of that activity in the National Water Commission-funded TRaCK Synthesis Year Project, a one year project designed to draw together results from multiple projects and promote their widespread adoption. TRaCK's Project Management Committee saw value in a systematic understanding of Indigenous engagement in a large, multi-site, multi-disciplinary integrated program; one that promoted insights and lessons to other researchers and government R&D agencies undertaking or contemplating similar research initiatives. By this time many of the research partners had been successful in attracting funding under the Federal Government's NERP program and the need to adapt the lessons from TRaCK to the new program with some new members provided further impetus for this review.

This review examines the model of Indigenous engagement applied during TRaCK's first phase (2006-11) and:

- identifies key success factors, constraints and areas for improvement;
- analyses TRaCK's funding arrangements, protocols (e.g. employment and training), relationships with Indigenous organisations and communities, and research experience; and
- seeks the views of Indigenous participants in TRaCK research projects.

1.3 Report structure

The report is structured as follows. The first chapter provides introductory and background descriptions of the project context, aims and methods. The TRaCK program objectives, governance and research structures are described in chapter two. In the third chapter we discuss TRaCK policies, specifically the IES and its development. Chapter four contains the results of the evaluation of the Strategy and implications are drawn out in the final chapter.

1.4 Methods

TRaCK documents (project proposals, policies, communication products, research outputs) were reviewed and compared against the objectives of the IES. Two small independent reports inform this review. One, carried out by Dr Dermot Smyth (2012), interviewed TRaCK researchers and Indigenous participants to ascertain their views on the extent to which TRaCK had successfully engaged with Indigenous people and organisations throughout its first phase. The other, carried out by Kate Golson (2012), undertook a desk-top review of documents and interviewed a small number of researchers to ascertain their views on the benefits of Indigenous engagement to the research enterprise and to obtain suggested improvements.

For Smyth's review, the IES Steering Committee nominated 14 Indigenous participants or representatives of TRaCK partner Indigenous organisations to be interviewed. The fourteen were chosen on the basis of a high level of involvement in TRaCK research. Efforts were made to contact each of these individuals by phone and/or email, and similar efforts were made to contact the key research leaders of the TRaCK projects listed in Appendix B.

Smyth's interviews followed a semi-structured format based on the five objectives of the IES listed above. Interviewees welcomed the opportunity to provide feedback on their experience with TRaCK; interviews lasted between 20 and 60 minutes. However, interviewing many of the nominated individuals proved challenging due to:

- Difficulties in contacting individuals living in remote communities, including changed contact details, and not responding to phone messages and emails;
- Some individuals successfully contacted did not agree to participate in interviews or provide email responses.

For those individuals who were successfully contacted but who chose not to engage in the review, a decision was taken to respect their right not to participate rather than persist in contacting them. Efforts were made to contact a total of 24 people, resulting in 12 successful interviews. A list of people sought and contacted for interviews is available from the authors.

Golson's review is based largely on an assessment of the TRaCK milestone reports (in particular, the final one from April 2011), Project Management Committee minutes, the two Coutts TRaCK-wide evaluations, knowledge and adoption documents and workshop notes that formed the basis for the TRaCK IES.[1] Five interviews were undertaken by Kate Golson, two with biophysical researchers and two with social researchers from projects covering all the research themes except Theme 6. The fifth was a member of the Knowledge and Adoption (K&A) team. The questions focused on the IES objectives and the perspectives of the researchers.

The terms of reference for these reports can be found at Appendix B and copies of the reports are available from the authors.

[1] Useful summaries of program and project achievements are included in appendices 7 – 10 of Coutts (2011).

2.0 TRaCK: Objectives, organisational structure and project activity

2.1 TRaCK objectives

TRaCK was established in 2007 as a research hub under the Federal Government's Commonwealth Environment Research Facilities (CERF) Program. Its aim was to provide the science and knowledge needed by governments, communities and industries for the sustainable use and management of Australia's tropical rivers and coasts. When formed, TRaCK aimed to:

- increase understanding of the environmental, cultural, economic and social benefits provided by tropical rivers and coasts;
- develop methods and tools for assessing the implications of current use and potential developments;
- identify opportunities to develop sustainable enterprises; and
- build the capacity and knowledge of the community to manage Australia's tropical rivers and coasts.

While not directly developing policy, TRaCK contributed knowledge to inform the National Water Initiative and was used as independent and objective advice by those making policy and management decisions in northern Australia. Intended for the public good, research findings and data were made available to the public (see www.track.gov.au).

2.2 Organisational structure

2.2.1 Governance and funding

The research consortium was led by Charles Darwin University, Griffith University, the former Land & Water Australia (LWA), CSIRO, the North Australia Indigenous Land and Sea Management Alliance (NAILSMA) and the University of Western Australia. An MOU guided the parties in the consortium as did contracts between research organisations and funding bodies.

A Project Management Committee (PMC) was formed to ensure that funding bodies could influence the scope of work and monitor progress against contracted milestones. The PMC was initially a delegated committee of the LWA Board and was chaired by a LWA Board member. Other members represented the major funding partners (Department of Sustainability, Environment, Water, Population and Communities, SEWPAC) and the National Water Commission, NWC), State and Territory governments and an Indigenous representative nominated by NAILSMA. The PMC continued with the same membership and similar terms of reference after LWA was abolished in 2009.

The scientific program was led by a Research Executive Committee (REC), comprising the Principal Researchers with an elected Chair. This Committee reported directly to the Project Management Committee. In addition to leading development and delivery of the research program, the REC facilitated collaborative arrangements among consortium members,

reported on milestones, coordinated meetings with stakeholders and oversaw the communication strategy.

The REC was supported by an Indigenous Engagement Strategy Sub-Committee that was set up after the Strategy was endorsed. Its role was to assess projects and advise on the appropriate level of Indigenous engagement for each project. This committee was comprised of Michael Douglas (Charles Darwin University), Sue Jackson (CSIRO) and Joe Morrison (NAILSMA). After fulfilling this initial task, the Committee monitored Strategy implementation through milestone reports and informal communication networks. It later proved valuable in the resolution of a conflict between researchers and Indigenous community members in the Mitchell River catchment.

More than $20 million was invested in TRaCK over five years. The major funding agencies were the Commonwealth Environmental Research Facilities (CERF) program, the Australian Government's Raising National Water Standards program of the National Water Commission (NWC), Land & Water Australia's (LWA) Tropical Rivers program and Queensland Government's SmartState program. TRaCK research partners provided significant additional funding, in both cash and in-kind, allowing the program to draw on an array of field and laboratory equipment and facilities.

2.2.2 Theme structure and project scope

TRaCK's program of research had seven interconnected themes as a means of organising and coordinating the 27 research projects. For a complete list of all research projects see Appendix C.

Theme 1. Evaluating scenarios

This 'big picture' theme drew from all other themes to deliver scenario planning tools for exploring the social, cultural, environmental and economic implications of change for tropical rivers and estuaries. Predictions were used to inform public debate, stimulate community action and help policy makers explore solutions to conflicting stakeholder needs.

Theme 2. Values and assets

Researchers examined the social, cultural and economic values embodied in our tropical rivers and estuaries and how they influence behaviour patterns. Working closely with Indigenous landowners, they reviewed and designed mechanisms for sustainably allocating the goods and services provided by these ecosystems.

Theme 3. Riverscape and coastal settings

Researchers developed a physical classification system to characterise riverscapes in the region based on their seasonal variation in flow and how they form and evolve. They also sought to understand the demographic and social character of local communities in nominated catchments, and how they relate to the physical classification.

Theme 4. Sediment, nutrients, water and carbon

Researchers developed models to predict the effects of land use and climate on the sources, loads and movement of sediment, nutrients, water and carbon. Indicators for monitoring and assessing water quality and quantity were also developed.

Theme 5. Food webs and biodiversity

In tropical aquatic systems, the sources of organic matter that drive the food webs are largely unknown. Researchers identified these sources, developing models that predict the effects of land use change on food webs and aquatic biodiversity, and developed indicators for monitoring and assessing biodiversity and ecological condition.

Theme 6. Sustainable enterprises

Researchers identified ecologically sustainable and culturally appropriate uses of riverine and coastal resources, which offer opportunities for innovative development to remote and regional communities.

Theme 7. Communicating and integrating

TRaCK synthesised knowledge from the different themes and tailored it to local communities, regional natural resource management bodies and government policy makers. To maximise local ownership of the program, TRaCK invited local communities to influence the nature of the research and participate in the research. A Communication Strategy was also developed.

2.3 Focus catchments

In recognition of resource constraints, TRaCK selected four focus catchments. These four catchments were the Fitzroy in Western Australia, the Daly in the Northern Territory, and the Mitchell and Flinders catchments in Queensland (see Figure 1). The majority of the field-based research occurred in these catchments, although there were also a number of projects that operated across the entire northern Australia, tropical rivers program area.

TRaCK consulted communities and interest groups in these areas to make sure the catchments met three key criteria. Firstly, the catchments needed to be representative of different types of rivers in the region. Secondly, they needed to confront a wide range of future development pressures. And thirdly, the communities in these catchments needed to support and be interested in TRaCK research.

The full application of 2006 proposed that an obligation of each project would include the employment of community members associated with the rivers and coastal areas where the research was to occur.

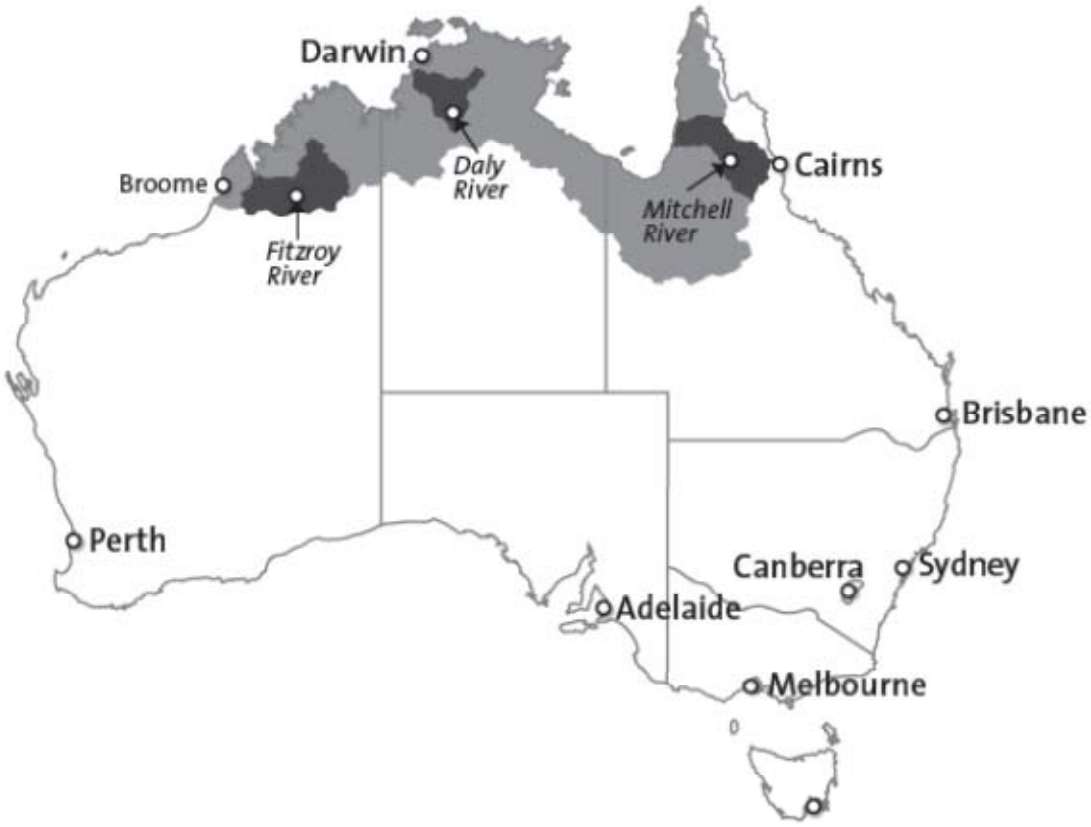

Figure 1. Map of TRaCK focus areas

2.4 Consultations prior to the formation of TRaCK

As mentioned above, TRaCK took two years to develop its program (2004-06) and during this time it undertook a series of consultations to allow for Indigenous communities, government agencies and other stakeholders to contribute. Indigenous representative organisations such as Land Councils were consulted. A series of regional visits were undertaken in areas identified as likely to face increased water use pressure, particularly the Ord River (WA), the Daly River (NT) and the Fitzroy River (WA).

Key stakeholders included government policy makers and management agencies, regional natural resource management and Landcare groups, Indigenous traditional owners and representative bodies and industry groups. Government management agencies and stakeholders were engaged in identifying knowledge needs and setting research priorities during three workshops between February 2004 and June 2005. Additional feedback from regional NRM and Landcare groups was obtained at meetings in February 2005, September 2005 and February 2006. The program was given the support of the NT, WA and Qld governments through the co-operative Framework for Tropical Science Knowledge and Innovation in September 2005. Partnership with the North Australian Indigenous Land and Sea Management Alliance (NAILSMA) was finalised in February 2006.

By way of example of the regional consultation process, in June 2007 TRaCK researchers attended a meeting of the Mitchell River Watershed Management Group. The meeting was held at Karma Waters station on the banks of the Mitchell River and was attended by 40 people representing a diverse mix of stakeholders. The Group expressed strong interest in TRaCK undertaking research in the Mitchell and were keen to learn more about the proposed projects. TRaCK researchers also travelled to the Daly catchment giving presentations and having discussions with a range of stakeholder groups, as well as to the Fitzroy in the Kimberley.

Consultation continued throughout the first few years of research activity. On numerous occasions TRaCK staff, researchers and executive members attended community events and stakeholder consultations. For example, a number of researchers made a significant contribution to the Kimberley Water Forum organised by the WA Department of Water which had a strong focus on Indigenous water management. A TRaCK report was a standing agenda item for the Daly River Management Advisory Committee and the Director presented at nearly all meetings of its Aboriginal Reference Group, sometimes with other researchers.

3.0 TRaCK's Indigenous Engagement Strategy

3.1 Introduction: research ethics and the politics of research practices

The challenges and ethical dilemmas of conducting research at the community level are well rehearsed within a number of social science disciplines (Newton *et al.* in press). A number of authors have commented on the tensions between the research sector and local communities, not least in relation to the mismatch between funding cycles and programs and the demands of participatory research (Baum; Newton *et al.* in press). Cloke (2002, p. 591) for example notes that 'the unwillingness to promote and fund long-term, longitudinal research has created the conditions for 'flip' ethnographies by which researchers too often breeze in and out of research situations, with insufficient commitment to the people and issues concerned' (cited in Newton *et al.* in press). A paper on (non-Indigenous) community impacts in sustainability research identified a number of issues that TRaCK researchers encountered (Newton *et al.* in press), particularly points of tension indicative of the unequal research/researcher relationship. Clark (2008) for example observes that the financial costs of engagement are rarely considered by major funding bodies and that the costs of engagement are often much more nebulous than might first be assumed and can be difficult to calculate and compensate for'' (Clark, 2008, p.964) (ibid). This same author encountered 'research fatigue' that he believed was related to perceptions that there is a lack of change following research engagement.

In Australia, the broader social impact of academic research on Indigenous communities in particular has been the subject of considerable research attention in the past decade as they voice concerns about research ethics and the practices of research organisations. A parallel discussion has been occurring within the broader knowledge literature that seeks to better understand the similarities and differences between local knowledge, Indigenous knowledge, and traditional ecological knowledge (Berkes 1999; Sillitoe, Bicker, and Pottier 2002).

The critiques have questioned the extent of benefits from research practice derived by Indigenous communities (Henry *et al.* 2002; Humphrey 2001). More recently, a significant quantity of ethics resources have been produced as a result of growing interest in Indigenous knowledge and its application in land and natural resource management (Holcombe and Gould 2010). Holcombe and Gold define ethics resources as tools such as 'guidelines, protocols, agreements, memorandums of understanding (MoUs) and strategic plans that seek to ensure an equitable and negotiated approach to research and/or working with Indigenous peoples' (p 108). A range of collaborative methods are now being utilised by government agencies, universities, research institutes and NGOs to recognise and harness Indigenous knowledge and deliver benefits to Indigenous experts and their communities. Notwithstanding this trend, in their study of ethics resources, Holcombe and Gould found that across Australia

> *There are diverse approaches to the management of Indigenous Knowledge (IK), with some NRM bodies being very proactive in developing specific engagement strategies*

and associated resources, and others barely acknowledging Indigenous interests (2010: 108).

A body of work offering a critique of conventional research methodologies has developed largely within the health research arena where, since the 1980s, there has been a greater 'ethos of reflection' in Indigenous health research. The Australian trend corresponds to the rise of reflexivity in other disciplines (Humphry 2001).

Henry *et al.* (2002) describe this critique as a reform agenda and outline its characteristic elements:

- involvement of Indigenous communities in the design, execution and evaluation of research;
- defining a co-ordinating role for Indigenous community controlled organisations associated with the research;
- consultation and negotiation with Indigenous organisations as ongoing throughout the life of a research project;
- mechanisms for ongoing surveillance of research projects by Indigenous partner organisations;
- ownership and control of research findings by participating Indigenous community controlled organisations;
- processes to determine research priorities and benefit to the Indigenous communities involved;
- transformation of research practices from 'investigator-driven' to an adoption of a needs-based approach to research;
- determination of ethical processes for the conduct of research;
- linkage between research and community development and social change;
- the training of Indigenous researchers; and
- the adoption of effective mechanisms for the dissemination and transfer of research findings (2002: 1).

According to Henry *et al.* (2002), proponents of Indigenous research reform are not necessarily advocating for the development of new research methods, rather to re-position Indigenous people within the construction of research and to ensure that Indigenous systems of knowledge are central to processes of inquiry and investigation (see also Storrs *et al.* (2001)). Some methodological approaches offer a means of achieving this aim. For instance, Winch and Heywood (1999) identify some preferred methods of qualitative data collection, including oral history, ethnography, participant observation, community study and collaborative inquiry. Cullen-Unsworth *et al*. (2011) advocate the employment of cooperative

research (or co-research) methods which entail techniques that allow for multiple groups to frame or define the problem under investigation. In a study of Aboriginal participation in environmental research relating to the World Heritage listed Wet Tropics region, Cullen-Unsworth *et al*. (2011) found shared problem framing to be a key determinant of success.

In relation to British communities, Newton *et al.* (in press) argue that contestation and friction between researchers and communities has given rise to new methodologies. For instance, according to Newton *et al.*, 'the 'extractive nature of traditional research methods and the ethical issues this raises are increasingly being made visible by advocates of participatory research approaches' (in press; 4). That paper advises that careful consideration has to be given to the particular contexts in which participatory action research approaches may be deemed more or less suitable as a research approach and that researchers could be pressured into applying these methods in a tokenistic way to satisfy funding bodies demands for research to 'have an impact'. Projects that run for less than a year are not likely to be good candidates for participatory approaches, nor are projects that have had their core research questions defined by funders prior to the research taking place.

3.2 The historical legacy of research in the tropical rivers region

At the time TRaCK was forming, the R&D corporation Land & Water Australia (LWA) had commissioned NAILSMA to deliver a scoping study of Indigenous interests in tropical rivers (Jackson and O'Leary 2006)[2]. That report surveyed Indigenous organisations and found a general scepticism towards research in some sectors of the Indigenous community. It stated that:

> *To address concerns about the relevance of research programs and the motivations and ethics of researchers, research organisations need to address Indigenous peoples' demands for research to be of more immediate and direct benefit, to involve Indigenous people more fully in formulation of research proposals and practice, and to increase the impact of their research on the policies affecting Indigenous communities (2006: 7-8).*

The report made a number of recommendations relating to research ethics and practice but it also conducted a literature review and interviews with representatives of Indigenous organisations. The NAILSMA report outlined a number of areas or topics of research interest, including:

[2] In 2004, the Board of Land Water Australia (LWA) identified Australia's tropical rivers as a priority area for major investment for the next five years. The goal of the Tropical River's Program was 'to undertake research and knowledge exchange to support the sustainable use, protection and management of Australia's tropical rivers (Land and Water Australia 2005). Later that year, a process of dialogue, consultation, and negotiation with Indigenous communities, stakeholders, governments and researchers commenced to develop a shared vision for the program.

- *The need for a sound understanding of the current condition of river and wetland environments and their contemporary role in meeting the subsistence and spiritual needs of Indigenous communities. Increased pressure on resources, places, and sites is felt by many groups who wish to be able to better understand the drivers of change and the consequences of further and new changes for their communities.*

- *Research also has a role to play in generating a better understanding of successful resource governance arrangements, management models and engagement methodologies, particularly methods with an action research orientation, for they seek to work directly with communities in identifying problems and addressing information and knowledge needs.*

The report identified a number of ways that LWA and other research organisations could make tropical river research more relevant and beneficial to north Australian Indigenous people and their representative organisations, including three specific recommendations to improve the rates and quality of research conducted in partnership with Indigenous communities:

1. That the LWA Board considers ways of ensuring a high standard of ethical research from the research it sponsors where Indigenous people are involved, including research conducted by Indigenous organisations. It is suggested that the Guidelines developed by the Australian Institute of Aboriginal and Torres Strait Islander Studies should be adopted as a basis for satisfying LWA's human ethics requirements.

2. In recognition of the importance of early engagement with Indigenous communities and the under-resourced nature of Indigenous organisations, that LWA consider mechanisms for discussion and negotiation of research project ideas with Indigenous communities, organisations and research providers.

3. Given that the opportunity for Indigenous participation in research is a key ingredient in successful arrangements and relationships nominated by people consulted during this study, LWA should consider offering incentives to encourage LWA sponsored researchers to work collaboratively with Indigenous organisations in the tropical rivers region.

Some TRaCK researchers and partners were aware of the relevance of the above reform agenda to their own program's research project development processes, methodologies and forms of communication and application (see Jackson and O'Leary 2006; NAILSMA www.nailsma.org.au[3]). Effective river science requires multi-disciplinary and trans-disciplinary approaches to better understand the complexity of socio-ecological systems and inform decision-making processes. Whilst many scientists are interested in integrating their

[3] CSIRO introduced a human ethics policy and process for vetting research projects in 2009.

endeavours across disciplines, some researchers, policy analysts and numerous Indigenous land managers were calling for a form of interaction and integration across cultures which exhibit 'parallel, co-existing, but different, ways of knowing' (Langton 1998: 8; Dodson 1996). This context and the catalysing role of LWA and NAILMSA in the TRaCK program influenced the development of the Indigenous Engagement Strategy as a critical feature of conducting research in northern Australia.

3.3 Developing the Indigenous Engagement Strategy (IES)

Engaging with Indigenous Australians was a critical feature of TRaCK. Researchers were to draw on Indigenous knowledge and perspectives on the region's ecology to better understand how changes brought about by water resource development could impact Indigenous values and livelihoods in the region. Much of the research would be conducted in places where Indigenous people maintain customary ties to their estates and some of it would be carried out on tenures under the legal control of Indigenous communities. The potential for Indigenous knowledge to inform contemporary science and management questions was clearly high in the TRaCK region.

The REC therefore agreed that every TRaCK project was required to engage with local communities. This engagement was expected to benefit the affected communities and also provide researchers with local geographical and historical knowledge and help them tailor their research to meet local needs.

With more than 20 interrelated projects assessing the social, cultural, economic and environmental status of Australia's tropical rivers, it was apparent that TRaCK needed a policy statement that expressed its objectives and was transferable across the TRaCK program area. Although the REC sought transferability of principles and approach across all northern jurisdictions, it did not want the approach to appear overly proscriptive or to encourage researchers to merely comply with rules or 'tick the boxes'. The REC believed that, in the long run, more would be achieved from an approach characterised by high standards, provision of resources to assist researchers to achieve or surpass the standard, and oversight of project implementation as projects progressed.

The following steps were taken to develop the IES:

1. A workshop was held in Darwin in September 2006 to ensure adequate Indigenous input to the content of the Strategy (participants included researchers from the REC and Indigenous representatives working in the area of NRM).
2. A draft was developed following the workshop.
3. The draft was discussed at the first full meeting of the TRaCK consortium in December 2007 and revised.
4. An implementation plan was appended to the Strategy to ensure ongoing oversight from the REC.

5. Efforts were made to develop resources to assist in implementing the strategy (e.g. copies of standard research agreements were made available to researchers, information on cross cultural courses was provided as were examples of completed Human Research and Ethical Conduct applications).

With such a diverse program of research encompassing markedly different disciplines, the REC appreciated that there were considerable differences in project objectives, methods, scales of operation and information sources and that these had a bearing on the level of engagement that could be anticipated. For example, most of the social science projects drew on survey or interview methods which required community consent to the research setting and were designed to meet community information needs. Whereas a few projects were conducting research based solely on desktop studies of existing biophysical or socioeconomic data (e.g. the theme 3 projects) and in these latter cases, a very high level of Indigenous engagement was not warranted. As a result of these differences, the REC recognised that projects needed to tailor their efforts to meet reasonable expectations while taking into account other pressures on communities and their likely levels of interest in the underlying research questions.

The REC attempted to build Indigenous engagement requirements into the research projects as early as possible. Project plan templates were made available on the intranet in 2006 and researchers were required to explicitly address Indigenous engagement in each plan. During 2007 each proposal was then assessed and advice provided on:

i. an appropriate level of Indigenous involvement and how to achieve this;
ii. the need for a written research agreement;
iii. a realistic timeframe for effective collaboration and project development, implementation and communication;
iv. an appropriate budget for Indigenous consultation and employment, and the method for payment;
v. the benefits of the project for Indigenous people;
vi. a risk assessment and mitigation plan.

All projects were required to quarantine a portion of their funding for Indigenous engagement and report on progress in each six monthly milestone report.

Notwithstanding efforts to shape the research to maximise its relevance to Indigenous people, by the time that projects were finally approved the program was somewhat constrained by funding agency priorities. Researchers faced a chicken or egg situation: in order to attract funding for the entire program the project scope and impact had to be agreed upon but this restricted the extent to which Indigenous communities could shape project objectives and design.

TRaCK also established dedicated knowledge and adoption positions under Theme 7 in each jurisdiction to coordinate engagement and collaborative research activities. The regional coordinators served as the TRaCK program's main points of contact in the catchments, linked

researchers to local Indigenous organisations and groups, and supported the transfer of information, in particular, information-dissemination and reporting, between TRaCK and its stakeholders.

3.4 Aims, outcomes

Table 1 below sets out the objectives, outcomes and performance measures for the Indigenous Engagement Strategy.

Table 1: Objectives, Outcomes, Performance Measures and Summary of Performance for the TRaCK Indigenous Engagement Strategy

OBJECTIVES/ OUTCOMES	PERFORMANCE MEASURES	SUMMARY OF PERFORMANCE
1. ENSURE TRACK RESEARCH IS RELEVANT AND BENEFICIAL TO INDIGENOUS COMMUNITIES AND ORGANISATIONS To build the capacity of Indigenous people to undertake research that will answer important questions being posed by Indigenous communities.	Number of Indigenous people leading the development of research Number of people (both non-Indigenous & Indigenous) acting as mentors to local Indigenous researchers Number of researchers engaged by Indigenous people to support their local initiatives	NAILSMA led the Indigenous Livelihoods theme which included 5 projects: 2 led by Indigenous people or organisations and 2 directed by NAILSMA's Indigenous Water Policy Group. Two other projects provided high levels of Indigenous input to their direction although were not entirely led by Indigenous organisations Difficult to quantify but there were numerous examples reported of mentoring through participation in research activity and joint conference presentations, informal training on monitoring. More than 20 researchers were involved in supporting the establishment of local catchment groups; providing technical support and training for recording of Indigenous knowledge and monitoring of river and wetland health; supporting livelihoods planning, governance training and developing research protocols.
2. ENSURE TRACK RESEARCH IS CONDUCTED ACCORDING TO THE HIGHEST ETHICAL STANDARDS	Number of research projects initiated by Indigenous parties Number of Indigenous co-authored papers, reports and presentations	5 projects in Livelihoods theme initiated by NAILSMA or partners, 2 major components of other projects initiated by Indigenous parties 6 co-authored journal articles or book chapters, 2 co-authored articles in TRaCK newsletter; an Indigenous Engagement Guide developed in collaboration with over 30 Traditional Owners from north Queensland, 12

All TRaCK research projects will be conducted with an appropriate level of Indigenous involvement and undertaken according to written research agreements.	The proportion of TRaCK projects with Indigenous collaborators operating under a written research agreement	co-authored conference presentations All projects with Indigenous collaborators were operated under written research agreements.
3. PROVIDE OPPORTUNITIES FOR INDIGENOUS EMPLOYMENT, AND TO TRANSFER SKILLS, SHARE KNOWLEDGE AND INCREASE CULTURAL AWARENESS AMONGST ALL PARTIES Greater understanding & acceptance by non-Indigenous TRaCK researchers of Indigenous people's knowledge systems, cultural values, perceptions & rights & greater understanding by Indigenous people with insight into & understanding of research methods and institutions.	Majority of Indigenous partners remain interested and committed to the project after the first year of project operation. Number of jobs stays constant or increases. Types of jobs and roles that Indigenous partners are fulfilling are increasing in variety, complexity and responsibility. Perceptions and attitudes amongst Indigenous people towards research are increasingly positive. Number of non-Indigenous people completing a cross-	NAILSMA and its affiliate partner organisations remained partners in TRaCK for the duration of the program. All other Indigenous organisations involved in projects remained partners through to completion. At an individual level there was a very high level of continuing interest and involvement at the project level. No evidence of major increases in the number of jobs over time. Most employment remained as short term contracts as field assistants and cultural advisors. From the second year, two Indigenous research leaders were employed to lead two Indigenous livelihoods projects and in the third year an Indigenous co-ordinator position was created in the K&A team for Qld and took responsibility for Indigenous engagement with Mitchell River traditional owners. Many examples of positive attitudes towards research. 21 researchers completed cross-cultural awareness courses

	cultural awareness course.	
4. EFFECTIVELY COMMUNICATE RESEARCH RESULTS AND SHARE KNOWLEDGE WITH INDIGENOUS PEOPLE Establish robust & longstanding relationships between Indigenous & non-Indigenous research communities & universal application of appropriate Indigenous communication strategies.	Number of joint projects & co-authored publications. Number of collaborations that lead to additional externally funded projects. Number of projects undertaken by same collaborators over a period of time. Uptake of communication products Number of projects completed on time.	See above. At least 8 additional external projects arose from collaborations developed through TRaCK. 4 projects had sustained collaborations that extended beyond TRaCK resources or time frames. Evidence of a high level of uptake of communication products Most projects with Indigenous collaboration experienced delays due to research agreement negotiations or delays in project scoping and approval. All projects met their revised project timelines.
5. ENSURE MEANINGFUL INDIGENOUS PARTICIPATION IN TRACK GOVERNANCE Indigenous participation in TRaCK governance.	Number of Indigenous people represented in TRaCK governance structures.	1 Indigenous person out of 7 on the Research Executive; 1 Indigenous representative out of 7 on the Program Management Committee level, 2 out of 30 project leaders were Indigenous.

4.0 Results

4.1 Overview

By all accounts TRaCK achieved a high level of Indigenous engagement in its program. Independent reports offer over-arching observations of the program's record:

> *The Indigenous engagement protocols established by TRaCK have demonstrated their effectiveness in achieving a degree of Indigenous participation in research that otherwise would not have occurred, given the current focus within research institutions on measuring research success primarily through monitoring academic publication outputs, with little emphasis on monitoring social impacts and benefits of research (Smyth 2012).*

> *The overall response from interviewees was very positive. Indigenous participants and representatives of Indigenous partner organisations reported multiple benefits in participating in TRaCK research, including opportunities to return to country, exchange traditional and scientific knowledge, learn new skills, strengthen pride in culture and identity and stimulate interests in strengthening Indigenous involvement in researching and managing country. TRaCK researchers reported largely enthusiastic responses from Traditional Owners who participated in the projects, including a desire for extending the partnerships beyond the life of TRaCK (Smyth 2012).*

The review of TRaCK's Knowledge and Adoption theme (Coutts 2011) noted that there had been good engagement in the program, particularly with Indigenous groups. Golson's report confirms the view of Coutts (2011).

These reports also note deficiencies and shortcomings in the TRaCK approach. Smyth's comments for example are reported below:

> *Interviewees also reported some challenges experienced during the Indigenous engagement process, including delays in obtaining research agreements and permits, communication difficulties between researchers and Traditional Owners for whom English is not their first language, discrepancies between Indigenous groups regarding their capacity to fully benefit from partnerships with researchers, uncertainties about long term application of new skills, knowledge and aspirations developed during TRaCK projects and difficulties in processing payments to Traditional Owners.*

Shortcomings and criticisms were also expressed in the Coutts review:

> *The majority of the Indigenous engagement appears to have been positive across the TRaCK program. One K&A team member commented that from an Indigenous point of view there were no real problems with engagement. Some issues however were raised by one of the informed persons (traditional owner). They indicated that they*

were not satisfied with the level of engagement and believed the two groups involved in the program had received no control, ownership or employment out of TRaCK. This respondent believed cultural protocols could be better followed and that some groups needed to be better informed. The volume of information and decisions coming out could be overwhelming for these groups and some participants felt they should have been paid for their input.

Coutts observes that:

> *… a couple of K&A team members felt that objectives were set a little too high in this area and therefore targets were not reached. They suggested that the program needed to be a little more realistic about what could be achieved. Others commented that despite difficulties (e.g. discussions regarding reimbursement for services, it's hard to get feedback but that's just the way it is) there was goodwill on both sides.*

Golson's report noted that:

> *All of the interviewees spoke about the high level of engagement that they had with Indigenous people and organisations. For both biophysical researchers, this was the first time they had worked with Indigenous people and they talked about having learnt about the timing and flexibility of activities.*

The rest of this chapter is structured around performance against the objectives of the IES which provide the framework for this assessment of the efforts and achievements of TRaCK (see Table 1).

4.2 Objective 1: Ensure research is relevant and beneficial to Indigenous communities and organisations

This objective was intended to result in an increase in the capacity of Indigenous people to undertake research that would answer important questions being posed by Indigenous communities (see outcome #1 in IES). The performance measures indicate that Indigenous control of research initiatives was considered to reflect the extent to which research was relevant and beneficial:

- Number of Indigenous people leading the development of research
- Number of people (both non-Indigenous & Indigenous) acting as mentors to local Indigenous researchers
- Number of researchers engaged by Indigenous people to support their local initiatives

Prior to finalising the bid, REC members spent considerable time meeting and establishing relationships with Indigenous groups and organisations in the three jurisdictions, providing information on the Program and seeking people's input about the best approaches to engage

at the regional and local levels. This served as a mechanism for learning about Indigenous research interests and information needs and resulted in ideas that were subsequently taken up by projects. For example, the River Change Stories component of Project 1.2 was developed after hearing compelling accounts of environmental change from Indigenous people during the pre-research phase.

Both of the Coutts evaluations found that capacity building at the research and community levels had taken place and, according to Golson's review, TRaCK documents were 'littered with examples of this across the Program and its projects in the three jurisdictions' (see for example PMC Minutes 4/2010).

Plate 1. Wagiman Association members holding a poster from the Fish and Flows Project with project team researchers, Michael Douglas (CDU) and Sue Jackson (CSIRO), Pine Creek, NT.

Golson found that although performance measures 1(a) and 1(b) focus on the building of Indigenous *research* capacity, it is the development of Indigenous *community* capacity generally, including research capacity, that TRaCK activities have supported. Golson further states that TRaCK's efforts better addressed performance measure 1(c) than the first two: '1(c) better captures how TRaCK worked widely with community members in all the jurisdictions to build capacity and ensure that the research was relevant and useful to Indigenous people'.

a) Indigenous-led research

Theme 6 (Indigenous Livelihoods) contained the only projects that could be described as Indigenous led. The theme was led by NAILSMA and two of the five projects were run by either Indigenous researchers or Indigenous organisations.

Projects 6.1, 6.2 and 6.3 were also overseen by NAILSMA but were designed by non-Indigenous researchers with knowledge of water resource institutions and ecological economics. The project brief for 6.1 (water markets) was developed with input from NAILSMA and the Indigenous Water Policy Group (IWPG), who provided direction to the study, informed the design of survey methods and gave feedback on results (see Nikolakis 2010). Once designed and commissioned, Project 6.2 (Indigenous Water Rights) was directed by NAILSMA's Indigenous Water Policy Group (see O'Donnell 2011). Both projects relied largely on desk-top methods of review and interpretation, although 6.1 undertook a face-to-face survey to elicit attitudes towards the introduction of water markets in north Australia. Project 6.3 was led by ANU and involved economic research in central and north-east Arnhem Land (see Concu *et al.* 2011).

Two other projects provided high levels of Indigenous input to their direction although were not entirely led by Indigenous organisations. Project 1.2 (river change stories) responded to requests by an Indigenous organisation in Fitzroy Crossing and Indigenous groups in the Mitchell River to undertake the research in those catchments. Funded by and with input from projects 1.2 and 2.2 (Indigenous socio-economic values and river flows), the Yiriman Project coordinated the collection of a series of filmed interviews, with 30 or so Indigenous people from the Fitzroy catchment participating in a range of roles. Project 2.2 (Indigenous Socio-Economic Values and River Flows) had a participatory monitoring component that responded entirely to local information needs in both the Fitzroy and Daly (see Jackson *et al.* 2011). At the request of communities in these regions, this project also documented Indigenous ecological knowledge and compiled it into four seasonal calendars (Woodward *et al.* 2012).

Projects 6.4 and 6.5 were developed and undertaken by Indigenous people in the Archer River and West Kimberley, respectively. These two projects were conceived as ones that would employ participatory and action-based research methods to respond to community needs and priorities. In their work on sustainable Indigenous livelihoods on country, the two Theme 6 case-study projects were not only initiated and led by Indigenous groups but built upon existing activities and priorities in their local areas. In the Archer River area, for example, Project 6.4 worked through local initiatives to develop a basin-wide livelihoods plan. The work supported people engaged in, for example, joint management negotiations over National Park lands to define opportunities, priorities and directions for sustainable livelihoods.

b) Mentoring

According to the IES (Implementation Table), mentoring and training programs were to be established to support Indigenous researchers. TRaCK provided a significant number of opportunities for skill development, mentoring and practical training to Indigenous *research participants* at both the Program and project levels. It did not run formal mentoring programs.

Projects that contracted community members to work with them as research assistants (see Objective 3(b)) provided training and mentoring as part of the research process. Some assistants helped with the conducting of surveys (for example, Project 3.1 conducted interviewer training sessions with the Mitchell River Traditional Custodians Advisory Group and four Traditional Owners who were responsible for collecting expenditure and water use data from Indigenous households in and around the middle and upper reaches of the Mitchell) while others were engaged in the collecting of samples (for example, as part of its work with the Kowanyama Lands Office on threats to wetland systems within the Kowanyama lands, Project 4.4 conducted training with rangers on methods for monitoring the condition of wetlands within the Mitchell fan wetland aggregation).

TRaCK researchers collaborated with local and regional Indigenous organisations to impart skills and knowledge through forums and workshops, such as at the Kimberley Land Council's first Kimberley Ranger forum in 2010, where Project 2.2 and 5.1 researchers assisted rangers with hands-on workshops on water quality monitoring.

TRaCK supported Indigenous research participants to attend and present at conferences that took place over the life of the program, including:

- Three presentations at the River Symposium in Brisbane. In 2008, Project 1.2 and two Daly River Aboriginal Reference Group (ARG) members delivered a paper. In 2007 a TRaCK researcher and an ARG reference group member presented on the approach being used in Project 5.5 and in 2011 they presented a paper reflecting on the outcomes of this process four years later.

- In 2009, four Traditional Owners were sponsored to attend the Australian Society for Limnology Congress in Alice Springs, two of whom gave presentations and all presented a poster.

- In 2009, at the Indigenous Studies Indigenous Knowledge Conference in Fremantle, three traditional custodians from the Daly and Mitchell river catchments invited TRaCK researchers to co-present on collaborative research in the Daly River catchment and on developing research protocols for the Mitchell River.

- In 2010, at the CERF Conference in Canberra, at a special session organised by TRaCK on the 'Exploration of contemporary Indigenous environmental research issues,' eight representatives from collaborating Indigenous organisations, including the Yiriman Project and the Mitchell River Traditional Custodians Advisory Group, presented on their work with TRaCK.

c) Support for local initiatives

According to Golson's review, the Program's support for initiatives at the local, catchment and regional levels 'spearheaded much of its extensive engagement and collaborative efforts'.

In the Mitchell River catchment, where there was no over-arching Indigenous body representing the area's language groups, TRaCK consultations led to the establishment - and subsequent incorporation - of the Mitchell Rivers Traditional Custodians Advisory Group (MRTCAG). In 2008 TRaCK held a forum that brought together over 90 traditional custodians to talk about the research and engagement. This forum was critical to the establishment of MRTCAG and the agreement process that followed the forum strengthened local research capability. These developments laid the foundation for the Program's engagement and collaborations with Indigenous people in the upper catchment. The achievements of the partnership were celebrated in an event organised by MRTCAG in 2010.

At the catchment-level in the Kimberley, TRaCK was instrumental in the establishment of the first community-based catchment group in the region, the Fitzroy Catchment Action Management Group (FitzCAM) and its Aboriginal Reference Group. Once operating, TRaCK was an active member of the FitzCAM management committee and researchers presented interim research results at FitzCAM meetings on several occasions.[4] In April 2010, the Program also provided support to the first Kimberley Ranger forum by sponsoring the attendance of a group of Gooniyandi people from the Fitzroy River catchment.

In 2009, a member of the Wungurr Rangers from the Kimberley undertook work experience at CDU to learn more about the analysis of the samples they had collected for Project 5.5 and to develop a feral pig monitoring plan.

[4] UWA oversaw a TRaCK-associated project, the Investment Framework for Environmental Resource Catchment management project, with FitzCAM. See also Objective 4(b). FITZCAM did not continue after the first round of funding was complete.

Plate 2. Traditional owner Graham Brady talks about the changes he has seen in the Mitchell River in QLD (from *OnTRaCK* Issue 5).

Local input guided research activities and processes. In the Kimberley, arrangements were made with local educational facilities, resource centres and projects through which aspects of the TRaCK research were integrated into existing curricula and programs. For example, at the direction of the Noonkanbah Community Council, researchers from Projects 2.2, 4.1, 5.1 and 5.9 worked closely with teachers from the Kulkarriya community school to engage students in research-related activities and to provide useful and interesting information to the students.

At the project level, particularly for the projects that undertook intensive and sustained fieldwork, there are many instances of support for local initiatives across the three jurisdictions and beyond (see examples under 2 (a) and 4 (b), in particular).

Project 1.2 was dedicated to the provision of skill development and targeted training (learning by doing) to Indigenous people. The ultimate aim of this project was to strengthen Indigenous participation in water planning processes and debates. Areas of need identified by Indigenous groups determined the sort of activities that were undertaken, for example, the Project assisted the newly formed MRTCAG to develop research protocols, governance training and a business plan for its operation.

Plate 3. Bill Harney and Mark Kennard (Griffith University) working on the fish and flows project on Wardaman country, Katherine region, NT.

It is from these and other outcomes that we can see that TRaCK worked widely with community members in all the jurisdictions to build capacity and ensure that the research was relevant and useful to Indigenous people. TRaCK was less successful in achieving a high degree of Indigenous control of the projects but nonetheless it is clear that respectful and trusting relationships were the hallmark of most interactions.

The Coutts review of 2011 noted that some respondents felt the initial plans based on negotiated protocols with the five traditional owner groups in the Mitchell River had helped TRaCK build good working relationships with the Indigenous community. The plans had also made participants more aware of their responsibilities to the program.

Plate 4. Fish and flows research on Wagiman country, Douglas Hot Springs, NT.

Smyth's review found that one of the reported benefits was the opportunity that TRaCK research offered Indigenous people to visit their customary estates:

> *While each interviewee reported a unique combination of issues, central to each of them was the opportunity the TRaCK projects provided to enable Traditional Owners to return to country. For remote, low income communities with little access to transport and other resources needed to overcome the logistical barriers to returning to country, field-based research trips involving Traditional Owners bring immediate benefit to them, independently of the purpose of the research. That this is regarded as such a significant benefit is an indication of how rare is the opportunity for many Traditional Owners to return to their country and how little policy and financial support is available to meet this aspiration.*

One of the researchers that Smyth interviewed added the following comment:

> *The TOs loved coming out on country – we took Paddy to a place of great significance for his sister…. the first time he had been there in 40 years, even though it is just 2 hours drive from Kowanyama.*

Below is a sample of the comments obtained by Golson (2012) and Smyth (2012) relevant to this objective:

- While Indigenous people would not have asked many of the questions that were the focus of the biophysical research, projects such as 2.2 were more directly relevant to local people. As well, the ecological, hydrological and other biophysical work will have practical application for water management and inform policy.

- Working with TRaCK was a good experience – it was an opportunity to tell my stories about my country. I only got a chance to tell some of my stories about some of my country – I'd like the opportunity to tell more of my stories to the researchers if they come back. Stories about my country are part of my heritage, and it's my job to keep the stories strong.

- A real strength of TRaCK was the integration of knowledge across projects, which has provided or will lead to useful and relevant information for Indigenous people.

- There is room for improvement through involving Indigenous people in the design stages of the research, where it is possible.

- Project 2.2's trial participatory monitoring activities are an example of how the research was community-driven.

- Some projects were devoted specifically to Indigenous capacity-building in areas that Indigenous people have identified as wanting support and information, such as 1.2's Power Tools.

- Mentoring went both ways. In both the Daly and Fitzroy River catchments, senior community members who were research participants or research assistants mentored Project 2.2 researchers.

- There are many instances of how the researchers supported Indigenous people, contributing to planning and presenting to schools and in other forums.

- The fishing surveys and calendar were successful projects; it was good to record and transmit traditional knowledge of seasons, fishing skills, river flows, health of the river, language names etc.; good for schools and younger generation to have access to traditional knowledge and skills; Calendar poster hasn't yet been used in school, but will be a valuable resource; Assisted researchers to find other people from other language groups to collaborate on the project; good ethical process – involved right people, and some people employed; enjoyed working with Emma Woodward, Pippa Featherston and Marcus Finn; project was an "eye-opener"– keen to be involved in future research projects and motivated to encourage her people to help keep the Fitzroy a healthy river – keep it clean and don't over-fish.

- Enjoyed and appreciated participation in Brisbane River Symposium; Wagiman people expressed excitement and happiness to be on-country displaying their cultural knowledge, and speaking passionately about the cultural significance of

Guwardugan River; Elders very proud to show their achievements to the wider community, and through presentations at conferences; Participation of young people instilled pride and recognition in future leaders - strengthened their spiritual ties to country, their community and identity.

4.3 Objective 2: Ensure TRaCK research is conducted according to the highest ethical standards

In preparing the IES, principles from the Guidelines for Ethical Research in Indigenous Studies authorised by the Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS 2000) were consulted. These guidelines, which provide a coherent and clear national standard, had been endorsed and recommended in the NAILSMA Guidelines and Protocols for the Conduct of Research (NAILSMA 2006). TRaCK also endorsed the AIATSIS Guidelines so as to assist TRACK researchers in achieving the best standards of ethical research.

The IES expected that all TRACK research projects would be conducted with an appropriate level of Indigenous involvement and undertaken according to written research agreements. As mentioned above, a template was developed to ensure that key elements of Indigenous engagement were to be addressed from project commencement including those where Indigenous engagement was not central to their data collection i.e. the biophysical projects in themes 4 and 5. The IES Steering Committee was also tasked with ensuring that all applicable TRACK research projects obtained Human Research Ethics clearance from their host organisations. Each of the Universities had their own Human and Animal Ethics Committees although CSIRO did not have a Human Ethics Committee until after TRaCK started. One of the CSIRO projects (2.2) was instead approved by CDU's Committee.

A breach of the research ethics approval process did occur in relation to two community-oriented projects in Theme 6. Although these projects were conducted with Traditional Owner support, towards the end of the projects it was found that approval had not been sought from a registered Human Research Ethics Committee. This matter was brought to the attention of CDU's Human Ethics Committee, which advised that the results of these projects could not be used or published. NAILSMA, TRaCK and CDU went through an extensive process in order to address this issue. The failure was multi-tiered and identified the gap and lack of recognition between ethical research processes, Native Title and aspirations of regional Indigenous organisations and individuals. The complex nature of working with Indigenous people that exists largely due to adverse circumstances currently remains unfounded territory where many lessons need to be documented and built upon in order to progress Indigenous engagement. In recognition of the challenges faced during the Theme 6 case study projects NAILSMA and TRaCK, as part of the TRaCK synthesis and adoption year, developed guidelines for researching and developing Indigenous livelihoods on country. NAILSMA and TRaCK have adapted their project development, approval and reporting processes to reduce the risk of future breaches. Specifically, NAILSMA now

insists that gaining approval from a registered HREC is a contractual requirement of its sub-contractors and TRaCK now requires research partners to submit a copy of all ethical approvals before milestone payments are made. The NERP Northern Australia Hub has also adopted these processes.

a) Projects initiated by Indigenous parties

As mentioned above, Indigenous Traditional Owners and representative bodies took part in developing TRaCK's program of research[5]. Through workshops in 2004 and 2005, for example, TRaCK engaged Indigenous groups in identifying knowledge needs and setting research priorities.

The partnership with the Program's main Indigenous partner NAILSMA was finalised in 2006. In developing the details of the Theme 6 'Opportunities for Indigenous Livelihoods' research, Indigenous interests were documented through the processes and consultative forums developed by NAILSMA. There was an emphasis on direct responses to stakeholders and landowner requirements to design and deliver research. Project leaders contracted community members associated with the rivers and coasts where research was occurring to ensure that projects were running according to their objectives[6].

In addition, a number of Project 2.2's activities were initiated and driven by members of local Indigenous groups who the researchers were working with, including the development of seasonal calendars, 'photo voice' projects and the monitoring program.

b) Co-authored papers, reports and presentations

Papers

- Project 2.2 has co-authored two papers with Indigenous research participants and plans another one during the TRaCK Synthesis year. For example,
    - Woodward, E., Jackson, S., Finn, M and P. Marfurra McTaggart (2012). Utilising Indigenous seasonal knowledge to understand aquatic resource use and inform water resource management in northern Australia, *Ecological Management and Restoration* 13(1): 58-64.

- Project 5.5 (Fish and Flows project) has one paper with Indigenous research participants in preparation.

- Project 2.1 co-authored two articles for the TRaCK newsletter with Indigenous research assistants[7].

[5] See, for example, Milestone report 4/2011 p. 25.
[6] Milestone report 8/2011 p.21.
[7] On the basis of Project 5.2's work with the Kowanyama Aboriginal Land and Natural Resource Management Office, a co-authored manuscript is planned.

Book chapters

- Jackson, S. and J. Morrison (2007). Indigenous perspectives on water management, reforms and implementation, in Hussey, K & S. Dovers (eds) *Managing Water for Australia: the Social and Institutional Challenges*, CSIRO, Melbourne: 23-41.

Reports

- The Indigenous Engagement Guide was developed by Project 1.3 in collaboration with 16 Traditional Owners from Aurukun Waterways, Wetlands and Coastal Advisory Committee and with 20 members of the Mitchell River Traditional Custodians Advisory Group.[8]

Presentations

- Project 1.1 and two Daly River Aboriginal Reference Group members at the River Symposium, Brisbane, 2008
- Project 2.2 co-authored two presentations with Indigenous research participants and presented the findings at the River Symposium in Brisbane in 2009.
- Project 1.3 at the River Symposium in Brisbane in 2008.
- Project 2.2 and Indigenous research participants presented at the Australian Society for Limnology Congress, Alice Springs, 2009.
- Jackson S, Altman J, Morrison J, Douglas M at the Coast 2 Coast Conference, Darwin, 2008.
- Project 5.5 co-presented at River symposium in 2007 and 2011 and at the Australian Society for Limnology Congress, Alice Springs, 2009 and the Indigenous Studies Indigenous Knowledge Conference in Fremantle in 2009.
- The TRaCK Director co-presented on the development of research protocols in the Mitchell River Catchment at the Indigenous Studies Indigenous Knowledge Conference in Fremantle in 2009.

c) Indigenous collaborators operating under a written research agreement

TRaCK undertook extensive engagement with land councils and Indigenous community organisations over the life of the Program. The three research agreements that were finalised after lengthy and protracted negotiations are major TRaCK legacies. TRaCK contributed to the building of capacity through working closely with regional and local organisations and groups to negotiate the agreements and secure approvals as well as local research protocols research. All respondents interviewed by Golson (2012) referred to the positive aspects of the research agreement processes. However, most respondents also mentioned that they had been difficult and protracted and had consequently affected the timing and quality of the research.

[8] The researchers are exploring the possibility of developing the Guide as a field resource for Indigenous water facilitators in Northern Australia through a joint project with NAILSMA and the Indigenous Community Water Facilitators Network.

The Cooperative Research Agreement signed with the Kimberley Land Council (KLC) signed in April 2008 underpinned all the research undertaken with Indigenous people. Its scope was regional and provided for the protection of Indigenous knowledge and the regular reporting of progress and use of information. Working through local and regional Aboriginal organisations and communities, TRaCK also developed local protocols for securing approvals and collaborating with local people.

All field activities in the Kimberley were conducted according to the Agreement except, initially, for Project 4.1, which began fieldwork before it had been signed by both parties and then withdrew until it was finalised. All collaborative research activity with Indigenous members, groups and organisations – the KLC, Traditional Owner groups, individual communities, schools, the FitzCAM Aboriginal Reference Group and the Indigenous Community Water Facilitator and so on - was covered by the Agreement.

In the Mitchell River catchment, as outlined above (1(a)), TRaCK's activities led to the formation of the Mitchell Rivers Traditional Custodians Advisory Group (MRTCAG) and the signing of a research agreement in November 2009. In addition, TRaCK research in Queensland was undertaken in other areas not covered by agreement with MRTCAG. However, because of the extended period that passed before the research agreement with MRTCAG was finalised, many projects undertook field research in the Mitchell River catchment prior to the Agreement being finalised. According to internal documents, in the Kowanyama lands, researchers followed existing research protocol arrangements developed by the Kowanyama Aboriginal Land and Natural Resource Management office (KALNRMO). KALNRMO was also a signatory to the protocols agreed to with MRTCAG.

In the Northern Territory, some TRaCK research activities did not begin in the Daly River catchment until a Northern Land Council research agreement with the Wagiman Association was signed by all parties in August 2009. This resulted in a significant delay in the start of a two year schedule of household surveys for Project 2.2. Since project completion, researchers have followed the terms of these agreements to ensure that the Land Council approves the release of draft papers and presentations.

The following comments from respondents interviewed for this review illustrate the above points:

- We recognised the importance of the agreements to the building of relationships and to working well with local people.

- The Mitchell River Agreement was worthwhile even if late in the day and lots of lessons were learnt. It was a great effort even though there were holes in it, such as it not dealing with all the groups in the catchment. People appreciated having input into the process.

- The researchers in the Mitchell had mixed views about the agreement process. Some were excited by the prospect of more meaningful engagement and were open to it, appreciated the guidance, while others questioned it because, for example, Indigenous people were not major end users of their research.

- The research agreement processes created a great deal of difficulty in contrast to the reception of the research on-the-ground. We had to delay our fieldwork for a year. Overall, things went well enough.

- As a result of not being able to gain approvals to sample in particular areas, we have gaps in our overall findings that keep on showing up.

- Our project had realistic expectations about how long things would take and we committed to our milestones accordingly, such as that we wouldn't be gathering data in the first six months.

- One lesson we learnt was to have a flexible field program if you're working with Indigenous people. We encountered delays in, for example, meeting up with people and had difficulty balancing this with our work schedule. We'd allow a lot more time for fieldwork in the future so we can interact with people properly and deal with unforeseen events.

- We'd definitely engage as early on as possible with local people to establish relationships. I got a call from another non-TRaCK researcher recently who was going to be working in the Kimberley and I asked him if he had contacted the KLC and was going to work through ranger groups and he didn't know anything about either. That's where I was at before I worked with TRaCK. TRaCK is unique among research programs.

- What we did was negotiate protocols with the 5 traditional owner groups and gave these to TRaCK as a guide to how we wanted to be engaged. TRaCK adopted these and integrated them into the way they did business with us. They collaborated with us fully.

- They engaged everyone on their own terms and allowed us to have our say. We wanted to engage and they respected us. And so it went both ways – we had a lot of respect for the researchers – they did the right things by us (Coutts 2011).

- What about the longer-term obligations and responsibilities that research programs have to the Indigenous people they are working closely with once the research

finishes? Look what's happened to MRTCAG. TRaCK could have supported it to continue through helping to find longer-term funding.

- As a follow up to the final comment, it is noteworthy that in 2012 MRTCAG members attended a public presentation of the TRaCK research results and voiced strong support of the process. After the presentation, the Chair of MRTCAG commented that by the end of the first phase of the TRaCK program they had come to "stand on their own two feet" and they were proud that they have since been successful in securing external funding for a vehicle and office support and support to further develop the videos recorded as part of Project 1.2.

4.4 Objective 3: Provide opportunities for Indigenous employment, and to transfer skills, share knowledge and increase cultural awareness amongst all parties

The outcome and performance measures for this objective centre on two-way learning and the creation of employment opportunities for Indigenous people.

Not all of the research projects contracted Indigenous people as paid participants in their research. This was particularly the case in Queensland, where the research agreement process occurred after the field activities of many of the projects had begun.[9] In the Kimberley, by contrast, all projects were required to contract at least two people as cultural advisors and/or as research assistants. Projects working in the Daly River catchment appear to have paid participants according to protocols negotiated with local groups and the NLC but delays in getting research agreements negotiated reduced the opportunity for employment.

Plate 5. Thomas Dick and Pippa Featherston (CSIRO) following a household survey, as part of Project 2.2 at Bayulu, Fitzroy River catchment, WA.

In general, and as described in more detail below, most TRaCK projects could offer only short-term intensive paid work because they were not in the field for any sustained period and/or were spread across many locations and working with different people. As a result, there is an obvious misalignment between the research context and performance measures

[9] The research in Queensland that took place later had better engagement generally because TRaCK had by then established relationship and linkages with local Indigenous people.

3(b) and 3(c), which assume the cumulative building of research capacity across an extended period.

Given this, Golson argues that the terms 'work contracts' or 'paid participation' rather than 'employment' more accurately describe the many shorter-term opportunities that arose from the research.

The program also sought to ensure consistent rates of pay across the TRaCK region for expertise offered. In the end, a regional approach was taken where rates common to a region (or jurisdiction) were adopted as the TRaCK standard. It was also considered important to be clear when payment would not be provided (e.g. for attendance at general community information meetings, for answering surveys that did not depend on specific Indigenous knowledge). This issue was raised at the REC meeting in August 2007 and a formal position was agreed upon to demonstrate consistency and transparency in arrangements relating to payments to participate in research processes.

Smyth's review notes that the means by which people were paid caused some tension. Electronic payment of Traditional Owners for their collaboration in research projects resulted in difficulties where Traditional Owners don't have ready access to their account details. Long lead times in getting contract workers 'on the books' caused difficulty for Traditional Owners in the Daly for example.

TRaCK collaborated with local people in almost all of its activities - knowledge sharing and exchange were key elements. Both Coutts evaluations found that there had been a high level of two-way learning between researchers and Indigenous people, including a growing awareness among researchers of Indigenous values which had led to the building of research capacity within the TRaCK. Project 2.2's collaborative work with Indigenous research participants, in particular, was widely commented on in this context. According to that evaluation: 'This increased capacity has mainly come in the form of working with Indigenous communities to develop funding proposals, guiding future planning, influencing policy change and providing employment opportunities for Indigenous people'. Other examples noted by Coutts include:

- *Project 1.2 - Employment of Daly River ARG member on casual basis with project 2.2.*
- *Project 1.2 - Community wages payed to about 30 people*
- *Project 5.2 - Close work with the Kowanyama Aboriginal Land and Natural Resource Management Office (KALNRMO) has resulted in join activities and funding proposals (although 2 failed and 1 is still under review).*
- *Project 5.8 - Ten Indigenous rangers were employed on this project to assist with field sampling in the Kimberley.*
- *Project 6.2 - Assisted stakeholders in relation to the nature of Indigenous rights in water and the ongoing implementation of the National Water Initiative, current reviews of water management legislation in the Northern Territory and Western Australia and the Indigenous Water Policy Group.*

a) Indigenous partners remain interested and committed to the program after first year

The partnership with NAILSMA and collaborations with its affiliate bodies and networks, the Indigenous Water Policy Group (IWPG) and the Indigenous Community Water Facilitators' Network (ICWFN), was of value for the life of the Program. Within the focal catchments, and despite the length of time experienced in finalising research agreements, the Program supported and maintained solid collaborations with the Daly River Aboriginal Reference Group, the Mitchell Rivers Traditional Custodians Advisory Group and FitzCAM as well as regional and local representative organisations such as the Kimberley Land Council and Kowanyama Land and Natural Resource Management Office.

At the project-level, across the three jurisdictions, researchers maintained continuing interactions and collaborations with local Indigenous research participants through the course of their work and beyond. For example, over two years in the Daly and Fitzroy River catchments, Project 2.2 conducted intensive household surveys on river and wetland resource use and harvesting efforts which entailed visiting each survey household eight times a year over a two-year period. While a few participants chose not to continue, the vast majority collaborated until the end of the research. The 2.2 researchers reported that they made cash payments to all the informants and research assistants they worked with and that this was done immediately after people had participated.[10] They believe this arrangement contributed significantly to people's continuing interest and participation in the research. Over a year after that project finished, the Wagiman Rangers sought the assistance of one of the CSIRO researchers to continue the community monitoring that had been initiated by the project team.

[10] This excluded the participants of the household survey, where payments might have compromised the integrity of the data collected.

Plate 6. Rangers from the KALNRMO with TRaCK researchers from Griffith University

b) Number of jobs stays constant or increases

The main opportunities that the Program offered for the paid participation of Indigenous people in the research were as cultural advisers, research assistants and field guides. The contracting of people occurred across a large number of projects in all three jurisdictions including beyond the focal catchments in areas such as the Archer River area, the Kowanyama lands and the North Kimberley.[11]

In the Kimberley, all field research followed agreed protocols developed in consultation with the Kimberley Land Council (KLC) and local groups. Projects contracted at least two local people nominated by their communities to work with the researchers according to the KLC's scale of fees for rangers and Traditional Owners. Where ranger groups were operating, projects worked with them. For example, in 2009, Project 5.8 contracted the Wunggur rangers to guide them and assist with field sampling on a two-week field trip to seven river systems in the north Kimberley.[12]

[11] Project 5.3 reported working with the Pormpuraaw Wild River Rangers (Coutts 2011, Appendix 9).
[12] For other examples, see individual project reports in Milestone Report 10/2009.

Plate 7. William Shaw being interviewed by April Mirindo at Gillarong community, Fitzroy catchment, WA. (Project 2.1)

However, as outlined earlier, the field research conducted by the majority of projects was short and sporadic and did not necessitate long-term work contracts. The typical duration for a contract was a week or less on one to two occasions over the life of the project. Some projects such as 4.1 and 5.9, for example, sampled at many sites across the focal catchments and beyond, contracting local Indigenous people for one or two days to help with the field activities in the different locations. The exceptions were projects 6.4 and 6.5 where both lead Indigenous researchers held fulltime contracts for the duration of their project activities.

Even for those projects that undertook field activities over a longer period in one or a few locations – mainly the social research projects in Theme 1, 2 and 6 – there was not a cumulative increase in the amount of contracted work provided over time.

Project 2.2 worked most intensively with Indigenous research participants. In all, the researchers engaged 144 Indigenous informants and research assistants over the three years and made approximately $53 936 in cash payments. The research assistants helped in the face-to-face delivery of surveys in the Daly and Fitzroy river catchments as well as establishing contacts, facilitating introductions with researchers, setting up interviews and facilitating discussions.[13]

[13] Other examples include: Project 2.1 contracted three local Indigenous co-researchers for several months each to visit communities and people in and around Fitzroy Crossing and Derby in WA. In the Mitchell Catchment, Project 3.1 contracted four Traditional Owners to assist with the collection of expenditure and water use data from Indigenous households in, and around, the catchment.

In addition to field-based work, in Queensland, TRaCK's arrangements with MRTCAG included the creation of an Indigenous coordinator's role and member of the K&A team. From May 2008, the fulltime position was based with MRTCAG and assisted with research proposals, the coordination of fieldwork with appropriate traditional custodians and the coordination of cultural awareness training.

c) Jobs and roles filled by Indigenous partners increase in variety, complexity and responsibility

As outlined above, this performance measure assumes that the types of work and roles that Indigenous partners would be undertaking were continuous over an extended period, which was overwhelmingly not the case. This is not to ignore the possibility that, where project participants undertook training and gained more experience in survey or sampling work, their roles may have became more complex and varied (see Objective 1(b)). For example, the four groups involved in Project 2.2's trial of participatory monitoring received training in water monitoring methods such as water quality testing and, armed with the necessary tools, were responsible for collecting their own data. The Wagiman Rangers are recommencing this monitoring now that the group has a new Coordinator.

In the Mitchell River, one Indigenous woman was employed initially as a assistant for a single field trip for Project 2.1, then on a casual basis to help co-ordinate consultation meetings and then as the Indigenous co-ordinator on a full-time basis until August 2009. During this period she developed ideas for a Masters project based on the work she was undertaking for TRaCK and is completing that qualification through Deakin University. Since 2011 has been based at CSIRO in Cairns through a partnership between CSIRO, JCU and Deakin University. The opportunities provided through TRaCK are acknowledged as an important factor in her recent achievements.

However, this is one of a few exceptions along with projects 6.4 and 6.5. Otherwise, the research imperatives of the majority of projects saw them in field locations for short periods only and with a different focus to the social researchers.

d) Perceptions and attitudes amongst Indigenous people towards research are increasingly positive.

Two of the key findings of the 2011 Coutts evaluation were that, among the impacts of the Program, there is a high level of interest in TRaCK by stakeholders including Indigenous groups and that TRaCK knowledge and tools were being used at a number of levels from personal study to informing policy and planning (see also 4(d)).[14] Dermot Smyth's interviews with Indigenous stakeholders confirmed this view.

[14] See 2011: 3-4.

Plate 8. Amy Nuggett and Joy Nuggett working with Emma Woodward (CSIRO) at Fitzroy Crossing (WA) on the Walmajarri Words from the River Side seasonal calendar

Smyth's report concluded that:

> *At the heart of successful Indigenous engagement in research is the nature and strength of the relationships between researchers and Indigenous people – individuals, communities and organisations. Interviewees by and large reported that relationships between TRaCK researchers and their Indigenous partners were and are very sound, respectful, harmonious and productive. Factors contributing to these successful relationships, as reported by interviewees, include:*
>
> - *Appropriate time and effort devoted to communicating and developing rapport with potential Indigenous partners – including making several trips to visit a community prior to commencing research;*
> - *Building in components or outputs of research of particular relevance to the Indigenous partners, including assisting with school projects, developing traditional calendars and communicating the outcomes of research through appropriate mechanisms, such as community visits and posters;*
> - *Transferring scientific and technical skills to Rangers as a lasting legacy of the research experience;*
> - *Offering joint authorship of publications with Indigenous partners;*

- *Supporting Indigenous partners to give presentations at national and international scientific forums;*
- *Development of post-TRaCK research proposals to specifically address Indigenous research priorities – e.g. impacts of tourists on waterholes;*
- *Maintaining relationships beyond the life of the project, including, for example, sharing photographs of family.*

The Mitchell River co-ordinator example from the previous section demonstrates the benefit that some a small number of people derived from interacting with TRaCK and we are aware of other examples. A Daly Aboriginal Reference Group member conducted a review of TRaCK's Indigenous engagement efforts for Project 5.5 as a research project for her successfully completed Bachelor of Community Development from Curtin University. Her son attended a number of field trips as well as conferences and co-presentations on Project 5.5 and developed a report and presentation on this experience as part of a Year 11 project on community leadership. He has since been successful in gaining an Indigenous traineeship with the NT Government and is working with government collaborators on the TRaCK project.

On a number of occasions the TRaCK Director was called upon to provide references for Indigenous people for employment and for community organisations seeking grants from government.

e) Number of non-Indigenous people completing a cross-cultural awareness course

The IES outlined that appropriate cross-cultural awareness training courses be identified and researchers supported to undertake the training.[15]

Some difficulty was experienced in facilitating universal participation by researchers. For example, at the time that TRaCK projects were due to start, NAILSMA CDU was in the final stages of developing a course that would have been suitable for TRaCK researchers. It took longer to be finalised than was anticipated and as a result, the opportunity for researchers to receive training before field work was undertaken was delayed and hence the record of cross cultural training is patchy. The REC identified other suitable courses and researchers should have been encouraged to take these rather than waiting for the CDU course to be finalised.

[15] See TRaCK IES Implementation Table.

Plate 9. Traditional owner, Theresa Huddleston, welcomes Mark Kennard (Griffith University) to Wagiman country by putting water from the Douglas Hot Springs on his head.

In Queensland in 2008, at the request of and supported by the traditional custodians of the Mitchell River, 18 TRaCK staff received cross-cultural training. Many had little or no experience working with Indigenous people. Unfortunately, this happened after much of the fieldwork had taken place. Participating researchers provided positive feedback about the training, for example that it highlighted the mutual benefits of working in partnership with Aboriginal people. Theme 7 reported that "these events will be a significant legacy of the TRaCK program" (Milestone Report August 2011: 25). However, the same review reported the view that cross-cultural training should have been undertaken by all researchers. Interviews for the Golson's review confirmed these views (2012).

In one case a Project 1.3 researcher made his own arrangements to undertake training and similarly Project 3.1 researchers organised training with MRTCAG before undertaking fieldwork in the Mitchell catchment. Some biophysical respondents commented on their inexperience interacting with Indigenous people and the support they received from the Program.

It is worth noting that the delivery of the training by the traditional custodians was seen as particularly important to its effectiveness (see interviews below).

In summary, those interviewed made the following main comments about Objective 3:

- The engagement with people was rewarding and interesting.
- Knowledge sharing was relatively high - whenever I was in the community I gave a brief presentation to the staff at the KALNRMO office.
- People's knowledge about places made the work much easier. Usually when we go into a new area, it takes a long time to get around it and to begin to know it. With the rangers and the other groups we worked with, getting to suitable places fast-tracked things. So, we know that we need to engage with people as early as possible and before selecting sites.

- We hit some bumps talking with people about doing paid work with us. One man wanted to negotiate the amount we were asking and got really angry saying we were discriminating against Aboriginal people. We also could have done better when we were showing people who we worked with in the field how to sample. I'd spend more time doing that next time. That said, TRaCK was streets ahead of the other research projects in how they worked with local people.
- Skills transfer was relatively low because much of our analyses were conducted in distant labs.
- Rangers and Traditional Owners enjoyed learning new techniques (e.g. electro-fishing), seeing what species were collected, understanding the measurements taken, exposure to scientific questions and methods etc.; Traditional Owners appreciated seeing the Rangers getting new skills and knowledge;
- I started on the back foot. I didn't know how to communicate and what approach to take - I had no history with people. There were a few ups and downs with people because of miscommunication. This is why the support we got from the regional coordinator and FitzCAM coordinator was important to us. You need someone on-the-ground who has continuing interaction with local people.
- A downside of working closely with people was that we had to less time to spend on sampling. Things would take longer because we'd often be accompanied by many more people than the two paid participants. And we were on this 'whitefella' schedule. So, next time we will have a much more flexible schedule.
- The cross cultural training with MRTCAG was done late in the day but was worthwhile for many involved. If only it could have taken place at an earlier stage. But because it was so late in the piece, some projects in Queensland had already conducted their fieldwork as they had to satisfy milestones and funding commitments. Some researchers had even moved on to other jobs by that time, but MRTCAG invited all the researchers – past and present – to attend.
- The Mitchell training day was really good, profound. It was given by the local people, the very people that TRaCK researchers would have to interact with in the field. And they talked about their history and gave very personal perspectives, which was so different to corporate training.
- There were many more opportunities to engage with people than were taken up, particularly by some of the biophysical projects.

4.5 Objective 4: Effectively communicate research results and share knowledge with Indigenous people

The outcome and performance measures for this objective centres on the establishment of enduring collaborations between the Indigenous and non-Indigenous research communities and the development and use of appropriate communication strategies.

TRaCK put substantial effort into developing strategies and processes to make sure that Indigenous stakeholders were involved consistently and well, especially considering how

geographically dispersed they were. The Program and individual projects developed communication strategies about research progress and results. These included the production of written updates specifically for Indigenous organisations and research participants by the regional coordinators and Project 2.2 (see Appendix D). Researchers and the K&A team made consistent efforts to brief stakeholders at events including workshops, annual general meetings and cultural festivals as well as conducting briefings with smaller groups.

Plate 10. Delton Cox and Cainan Skeen of the Bayulu-Gooniyandi Rangers with Marcus Finn (CSIRO) taking a series of photographs at a permanent photo point in the Fitzroy River catchment, WA.

Smyth's review reports that communication was open and beneficial, particularly when research consultations were undertaken on country:

> *Returning to country, especially when the trip is focused on enhancing understanding of how country works (ecology, hydrology, biodiversity etc.) provides many opportunities to share knowledge, skills and practices. Interviewees reported that sharing traditional knowledge with researchers and with younger community members was a rewarding, pride-building experience. The process gave contemporary value to ancient knowledge and enabled elders to discharge their obligations to strengthen young people's understanding of culture, country and identity.*
>
> *Interviewees noted that knowledge-sharing was a two-way process: Traditional Owners enjoyed learning more about the biology of familiar and not-so-familiar species and ecological processes; researchers, some of whom were engaging with*

Traditional Owners for the first time in their career, benefited from access to traditional and local knowledge about species and places they were studying.

Some interviewees also noted that elders were pleased to see young Indigenous people, especially Indigenous rangers, being exposed to scientific knowledge, skills and new technologies.

a) Joint projects and co-authored publications

TRaCK projects conducted jointly with Indigenous parties at the local level were 6.4 in Queensland and 6.5 in the Kimberley and 1.2 in the Mitchell River and Fitzroy River catchments. Project 2.2 conducted various activities with community organisations including Ranger groups and schools.

For results relating to co-authored publications, see above, Objective 2(b).

b) Collaborations leading to additional externally funded projects

Collaborations between researchers and Indigenous parties led to the development of a number of other non-TRaCK funded projects. At the program level, for example, TRaCK partner UWA secured funds through the Rangelands NRM WA to undertake an environmental planning process known as Investment Framework for Environmental Resources with the Fitzroy Catchment Action Management Group in the Kimberley.

Plate 11. Marcus Finn (CSIRO) and Dan Wharfe (Charles Darwin University) participate in a TRaCK river workshop with school children from St Francis Xavier School, Daly River, NT.

At the project level, Project 6.4 well illustrates how TRaCK research collaborations led to the securing of external funding for further activities. Among other things, the Project secured:

- through the Caring for our Country (CfoC) Program, seed-funding for ranger service activities in the Archer River area;
- through a partnership with Cape York Aboriginal Australian Academy in Aurukun, resources for school camps for elders and children on country;
- through the Institute of Environmental Studies at the University of NSW (UNSW), the assistance of a researcher to work with Southern Wik families;
- through an agreement with the Queensland Parks and Wildlife Service, financial support to work with Traditional Owners on sustainable livelihoods planning.

In addition, the Project explored a potential collaboration with UNSW on a climate change project which, if secured, would provide resources for ranger service activities.

In 2009, Project 2.2 secured CSIRO funding to extend its TRaCK work to the Mitchell catchment. The extension allowed for the Kowanyama Land and Natural Resource Management Office (KALNRMO) to replicate the survey methodology applied in the Fitzroy and Daly using local rangers instead of CSIRO researchers. This work was conducted under a research agreement between KALNRMO and CSIRO. The relationship between CSIRO and the KALNRMO has resulted in the inclusion of that community in the Indigenous Livelihoods theme of the new NERP North Australia Biodiversity Hub.

In a number of instances, external funding was sought. In collaboration with the Kowanyama community, Project 4.4 submitted a Caring for Our Country application for a project to develop management responses to gully erosion, including the protection of cultural sites in the Kowanyama lands.[16] Project 5.2's work with the KALNRMO on waterhole monitoring and other tools had led to the development of further project proposals including an ARC Linkage grant.[17] To date, none of these projects have been funded.

In other cases, funding was secured but did not result in a project getting up - Project 2.2 supported the Gooniyandi rangers to submit an application to Rangelands NRM Group for future activities but the ranger group did not have the capacity to administer the grant.

As mentioned above, TRaCK provided a number of references to support Indigenous community organisations in their applications for government grants.

c) Projects undertaken by same collaborators over a period of time

See references to project 6.4 and 5.2 directly above.

[16] Coutts Appendix 8.
[17] Coutts, Appendix 8.

Project 2.2 worked with the same communities in the Fitzroy Valley on a number of different aspects of its research. A component of this project had been left open for negotiation with communities and as ideas emerged the project was able to fund them.

d) Uptake of communication products

The Coutts evaluation in 2011 found that TRaCK stakeholders were finding the research relevant and useful, there were many examples of research uptake across the breadth of the research projects, TRaCK research outcomes and outputs were continuing to filter through stakeholder networks and that, through a 'synthesis and adoption' year, it was to be expected that broader benefits would continue to grow (2011).

Two lengthy appendices in the report contain summary details of TRaCK's impacts.[18] The report concluded that much of the research was long-term, it was to be expected that the use and adoption of communication outputs, among other things, would increase in coming years. Coutts also provides detailed summaries of the communication outputs developed across all the projects as well as at the Program-level.[19]

Smyth also reports that communication at the end of projects was done well, although more could have been done:

> *Reporting back of research outcomes, especially through the use of posters, videos and photos was a key factor in the success in Indigenous engagement with TRaCK research; successful though this was, some Traditional Owner participants would like to receive more such feedback, especially more photographs of their own participation in research and their presence on country*.

Of a multitude of examples, two Theme 6 projects well illustrate the use of TRaCK outputs by Indigenous people at the local level and their organisations at the policy level. The collaborative work by Project 6.3 with rangers and traditional owners in Arnhem Land has resulted in the development of a visitor survey which the Djelk and Dhimurru Rangers are currently administering to non-Indigenous residents and visitors. And, the research outputs of Project 6.2 have informed high-level policy deliberations, including a 2010 submission by the Kimberley Institute to the North Australian Land and Water Taskforce.

The Synthesis and Adoption year is continuing to build awareness about the tools and products that have been developed as well as to seek feedback on the products in order to improve their 'useability'. Furthermore, the impact of K&A activities is being evaluated in this time and will inform future NERP program activities.

[18] Appendix 8: Secondary data analysis - Documented impacts and capacity building and Appendix 9: Examples of TRaCK research in use, skills knowledge transfer and unintended benefits.
[19] Appendix 6: Secondary Data Analysis - Communication outputs/activities across the projects and Appendix 7: Secondary data analysis - Specific outputs and engagement across the TRaCK program.

e) Projects completed on time

In all three jurisdictions, the long periods spent executing research agreements (after the terms had been agreed by researchers and community members). Substantial delays affected the proposed work plans of projects and led a number to revise their timelines and successfully apply for extensions. In addition projects 6.4 and 6.5 were very late in starting.

The final April 2011 milestone report outlines that six projects were given extensions of time to complete their work: 1.2, 1.4, 4.1, 6.2, 6.3 and 6.4. Nevertheless, in April 2010, the Coutts evaluation reported positively on the progress of projects generally, stating that the vast majority were doing well in meeting their milestones.

Respondents made the following points about Objective 4:

- We participated in roadshows with other researchers. TRaCK coordinated activities for reporting and working through and to MRTCAG and FitzCAM.
- MRTCAG had research protocols for communicating and reporting which we followed.
- We spend a lot of time and effort on presentations at face-to-face meetings. People were not necessarily that interested in all the details. And we didn't always get as many people at the meetings as we would have liked.
- A lot of Indigenous people we interacted with were happy that the research was being undertaken even if they were not involved.
- With more support from some of the regional organisations such as the land councils, the communications and the impacts of TRaCK research could have been even greater than they were.
- It was surprising that there wasn't more interaction between the projects that didn't have much of an on-ground presence and the ones, like ours, which did. There could have been a much higher level of cross-project sharing of information on communications among other things that would have benefited some of the biophysical projects working in the same areas in particular.
- We did some recordings of our own traditional knowledge and it would be nice to see these integrated with the scientist's knowledge and put together into a DVD. We could then send this everywhere in Cape York so everyone can understand how the research can be adapted into their community, because we all have the same erosion and weed issues (Coutts).

4.6 Objective 5: Ensure meaningful Indigenous participation in TRaCK governance

The outcome and single performance measure associated with this objective concern the number of Indigenous people represented on TRaCK governance structures.

The April 2011 Milestone Report states that: "There was Indigenous representation at all levels of governance and importantly, the initiative linked with the Indigenous Water Policy Group which NAILSMA in partnership with CRC Tropical Savannas and the

National Water Commission convened to develop models for management of water to reflect Indigenous interests and aspirations". As well, through NAILSMA, the Program worked closely with the Indigenous Community Water Facilitators Network.

At the highest levels, the attendance of Indigenous representatives was irregular. The absence of Indigenous representation at PMC meetings led the Committee at its April 2009 meeting to direct that a letter be written to the NAILSMA Chair stressing the importance of Indigenous representation and Indigenous perspectives on issues affecting TRaCK policy and requesting that the board nominate another representative. Following this, a NAILSMA representative took part in two of the three subsequent meetings.

Due to increasing demands on his time from other commitments the NAILSMA CEO requested to delegate REC membership to a NAILSMA nominated staff member in the early stages of TRaCK. The other REC members did not accept this but instead agreed to retain him as an REC member, acknowledging that his participation would be less frequent due to competing priorities.

The difficulties of ensuring Indigenous representation on the PMC and REC highlights the problems arising from the very many competing demands for the time of the relatively few Indigenous leaders in northern Australia. To improve Indigenous engagement at these levels of governance, research investments must support internal capacity building of Indigenous institutions that in most cases, engage in research from a significant point of disadvantage. Unlike all other TRaCK partners, NAILSMA for example did not have core government funding for these activities but were still requested to participate in these key research governance roles.

Representation and input from Indigenous research participants and stakeholders was facilitated in other ways, including through consortium workshops. For example, the Chair of MRTCAG was invited to present to the meeting held at Griffith University in April 2009.[20]

The participation of Indigenous people in project and Program governance is most evident in the strong linkages and collaborations that TRaCK established at the regional, catchment and local levels. For example, the FitzCAM Aboriginal Reference Group and MRTCAG along with the Daly River Aboriginal Reference Group were important mechanisms through which Indigenous people could have input into project activities in their jurisdictions and through which local accountability was achieved.

Respondents made the following points about Objective 5:

- At the Program-level, we were often reactive in our approach to Indigenous engagement and the processes were informal. The responsibility for much was in the hands of the two busiest people in TRaCK.
- The community-driven components of Project 2.2's work meant that Indigenous people were directing a range of the activities.

[20] Milestone report 4/2010.

5.0 Discussion and recommendations

The absence of major criticism or disappointments and the generally high level of satisfaction in their research collaboration experience reported by interviewees for both the Smyth and Golson reviews, as well as the 2011 Coutts review, suggest that TRaCK has achieved a high standard of Indigenous engagement. Smyth concluded that the TRaCK Indigenous Engagement Strategy has demonstrated its effectiveness in achieving a degree of Indigenous participation in research that otherwise would not have occurred, given the current focus within research institutions on measuring research success primarily through monitoring academic publication outputs, with little emphasis on monitoring social impacts and benefits of research (see Smyth and Whitehead 2012). The experience can inform and enhance future two-way research initiatives across northern Australia and elsewhere.

Importantly there is evidence that the researchers regarded the Indigenous Engagement Strategy as valuable and helpful:

- … in hindsight we can say these protocols were good (if overly bureaucratic).
- We had good leadership on Indigenous engagement in TRaCK, which made all the difference.

Smyth (2012) also identified a number of over-arching challenges for Indigenous engagement in north Australia that centre on capacities and priorities:

> *The challenges reported by interviewees relate one way or another to the capacities and priorities of researchers, the capacities and priorities of Indigenous partners or the capacities and priorities of both parties. These capacity and priority issues are explored further below:*

- *Researchers funded to achieve specific research aims, even for projects such as TRaCK that include best practice Indigenous engagement goals, have limited capacity to substantially achieve employment, training and other community development aspirations – potentially leading to frustration and disappointment for some Indigenous partners;*
- *By and large, recognition of research achievement with research institutions does not encourage researchers to devote time and effort to Indigenous engagement and preparation of effective communication tools, such as plain English reports of research outcomes;*
- *Researchers may not have the capacity or priority to provide long term support to local governance arrangements, such as the Mitchell River Traditional Custodian Advisory Group, established during a research project – again potentially leading to frustration and disappointment for some Indigenous partners;*

- *Indigenous groups with little or no capacity to access or manage country may struggle to fully benefit from research collaborations, notwithstanding the short term benefits of accessing country and sharing knowledge during research projects;*
- *Indigenous organisations, such as land councils, with responsibilities for negotiating research agreements and issuing research permits may have limited capacity and competing priorities, resulting in delays in commencement of collaborative research project.*

Meeting these challenges in a research program of the size and scale of TRaCK requires that expectations are realistic. Building capacity for example takes many years and, in the case of training in research skills, there is a number of pre-requisites that are beyond the control of a research program such as TRaCK. Firstly, building research capacity requires a standard of education that is not widespread amongst the regional Indigenous population: a long educational pathway culminating in research expertise is not present in many remote areas. Secondly, it requires specialist training skills within the researcher community that are not likely to be held by every research leader or their staff.

Although overall the TRaCK research was considered relevant and beneficial to Indigenous communities and organizations, this observation is qualified. One of Smyth's interviewee's made the important point that there is never perfect alignment between community interests and academic interests.

> *For us and our Indigenous partner (Kowanyama Aboriginal Land and Natural Resource Management Office), overlap in interest occurred in understanding impacts of cattle & pigs on wetlands, in understanding the importance of floods to ecosystem functioning, and in determining whether mercury was an issue for fish consumption. Beyond that, they are concerned with many other issues, including weeds which we did not cover very well in our research.*

In the case of TRaCK, we were aware of misalignment of various kinds between researchers and community priorities or objectives. For example, the scope of community interests was sometimes much broader than the scope of the research program, which was to some extent constrained by the priorities of funders and of the expertise in the consortium. There were sometimes major differences in the spatial scale of community interests, which were often local, and the scale of research programs which were focussed on the wet-dry tropical region (although local sites were important in terms of what they could tell us that might be applied in other places). Differences also arose in the topics that were considered to contribute to theoretical questions and therefore capable of advancing the research discipline, compared with those topics that might address a localized problem. In other cases, there was a lack of alignment between the need for livelihoods research compared with the community need for funding to develop livelihoods. This latter issue is elaborated in the recent discussion paper by Smyth and Whitehead (2012).

The TRaCK approach focused heavily on procedural issues, an approach which is common to reforming research practices, according to Davidson-Hunt and O'Flaherty (2007). Less effort was given to epistemological inquiry within the program's research projects, although efforts were made in two projects with varying rates of success. With the benefit of hindsight we can say that it would have been worthwhile to have included more ethnographic studies of Indigenous ecological knowledge and to have explicitly examined the challenges of knowledge integration in project design (Bohensky and Maru 2011). However, giving knowledge production and integration a more explicit focus would have been risky if not quite difficult for TRaCK for two reasons: (i) for many of the researchers this was their first experience working with Indigenous communities and (ii) the skill base of the consortium did not lend itself to a strong sociological and philosophical approach.

On a more practical level, it is important that researchers, their organisations and Indigenous organisations like Land Councils and NAILSMA are aware that research collaborations with some Indigenous groups may be accompanied by expectations for ongoing support that may be difficult to deliver. Whatever the current level of capacity, the process of collaboration undertaken by TRaCK has shown that research can provide a catalyst for positive change – in knowledge, relationships, opportunities and visions. Although hard to measure, it appears that the process of carrying out the research should be regarded as potentially as valuable as the findings (see Newton *et al.* in press) and can in themselves generate further positive impacts.

Rather than nurture unrealistic expectations all parties should encourage honest discussions about what is practicable and achievable given the constraints that they all face. There is a particular need to consider the capacities of traditional owner groups to engage with and benefit from proposed research collaborations and to tailor the level of engagement accordingly. There is also a need to invest in building the internal capacity of Indigenous organisations (such as NAILSMA) to engage more effectively in the governance and management of research programs like TRaCK.

Research like that conducted by TRaCK generates many benefits to communities, and not all of these benefits are realised through employment. For example, Smyth concluded that research practice that involves and respects Indigenous knowledge provides a means to give contemporary value to cultural traditions, knowledge and practices, and in doing so supports their maintenance and transmission between generations. All projects should be able to undertake activities that can allow these processes to occur, no matter what their scientific focus. The depth of the interaction may well differ depending on the level of interest expressed by the community, but gains can be made in visiting country with traditional owners, allowing for exchange of information and considering the contributions local knowledge can make to addressing research questions and management implications.

The authors found that the negotiation and execution of research agreements usually required more time than was reasonable. TRaCK researchers accepted that the process of relationship building and negotiating over research scope and goals would take time however, they were not prepared for delays of up to 2 years to execute research agreements with legally incorporated bodies. Such delays were unreasonable because they were of an administrative nature and did not arise from complex or sensitive consultation processes with traditional owners. It was far from easy to reconcile the conflicting demands of Land Council processes and short term funding conditions that characterised the research projects. Although the points of resistance in concluding research agreements were eventually overcome, as Newton *et al.* (in press) experienced in securing access to communities in the UK for sustainability research, success was not the result of a linear process:

> *Rather, it required continuous attention to the building and maintaining of relationships, with regular reinvestments of time and effort. … 'research relationships are not automatic; they have to be created and sustained' (in press; 5).*

Good rapport needs to be maintained throughout the project and there is evidence that TRaCK projects were able to sustain successful communications over a number of years and, in some cases, build on relationships in the interests of addressing new and emerging goals. As should be expected in any social interaction, some researchers developed strong connections with community members as evidenced by the exchange of family photos, the invitations for research participants to stay with researchers when in Darwin for example, and assistance with higher education course work and personal job references. A number of TRaCK researchers attended community events such as the Daly River festival (Merrepen Arts Festival) on the weekend to support the event and be seen doing so; not for cynical reasons of gaining and maintaining access to the community, but rather out of a sense of reciprocity and ethical commitment to the community's interests. Spending significant periods of time 'hanging out' proved essential (Newton *et al.* in press).

The TRaCK experience confirms Holcombe and Gould's observation (2010) that reliance on institutional regulation and codification alone are unlikely to generate or sustain ethical and collaborative relationship with Indigenous peoples. In the 'intimate' ways described above, TRaCK researchers were involved in processes of continual dialogue and genuine negotiation that extended beyond mere adherence to procedure:

> *Formal instruments (e.g., a research protocol) are needed to confront power relations in research, but achieving intimacy also requires researchers and their Indigenous colleagues engage in the difficult work of establishing and maintaining trusting relationships that will enable the effective coproduction of knowledge (Davidson-Hunt and O'Flaherty 2007; 294).*

Relationships were not always harmonious. In two cases there was conflict over researcher conduct. One case related to the commencement of research before the agreement was signed (although it had been finalised and the researchers were invited by the Land Council to commence research) and in the other an Indigenous casual employee felt that the other member of the project team had not shown sufficient respect for other individuals in planning and conducting field work. In both cases, the TRaCK Indigenous Engagement Committee met and recommended an appropriate response to the project leaders involved. In the first case, for example, the immediate cessation of fieldwork and withdrawal of the research team, despite substantial cost to the project. Further effort was put into re-building these relationships and they remain very sound.

As mentioned above, tensions arose over payment systems and considerable effort was put to resolving this to the satisfaction of Indigenous participants. There were differences of opinion on the matter of the payment method in communities with some people preferring cash and others preferring bank transfers. Resolving these issues placed a strain on the researchers whose organisations were not well prepared for these employment arrangements. Cash payment placed large sums of money at considerable risk of theft or loss.

Another issue that invites ethical consideration is project finalisation. Although well aware that communities deserved copies of final reports and face-to-face feedback sessions at the end of the project, in the case of a few projects where relationships were strong and contact had been relatively frequent, some researchers found that Indigenous partners expected the project's 'life' to continue. For example, in the Daly River Fish and Flows project, a number of activities have extended the project into its 7th year, far beyond the initial period of three year funding. Although an obvious measure of success, researchers who embark on short projects will need to realise that there may be an expectation of a long relationship on the part of some Indigenous partners. Securing funding to maintain such relationships beyond the funding cycle may also be difficult. Some research funding bodies may not see the value in investing in the same area over repeated projects and yet such an approach is likely to yield positive results because of the longevity and strength of relationships, the opportunities for all concerned to build their capacity to undertake research in cross-cultural settings and for Indigenous groups in particular to expand their repertoire of management activities.

The 2006 TRaCK application proposed that a coordinator was also to be located in NAILSMA to further facilitate Indigenous engagement. This did not occur as originally planned as the position funded in NAILSMA was responsible for co-ordinating the Theme 6 research projects and Indigenous engagement was instead co-ordinated through the K&A Team, particularly by regional K&A co-ordinators. There are advantages in this approach because the regional co-ordinators were located in the catchments and generally had good contacts with local Indigenous people and could maintain regular face to face contact. However, Indigenous engagement was just one of the many responsibilities for the K&A team and it would have been beneficial to have staff with a specific focus on Indigenous

engagement. Future programs should consider employing specialised staff for this purpose. Further, it would be beneficial for these coordinators to be based in the regions where the research is occurring and co-location within Indigenous organizations would likely have benefits for the co-ordinators and the research groups. It would have also been beneficial to have coordinated and regular events throughout the life of TRaCK to constantly monitor and evaluate the effectiveness of the combined Indigenous/research effort.

Research programs should aim for a high standard of Indigenous engagement and should be actively seeking to improve on what has already been achieved. Review and evaluation are key steps in this process. The TRaCK Indigenous Engagement Committee did not formally review performance against the indicators identified in the Indigenous Engagement Strategy during the lifespan of the TRaCK program. Milestone reports included progress against key performance indicators in the Strategy and these were monitored buy the REC and the PMC. Regular review of progress against the Strategy by the IEC would have been helpful in identifying broader issues in Indigenous engagement and for discussing approaches to resolve these. Future programs should include regular review of strategies and this should be shared by a broader group of researchers and Indigenous collaborators.

In summary, we offer the following recommendations to researchers, funding bodies and Indigenous communities considering improvements to their Indigenous engagement activities:

1. Parties should not expect high rates of Indigenous leadership or direct control of research projects and this should not be the measure of the relevance of the project. Nonetheless, opportunities to support Indigenous leadership of research projects should be encouraged. Such support is likely to require close mentoring and capacity building, especially if the project's outcomes include peer reviewed publications.

2. Researchers should explore ways of retaining some flexibility at the program and/or project level to respond to Indigenous research priorities that may emerge during the course of the research. Include time and opportunity to identify these priorities.

3. Indigenous communities have many practical and pressing needs. An increasing number of Indigenous organisations now have clearly articulated research needs in relation to natural resource management land and sea management plans. Wherever possible, researchers should seek to align their research with these priorities. Tension can arise if there is a perception that the research is not relevant to local priorities. This tension is particularly noticeable in the area of Indigenous livelihoods where Indigenous people may want development assistance and funding from a research program that may not be able to provide grants for this purpose. A report by Smyth and Whitehead (2012) in relation to the NAILSMA projects further discusses this issue. They also make 35 practical recommendations for "securing

benefits for Indigenous participants and their communities" from research. Indigenous led projects should address these as part of developing any research proposal.

4. Protocols are essential to ensure that expectations and obligations of all parties are clearly stated at the outset of the project. Everyone benefits from early attention to research protocols. Allow plenty of time for research protocols to be negotiated and finalised with potential Indigenous partners. Land Council's tend to have the staff structures in place, however, are often very busy with other activities such as progressing native title claims. A Land Council is a suitable organisation to work with if they can commit to an efficient time-frame. Otherwise, we suggest that researchers work at a smaller scale, perhaps with a native title holding group or Prescribed Body Corporate. In our view, given that the research conducted here was done for the 'public good' and not of any commercial significance, protocols are as valuable as legally binding research agreements. The latter are more suited for commercial contracts/ventures. All our protocols referred to the need to develop such contracts should the project develop commercially significant outputs.

5. Ensure ethics approval is granted before the research starts and allow time and funds for communities to influence research design. Under the NHMRC guidelines, all research involving Aboriginal and Torres Strait Islander Peoples must be approved by a Human Research Ethics Committee even if it involves a low level of risk.

6. Research organizations, including universities, generally limit their involvement in research methods to ethical reviews that are aimed at harm reduction. A more active approach to relationship building based on delivering mutually agreed upon benefits to research parties is likely to be more successful in the long run. University (and research organisation) administrators will need to increase their understanding of these issues and the time involved in developing and maintaining these relationships (see Smyth and Whitehead 2012 for more discussion)..

7. Although there are benefits in the short-term employment arising from research activities, to achieve more substantial benefits parties should investigate existing traineeship programs at partner educational or research institutions as these may provide longer-term funding and additional support such as scholarships and cadet programs.

8. Cultural training for researchers should be considered a high priority for future research programs working in northern Australia. Where possible this training should be delivered by the Indigenous group(s) collaborating on the research and support should be provided to help develop and deliver the training. It should be done before research commences.

9. Appropriate accounting mechanisms could be explored to enable payments in cash or timely payment by other means. Some local Indigenous organisations have the capacity to administer employment contracts to Indigenous people and these should be explored.

10. Intellectual Property is a complex area of law made all the more so when one considers the interface with Indigenous Cultural and Intellectual Property (ICIP) rights. All research agreements need to address IP issues and research practice needs to be informed by the latest understanding of legal concepts and their implications. Changes in technology, particularly communications technology, raise potentially new issues for copyright and consenting to publication of images for example. When TRaCK started, there were few templates or pro-formas, and as far as the authors were aware, none that had been endorsed by our respective organisations.

11. Research organisations should therefore provide specialist training in IP issues pertaining to Indigenous knowledge for their research branches, legal staff and senior researchers. This is a complex legal area and researchers need the skills to ensure that projects run smoothly. Given that Australia is a signatory to the United Nations *Declaration on the Rights of Indigenous Peoples* and that convention contains articles relevant to research management (e.g. Article 31; see Holcombe and Gould 2010), organisations should consider providing legal advice at consultative meetings to clarify issues during negotiations around research protocols/agreements. The case of the Desert Knowledge CRC could be used as a benchmark[21].

12. At the project level, it is vital that adequate resources (financial, vehicles, supplies, etc.) and time are allocated to enable as many traditional owners as possible (not just the minimum for participatory requirements) to take part in on-country activities. This not only brings immediate benefits to traditional owners independent of any benefits that may arise from the research outcomes, but it is also a clear demonstration of researchers' commitment to address local priorities as part of best practice research design. In most cases this also enhanced the experience for the researchers involved.

13. Programs need to monitor and report on the impacts of research collaborations, including immediate positive and negative impacts, as well as longer term catalytic

[21] In 2006, the DK CRC revised its Indigenous Intellectual Property Protocol. In consulting widely on the protocol CRC staff encouraged participants (researchers, Indigenous community members and organisational representatives) to familiarise themselves with IP issues. Workshops were held to ensuring that these interests would be 'informed and enabled to seize, or indeed demand', opportunities that research should bring in relation to training and livelihood pathways (Holcombe, 2008). A community guide was produced (see Orr et al. 2009).

impacts that lead to changed visions, expectations and opportunities. A large research program should encourage reflection on this issue amongst researchers at annual meetings and provide opportunities for Indigenous partners to participate in discussions and publish papers on engagement methodologies and practice.

14. Funds should also be set aside to undertake writing workshops for those projects that wish to work with Indigenous experts and publish papers from the research. Publication usually comes after the project funds have been spent and so financing such activity may be difficult if not planned for.

15. Researchers need to consider what post-research support can be provided to manage catalytic impacts – e.g. to support aspirations to engage in land management or monitoring or country that were stimulated by participation in research. If such activity is beyond the scope and budget of the research program, funding from other sources could be sought.

16. Large programs may wish to do a skills audit of their researchers to find out which ones have training experience and then look to matching it to those situations in which there are employment and training pathways, especially communities with relationships with universities or TAFE's. At the program level, opportunities should be developed for scholarships that could be placed in the most conducive situation. At the very least, programs should identify situations where participation in research activity could be recognised as part of existing training programs, such as the TAFE Certificates in Land Management.

17. All programs should resource high-quality communication products. Opportunities for Indigenous people to develop communication outputs should be pursued (e.g. DVDs).

18. Researchers should consider activities, methods and approaches that would enable a better understanding of the similarities and differences between Indigenous knowledge and scientific research-based knowledge.

Final recommendation

19. This review and the discussion paper arising from the review of TRaCK's livelihoods projects (Smyth and Whitehead 2012) have been very helpful in evaluating TRaCK's efforts in Indigenous engagement in research. They have highlighted some of the achievements, discussed ongoing challenges and identified a number of recommendations that we believe will improve future research. They have necessarily focussed on the TRaCK program but the lessons have implications for other research initiatives in the region. The National Environmental Research Program has recently commenced, another phase of TRaCK is being planned and

new initiatives around carbon and biodiversity are currently under consideration. If these new initiatives are to set an even higher standard, then the complexities of engaging Indigenous people must be understood and acted upon accordingly. The findings from TRaCK are only part of an ongoing discussion and it would be extremely valuable to expand the scope of this discussion and hold a facilitated workshop on this issue involving a broad range of interested parties from northern Australia to share and reflect on past experiences and develop improved strategies for the future.

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Appendix A

Tropical Rivers and Coastal Knowledge (TRACK)

Indigenous Engagement Strategy

Introduction

The Tropical Rivers and Coastal Knowledge research hub (TRACK) is a consortium of more than 50 of Australia's leading tropical river and coastal researchers.

The aim of the TRACK research hub is to provide the science and knowledge that government, communities and industries need to make better decisions for the sustainable use and management of Australia's tropical rivers and coasts. It will:

- increase understanding of the important natural assets and ecosystem services provided by tropical rivers and coasts
- develop methods and tools to assess the implications of potential developments;
- identify opportunities to develop genuinely sustainable enterprises; and
- build the capacity and knowledge of the community to engage in management planning processes

A key feature of the research program will be engagement with Indigenous people, owners and managers of large parts of northern Australia's catchments and coasts.

TRACK is committed to a high degree of engagement with north Australian Indigenous communities through partnerships based on respect, trust, reflection and knowledge sharing. TRACK recognises the value of Indigenous knowledge systems, and its vision is to work alongside Indigenous people in sharing that knowledge, ensuring protection of intellectual property and an equitable distribution of the benefits derived from research.

TRACK participants recognise that we need to develop our organisational capacity to build and maintain collegial and collaborative research partnerships with Indigenous organisations and communities. This Strategy will guide TRACK policy, protocols, practice and internal performance measures as related to Indigenous engagement.

The central features of the Indigenous Engagement Strategy, its principles, goals and targets, were discussed at a workshop in Darwin in September 2006. Principles from the Guidelines for Ethical Research in Indigenous Studies prepared by the Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS 2000) were consulted as they provide a coherent and clear national standard and they have been endorsed and recommended in the NAILSMA Guidelines and Protocols for the Conduct of Research

(NAILSMA 2006). TRACK has endorsed the AIATSIS Guidelines and their application will assist TRACK researchers in achieving the best standards of ethical research.

Objectives of the TRACK Indigenous Engagement Strategy

1. Ensure TRACK research is relevant and beneficial to Indigenous communities and organisations;

2. Ensure TRACK research is conducted according to the highest ethical standards;

3. Provide opportunities for Indigenous employment, and to transfer skills, share knowledge and increase cultural awareness amongst all parties;

4. Effectively communicate research results and share knowledge with Indigenous people; and

5. Ensure meaningful Indigenous participation in TRACK governance.

Implementation of the objectives of TRACK Indigenous engagement

1. Ensure TRACK research is relevant and beneficial to Indigenous communities and organisations

Opportunities should be fostered to develop local capacity of Indigenous people to develop and undertake their own research initiatives using participatory and collaborative methodologies. Indigenous people should also have the opportunity to influence research project objectives and methods.

Indigenous peoples, as residents of the north, have many underlying questions about management which need to be researched. These require innovative approaches to develop local capacity if Indigenous needs and aspirations for research and ultimately management are to be addressed in a proactive manner. There is a strong desire among Indigenous people to develop mentoring arrangements to support Indigenous peoples who have the desire and capacity to further their skills in participatory research with non-Indigenous researchers, government staff and others.

This objective refers to the need to build local capacity of the Indigenous owners and managers of the resources in a practical and proactive manner. Empowering local people to act as researchers should encourage those people to develop a constructive understanding of research and will ensure that people, relationships and local politics are addressed appropriately.

Outcome: To build the capacity of Indigenous people to undertake research that will answer important questions being posed by Indigenous communities.

Performance measures:

a. Number of Indigenous people leading the development of research.
b. Number of people (both non-Indigenous and Indigenous) acting as mentors to local Indigenous researchers.
c. Number of researchers engaged by Indigenous people to support their local initiatives.

2. Ensure TRACK research is conducted according to the highest ethical standards

Research with Indigenous people requires consultation, negotiation and consent. Consultation and negotiation should achieve mutual understanding about the proposed research and opportunities for Indigenous involvement in research planning.

Researchers should provide opportunities for substantial Indigenous community input into, and control of, the research process. Indigenous groups need to be well informed about the aims and methods of a research project, its implications and potential outcomes, so they can decide for themselves whether the project is in their interests or not, and offer suggestions for ways of enhancing the relevance of the project.

This objective could be referred to as co-management to improve the relevance of research to Indigenous communities. There may be differing degrees to which the Indigenous community is involved in research management and control depending on the nature of the research question and community circumstances in which the research may be carried out.

It is important that researchers work with the appropriate Indigenous authorities. For instance, Traditional Owners may have different interests to those of the general resident community. The cost of consulting and negotiating with Indigenous communities, where face-to-face meetings are likely to be preferred, should be factored into all budgets.

It is recommended that TRACK researchers undertake a targeted literature review to identify the extent to which initial ideas align with Indigenous priorities (e.g. LWA Indigenous Scoping Study) and that researchers develop an understanding of the local Indigenous history and current issues in the area they propose to work.

Consultation involves an honest exchange of information about aims, methods, and potential outcomes for all parties. It provides an opportunity for researchers and community members to say what they are hoping will come out of the research and how they can contribute.

Negotiations should result in a formal agreement for the conduct of the research project. The aim of the negotiation process is to come to a clear understanding and to produce a written agreement about research intentions, methods, potential results and communication protocols. Such a document should spell out the roles, responsibilities and obligations of each party. Clear guidance needs to be provided for TRACK researchers on how to meet the required level of ethical standards.

Outcome: All TRACK research projects will be conducted with an appropriate level of Indigenous involvement and undertaken according to written research agreements.

Performance measures:

a. Number of research projects initiated by Indigenous parties
b. Number of Indigenous co-authored papers, reports and presentations
c. The proportion of TRACK projects with Indigenous collaborators operating under a written research agreement

3. Provide opportunities for Indigenous employment, and to transfer skills, share knowledge and increase cultural awareness amongst all parties

Indigenous knowledge systems and processes must be respected and Indigenous participation as collaborators encouraged and rewarded.

Indigenous knowledge can make a significant contribution to tropical rivers and coastal research. Researchers must respect the cultural property rights of Indigenous peoples in relation to knowledge, ideas, cultural expressions and cultural materials. These rights are part of the heritage that exists in the cultural practices, resources and knowledge systems of Indigenous people that are passed on by them in expressing their cultural identity (AIATSIS 2006).

Direct involvement as collaborators and employees is often the most effective means of incorporating Indigenous perspectives in research activity. TRACK activities should seek high levels of employment of Indigenous people in research, technical, field support and administrative positions, at appropriate and, where possible, consistent levels of payment. Differing types of participation may require different pay rates, for example, for technical assistance, consultation, liaison, translation, expertise in ecological and cultural knowledge.

Indigenous employment should be undertaken through organisations that have the appropriate institutional arrangements. TRACK will also attempt to develop employment pathways that provide professional development opportunities for Indigenous people during the course of the initiative. A skills base register may be developed to identify available groups or individuals to provide services.

In cases where local groups do not have the capacity, preference should be given, subject to local agreement, to other Indigenous groups and individuals where they have the skills and resources to provide services or other resources. Opportunities and support should also be provided for Indigenous participants to represent and promote research projects, activities and findings outside their communities (e.g. at conferences).

The research program should provide opportunities to transfer skills, share knowledge and increase cultural awareness amongst all parties.

Research must show an appreciation of the diversity of Indigenous peoples, who have different languages, cultures, histories and perspectives. It is also important to recognise

the diversity of individuals and groups within those communities, for example, restrictions upon knowledge acquisition between men and women.

TRACK research should recognise that Indigenous people may have different values and skill sets. Opportunities should be provided for researchers to increase their Indigenous cultural awareness and competence (e.g. NAILSMA's cultural awareness training package) and for Indigenous partners to increase their understanding of research goals, methods and culture.

Researchers are encouraged to participate in a cultural awareness course before commencing a research project, and to participate in any TRACK program designed to enable Indigenous collaborators to be exposed to research organisations and interact with researchers.

Outcome: Greater understanding and acceptance by non-Indigenous TRACK researchers of Indigenous people's knowledge systems, cultural values, perceptions and rights and greater understanding by Indigenous people with insight into and understanding of research methods and institutions.

Performance measures:

a. Majority of Indigenous partners remain interested and committed to the project after the first year of project operation
b. Number of jobs stays constant or increases
c. Types of jobs and roles that Indigenous partners are fulfilling are increasing in variety, complexity and responsibility
d. Perceptions and attitudes amongst Indigenous people towards research are increasingly positive.
e. Number of non-Indigenous people completing a cross-cultural awareness course

4. Effectively communicate research results and share knowledge with Indigenous people

Participating Indigenous communities should benefit from the research project, and strong research relationships will enhance mutual benefits. Strong partnerships built on trust and respect will weather occasional problems and mistakes.

Communication is central to developing trust and good will. Materials produced must be appropriate to the audience being engaged, considering literacy and numeracy levels, command of English, and understanding of scientific concepts. Regular reporting is very important and should be budgeted for.

Researchers should foster a clear understanding of what Indigenous communities see as desirable and take responsibility for becoming familiar with what research activities that have been undertaken so that their project can build on previous studies. Researchers must be mindful of other current research activity and make the effort to coordinate with other researchers to minimise the burden of research activity on the community (e.g. multiple meetings). Any local research needs should be incorporated into the project where possible and synergistic opportunities sought to 'stitch together' longer term benefits from other projects operating in the area.

Consultation and negotiation is a continuous two-way process and the responsibility for consultation and negotiation is ongoing. It is important to ensure that every TRACK research project allows a realistic amount of time for effective collaboration and project development, implementation and communication. Research projects should be staged to allow continuing opportunities for consideration of the research by the community and sufficient time should be allocated to account for regular reporting, remoteness, community activities and contingencies. TRACK recommends that researchers assess the risk of time delays and the need for flexibility arising from conflicting community events. Allowing time for community meetings as well as social interaction with the community will assist in building relationships.

Outcome: Establish robust and longstanding relationships between Indigenous and non-Indigenous research communities and universal application of appropriate Indigenous communicating strategies

Performance measures:

a. Number of joint projects and co-authored publications
b. Number of collaborations that lead to additional externally funded projects
c. Number of projects undertaken by same collaborators over a period of time
d. Uptake of communication products
e. Number of projects completed on time

5. Ensure meaningful Indigenous participation in TRACK governance

Indigenous engagement in TRACK governance occurs primarily through membership of NAILSMA representatives on the Program Management Committee and the Research Executive Committee. Indigenous participation will all occur at the focus catchment level, and in some cases the individual project level, where formal consultation processes are established to engage the community.

Outcome: Indigenous participation in TRACK governance.

Performance measures:

a. Number of Indigenous people represented in TRACK governance structures.

Key references

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Implementation

Actions:	Strategic Objectives	Timing	Responsibility
(1) Form an Indigenous Engagement Committee (IEC) to oversee implementation of the Indigenous Engagement Strategy	1, 2, 5	Dec. 06	Research Director
(2) Establish a NAILSMA/TRACK Officer (NTO) position	2, 4	Nov. 06	NAILSMA
(3) Develop a form for TRACK project proposals to ensure that key elements of Indigenous engagement are addressed.	2, 5	Jan. 07	IEC
(4) Assess each TRACK research proposal and provide advice on: a) an appropriate level of Indigenous involvement and how to achieve this.	1	Jan. 07	IEC
b) the need for a written research agreement	2	Jan. 07	IEC
c) a realistic timeframe for effective collaboration and project development, implementation and communication	1	Jan. 07	IEC
d) an appropriate budget for Indigenous consultation and employment and the method for payment.	3	Jan. 07	IEC
e) the benefits of project for Indigenous people.	1	Jan. 07	IEC
f) the risk assessment and mitigation plan	5	Feb 07	IEC
(5) Provide an indicative pay scale for Indigenous employment	3	Feb 07	NTO
(6) Provide information on Indigenous research priorities for tropical rivers	1,4	Jan. 07	NTO
(7) Establishment of a co-ordinating	2,5	Feb. 07	NTO/IEC/K & A

Actions:	Strategic Objectives	Timing	Responsibility
mechanism to link TRACK researchers with appropriate local Indigenous organisations and to assist in negotiating research projects and facilitating ongoing collaboration in research projects.			Manager
(8) Provide examples of completed written research agreements	2	Feb. 07	NTO
(9) Provide examples of completed Human Research and Ethical Conduct applications.	2	Feb. 07	NTO
(10) Appointment of Indigenous representatives on PMC, Research Executive, Consultative committee	5	Jun. 07	Research Executive.
(11) Collate and provide examples of culturally appropriate communication products.	4	Jul. 07	K & A Manager
(12) Provide a list of relevant media contacts	4	Jul. 07	K & A Manager
(13) Provide written examples of successful application of Indigenous engagement principles	2	Jul. 07	K & A Manager
(14) Identify suitable cultural awareness training courses for TRACK researchers.	2	Jul. 07	NTO
(15) Develop annual project reporting criteria for Indigenous engagement.	4	Jul. 07	NTO
(16) Establish TRACK Indigenous traineeship program	3	Dec. 07	IEC
(17) Establish Indigenous mentoring program	3	Dec. 07	Research Executive
(18) Report on project level IES targets	4, 5	Annually	Project leaders
(19) Review IES progress strategy	4	Annually	IEC

Actions:	Strategic Objectives	Timing	Responsibility
(20) Targeted training for Indigenous people in research methods and institutions	3	Ongoing	IEC/NTO
(21) Development of a register of relevant skills available at Indigenous organisations	3	Ongoing	NTO
(22) Assist researchers in the production of appropriate communication products.	4	Ongoing	K & A Manager
(23) Support participation of TRACK researchers in a cultural awareness courses.	2, 3	Ongoing	Research Executive
(24) Ensure that all applicable TRACK research projects have obtained Human Research Ethics clearance from their host organisations.	2	Ongoing	IEC

Appendix B

Terms of reference for review studies.

The Terms of Reference for Smyth consultancy were as follows:

1) In consultation with the Indigenous Engagement Strategy (IES) Steering Committee, identify and interview key TRaCK researchers and individuals who have worked with TRaCK and representatives from key partner organizations (approximately 10 to 15 people involved with a range of projects in a variety of capacities, across all three TRaCK focal catchments);

2) Prepare a short report describing key issues raised during the interviews, noting any suggestions or recommendations for improvement.

On the advice of the IES Steering Committee, interviews were sought with Indigenous participants and research leaders from the following TRaCK projects:

Project 1.2: Power tools

Project 2.2 Indigenous socio-economic values and river flows

Project 4.2 Sediment budgets

Project 5.1-5.3 Food webs

Project 5.5 Fish and flows

The Terms of Reference for the Golson consultancy were as follows:

1) In consultation with the Indigenous Engagement Strategy (IES) Steering Committee, assemble relevant reports and describe the extent to which the program and projects met the objectives of the Indigenous engagement strategy.

2) Interview key TRaCK researchers (approximately 10 people) to understand their perspectives on Indigenous engagement and

3) Prepare a short report describing the level of engagement recorded in milestones reports and other communication materials, key issues raised during the interviews, noting any suggestions or recommendations for improvement.

The Indigenous Engagement Strategy will provide a framework for assessing the efforts and achievements of TRaCK. The analysis and interview questions should focus on the objectives of the Strategy which were to:

6. Ensure TRACK research is relevant and beneficial to Indigenous communities and organisations;

7. Ensure TRACK research is conducted according to the highest ethical standards;

8. Provide opportunities for Indigenous employment, and to transfer skills, share knowledge and increase cultural awareness amongst all parties;

9. Effectively communicate research results and share knowledge with Indigenous people; and

10. Ensure meaningful Indigenous participation in TRACK governance.

A list of project documents to review include:

1. Individual project proposals, aims and objectives.
2. Interim and final milestone reports
3. Final reports from some projects may describe their level of engagement (e.g. Anna Straton's project, Project 2.2)
4. The Workshop notes/recommendations held at CSIRO in 2007 (prior to the IES)
5. Research agreements with KLC and NLC and MRTCAG
6. The external evaluation of TRaCK undertaken by consultants
7. The program's K&A strategy
8. The evaluation that Kate Golson did in the Kimberley
9. PMC Minutes.

Appendix C

Research projects

Theme 1: Scenario Evaluation

1.1: Scenarios for tropical rivers and coasts: integrating the TRaCK research program

Leader: Francis Pantus

This project integrates research from other themes and provides tools for evidence-based decision-making. In this project stakeholders are being engaged at various levels, from the local to the national, to develop likely scenarios for the future of tropical rivers and coasts.

1.2: New ways of better involving Indigenous people in planning for our water and land resources

Leader: Owen Stanley

The perspectives of Indigenous communities are often not heard in mainstream water and land planning processes and debates. Through targeted training (learning by doing) this research aims to give local Indigenous communities the skills required to effectively participate and be heard; and to explore alternative ways and arrangements for developing water resources (scenarios).

1.3: Collaborative water planning in northern Australia

Leader: Poh Ling Tan

This project aims to improve the certainty, legitimacy and efficiency of water planning processes across northern Australia. To do this, the team are developing a tool-kit of good practices to engage industry, Indigenous and rural communities in water planning. They are also working with water agencies to improve water planning approaches.

1.4: Knowledge integration and science delivery

Leader: Francis Pantus

Project 1.4 aims to improve our understanding of the functioning and management of tropical rivers and coasts by integrating the knowledge that is being developed across the TRaCK program. To that end, we will develop concepts, methods and tools that deliver such knowledge to a range of stakeholders, especially in support of natural resource management. Our approach to knowledge integration is based on a conceptual framework known as Catchment-to-Coast Management Strategy Evaluation. This framework recognises the various elements of an adaptive management approach, including (i) management decisions, (ii) management actions, (iii) our knowledge of the natural system, (iv) our capability for observation, (v) the assessment process and (vi) our ‘learning by doing’.

2: Assets and Values

2.1: The value of Australia's tropical rivers

Leader: Anna Straton

The aims of this research are to work with communities, businesses and the government to identify the uses, values and benefits of three of Australia's tropical rivers and to quantify some of them in dollar terms so that their extent and importance can be accounted for in decision making. The project will also examine how the uses, values and benefits of the river have changed through time so that we can learn from history about how some potential development actions may impact on future uses, values and benefits

2.2: Indigenous values and river flows

Leader: Sue Jackson

In northern Australia the need for water planning to identify and address Indigenous interests and values is great. However Indigenous values associated with rivers are poorly understood by decision-makers. This project will work closely with Aboriginal communities to look at the importance of water. It will document the social significance of water and quantify the economic benefits households derive from their use of aquatic resources.

3: River and Coastal Settings

3.1: Socio-economic activity and water use in the Tropical Rivers region

Leader: Natalie Stoeckl

An understanding of the socio-economic systems and their relationships with the environment is a key component in assessing the implications of future developments in northern Australia. This project will study a range of economic, cultural, institutional and human-capital aspects of northern populations to look for differences and similarities among communities and to describe how the region's socio-economic systems might change under the different future development scenarios.

3.2: Biophysical classification: Classifying Riverscapes across northern Australia

Leader: Andrew Brooks

A universally accepted system of classifying riverscapes (i.e. a geomorphic river classification scheme) does not exist for the tropical north of Australia. This project will develop such a classification and so provide an understanding of the diversity of riverscapes in northern Australia. It will also provide a rational basis for extrapolating limited, site-specific data collected in the TRaCK program to the rest of the wet-dry tropics.

3.3: Ecohydrological regionalisation of Australia: a tool for management and science

Leader: Brad Pusey

River classifications identify the key features that make rivers different or similar and so provide a tool by which the insights and knowledge gained in one river or region may be meaningfully applied or transferred to another. This project proposes to develop a regional classification of Australia's rivers based on ecologically relevant aspects of their hydrology (i.e. an ecohydrological classification).

4: Material Budgets

4.1: Catchment water budgets and water resource assessment

Leader: Richard Cresswell

This project aims to start measuring and calculating the different elements of water budgets in three of the TRaCK focus catchments. To build a water budget we need to know how much water there is in the catchment, where it goes and when. Water budgets are a useful tool for catchment managers making decisions about water extraction. They also help us understand how aquatic systems are linked or isolated within a catchment and how other materials such as sediment and nutrients move through catchments.

4.2: Regional scale sediment and nutrient budgets

Leader: Gary Caitcheon

To manage sediment and nutrient inputs to rivers we need to identify which of the erosion processes are most important in different parts of the catchment. This project aims to do this and so increase our understanding of how current land-uses impact the river systems in two north Australian river catchments.

4.3: Towards understanding the impacts of land management on productivity in the Daly and Flinders Rivers

Leader: Barbara Robson

A common result of human activity in catchments is an increase in the amount of sediment and nutrients (phosphorus and nitrogen) found in rivers. This project will answer questions about how changes to the sediments and nutrients found in rivers affect the processes and plant growth in rivers.

4.4: Bedload transport in large tropical rivers and its effect on dry-season pool habitat dynamics

Leader: Andrew Brooks

The pools that remain in northern Australian rivers during the long dry season provide an important refuge for stream fauna and flora and are often culturally significant. There is a common perception, however, that many of these riverine waterholes are being filled by sands. Changes in land-use upstream and the effects of climate change have been suggested as causes for sand accumulation. This project will determine, whether there is evidence for sustained infilling of pools within two north Australian river catchments.

4.5: Developing a Water Quality Monitoring Framework for the Katherine and Daly River Catchment

Leader: Simon Townsend

A Water Quality Monitoring Framework is being developed for the Katherine and Daly River Catchments in the Northern Territory. The aim of the Framework is to provide a comprehensive and locally relevant guide to assist future water quality monitoring planning and implementation in an integrated manner. The Framework will be consistent with the National Water Quality Management Strategy and involves consultation with stakeholders and the community.

4.6: Trial of the Framework for the Assessment of River and Wetland Health (FARWH) in the wet/dry tropics

Leader: Simon Townsend

The National Water Commission has developed a national framework that can form the basis of comparable national river and wetland health assessments, and has the capacity to bring together results of existing broad-scale assessments conducted at state, territory and basin scales. The Framework for the Assessment of River and Wetland Health (FARWH) is being trialled by TRaCK to evaluate the effectiveness of the Framework to assess river health in the wet/dry tropics, and contribute to north Australian river management.

5: Foodwebs and biodiversity

5.1: Bottom up and top down control of tropical river food webs

Leader: Michael Douglas

The food webs of Australia's tropical rivers are poorly understood yet provide the foundation for healthy rivers. This project will explore how these food webs are structured to support complex river ecosystems. Using a variety of experiments scientists will identify the sources of organic matter which kick-start tropical river food webs, which animals exert a strong control in the food chain and how land and water based food webs relate to one another.

5.2: Refugial Pools. Importance of waterholes as aquatic refugia and the biophysical processes that sustain them

Leader: Stuart Bunn

River waterholes are a critical refuge for aquatic plants and animals when rivers stop flowing and are also highly valued by local communities. Unfortunately waterholes are also vulnerable to increasing water demands, uncontrolled stock access, fishing pressure and the effects of climate change. This study seeks to understand how waterholes in northern Australia respond to such pressures.

5.3: River-floodplain food web subsidies

Leader: Stuart Bunn

As the wet season flows overtop river banks, fish and other animals make the most of expanded feeding grounds, moving out onto the floodplains. As the floodwaters recede, these animals take the nutrients and energy obtained from the floodplain, back to the river channel. This project will describe floodplain food webs, quantify the contribution of subsidies to, and from the floodplain, and determine how some current land management practices are affecting the floodplain food webs of northern rivers.

5.4: Assessing the effect of urbanisation and catchment development on ecosystem health in estuaries

Leader: Michele Burford

This project will assess the effects of different land-based development pressures on the assets and values of northern estuarine ecosystems. Research will first focus on the effects of urban development in Darwin Harbour. The second part of the project will focus on the effects of agriculture and potential water resource development in the southern estuaries of the Gulf of Carpentaria. In particular, young prawns living in the estuary will be studied.

5.5: Flow-ecology relationships for biodiversity and ecosystem processes

Leader: Peter Davies

Water managed and 'allocated' to the environment is commonly known as 'environmental flows'. The critical step in determining appropriate environmental flows is predicting how particular changes in river flows might affect natural ecological assets. This project will investigate the relationships between flow and several specific assets of tropical rivers.

5.6: Flow impacts on estuarine finfish of the Gulf of Carpentaria

Leader: Ian Halliday

Our current knowledge suggests that flows of freshwater into estuaries play a significant role in determining the numbers of fish that live there. This project aims to increase our detailed understanding of how freshwater flows affect some key estuarine species. This is crucial if we are to manage water resources in a manner that minimizes negative impacts on estuaries.

5.7: Environmental flow tools for northern rivers (synthesis project)

Leader: Peter Davies

There is growing interest in developing and allocating the water resources of tropical Australia. The big question is how much water can we extract for water development and how much do we need to retain to sustainably manage the ecological health of aquatic systems? This project will derive a set of 'rules' for people managing tropical rivers that help them decide on how to allocate water to the environment.

5.8: Biodiversity and HCVAE. Bioregionalisation conservation priorities and predictive models of aquatic biodiversity

Leader: Jane Hughes

Biodiversity is a feature of aquatic ecosystems that is often valued by different members of the community. To effectively manage aquatic biodiversity, we need to know where the areas of high biodiversity are. It is also useful to know what causes some areas to have high biodiversity and others not. This project aims to answer these questions and so define biologically unique regions (bioregions) within northern Australia, based on patterns of aquatic biodiversity.

5.9: Northern Australia Aquatic Ecological Assets

Leader: Mark Kennard

The Northern Australia Water Futures Assessment (NAWFA) is an Australian Government initiative to provide the science needed for sustainable development and protection of Northern Australia's water resources. One project being undertaken as part of the NAWFA Ecological Program is the TRaCK Northern Australia Ecological Assets Project.

6: Sustainable enterprises

6.1: Establishing water markets in northern Australia

Leader: Quentin Grafton

Northern Australian Indigenous people are among the most disadvantaged in the nation. Improved socio-economic status will depend on access to, and sustainable use of, natural resources, including water.

This research will examine the potential effectiveness and durability of water markets in tropical Australia, how the transition to market-based allocation may interact with existing institutions, and the potential socio-economic impacts arising from an open trading market.

6.2: Indigenous rights to water in northern Australia

Leader: Michael O'Donnell

This project builds on recent work done on international developments in Indigenous water rights. The project is examining the detail of present law and associated process in northern Australia and the way it deals with native title and other Indigenous interests in water. In particular, the project will investigate (i) the match of State and Territory law to the National Water Initiative in areas affecting Indigenous interests; (ii) obligations under existing law and process in water planning, including the nature of consultation required, treatment of native title etc and; (iii) implications of recent court decisions (especially Blue Mud Bay).

6.3: Developing an effective conservation and sustainable use economy in Arnhem Land: options for payment for environmental services

Leader: John Altman

Much of the Indigenous estate in north Australia is either thinly populated or unpopulated. There is emerging evidence that, in situations where Indigenous people live on their country, ecological and wider benefits are generated via favourable fire regimes, control over weed infestations, and potentially through feral animal harvesting. When people are on country, they generate economic benefit for themselves by harvesting wildlife for consumption and engage with the market sector by using natural resources in commercial enterprise like arts and crafts production.

This research project seeks to quantify the environmental needs and costs of environmental management in two contexts, the Mann-Liverpool riverine environment in central Arnhem Land, where the Djelk IPA is to be declared in August 2009, and the coastal area of the Dhimurru IPA.

6.4: Development of a holistic sustainable Indigenous livelihoods plan for the Archer River Basin, Cape York

Leader: Lorrae McArthur

Traditional Owners and their supporting organisations from the Archer River catchment are working with TRaCK in a participatory, action-based research project that will lead to the development of a holistic basin-wide sustainable Indigenous livelihoods plan. The focus will be on the delivery of environmental services by Indigenous people but it will also look for other opportunities that will contribute to a sustainable livelihoods agenda.

6.5: Nyikina Mangala Mardoowarra (Fitzroy River) Sustainable Livelihoods on Country Case Study

Leader: Lorrae McArthur

This participatory, action-based research project will document the factors that have contributed to the Nyikina Mangala Traditional Owners' sustainable livelihoods agenda to date. The project will also work to build local leadership and governance capacity, develop and implement a number of strategic management plans, and document barriers, strategies and actions to achieve Indigenous sustainable livelihoods on country.

Appendix D

Example of TRaCK project 2.2 newlsetter:

Aboriginal people and rivers

Project Update – Fitzroy River

July 2009

We thought you might be interested in receiving our 'Aboriginal people and rivers' project update!

This short newsletter is to let you know what has been happening with TRaCK project 2.2 - 'Indigenous socio-economic values and river flows'. This is the project that is looking at the importance of the Fitzroy River to the Aboriginal people that live along it.

This is the third update which covers our visit to the Fitzroy in June and July 2009.

When did we visit?

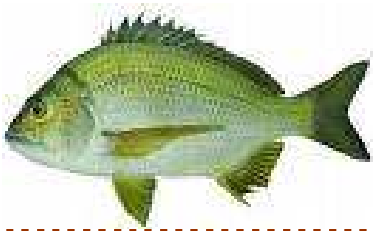
8 June – 3 July 2009

Who did we talk to?

We talked with people who live at Bayulu, Bungardi, Darlgunya, Junjuwa, Muludja, Ngurtuwarta and Noonkanbah.

Marcus talking with school children about food webs at Kulkarriya School, Noonkanbah

What did we discuss with people on our last visit?



When we visited earlier this year we talked with people around Fitzroy Crossing and at Noonkanbah about doing a survey to find out what people are hunting and collecting from the river and wetlands along the Fitzroy.

We have now started the survey in Fitzroy and have been asking people how many times they have been to the river or billabong in the past 2 weeks and what bush tucker they got each time they went hunting or fishing.

Household Survey

Pippa and Marcus will return to the Fitzroy 4 times a year for the next 18 months. Each time they visit the Fitzroy they will stay for 4 weeks and do the same survey twice with each of the households that are participating.

Pippa and Marcus will return to the Fitzroy in September to talk with the same people again. They wish to keep asking the same questions at different times of the year so they can get a good picture of how people use the river and wetlands during the wet and dry seasons, when the river is high and low.

Joy Nuggett, Helen Malo, Tracy Marr and Casey Forrest helped us on our last trip - with introductions and getting the survey started. **Thank you Joy, Helen, T-Marr and Casey!**

Emma also spoke with some communities about working on projects other than the household survey. These include writing down some stories about the River, the different seasons and the importance of different plants and animals and places that people like to go. Next time Emma visits she will start work on a fishing calendar with one group of people, and a seasonal calendar with another language group. If you are interested in this part of the project please let us know.

Marcus doing a survey with Ethel Forrest; assisted by Joy Nugget

Marcus surveying Mervyn Street and June Davis at Muludja

Marcus with George Brooking, who is signing a consent form

Where else did we visit?

Marcus and Emma did an interview at the Wangki Yupurnanupurri Radio Station. They talked about TRaCK, the project 'Aboriginal people and rivers', the household survey and other projects they would like to work on with residents of the Fitzroy region.

Marcus and Pippa visited Kulkarriya Community School at Noonkanbah and talked about food webs and other TRaCK research that is happening around the Fitzroy region. The team also participated in the FitzCAM meeting held in Fitzroy Crossing.

The project team were also fortunate to be in town when Fitzroy Express came to play at the Hall – Tracy Marr and Lillian Chestnut made sure we got out of chairs for a dance!

Marcus and Lillian Chestnut being interviewed at Wangki Yupurnanupurri Radio Station

Emma trying to give an interview

Marcus putting up a research poster at Bayulu

FitzCAM meeting

Black-headed python

We have also given ‘catch sheets’ to people who have taken part in the survey. People can use them if they want to record their hunting and fishing trips – to write down where they went and what they got.


Catfish


Black Bream


Barramundi

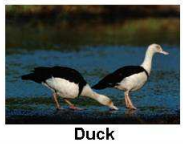

Sleepy Cod


Eel-tailed Catfish

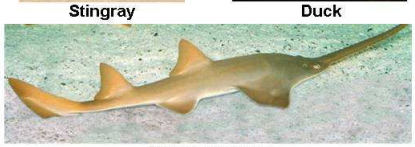

Cherabin


Turtle


Stingray


Duck


Goanna


Shark / Sawfish

What day and where did you go?

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday

Aboriginal People and Rivers

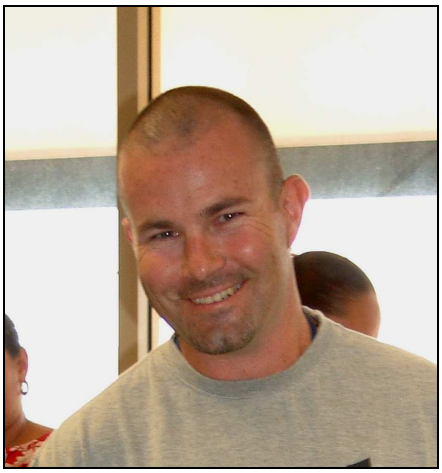
Fitzroy River	Tally				
	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5
Where did you go?					
What day is it?					
When did you…					
1. Leave home?					
2. Get back?					
How many people?					
Catfish					
Black Bream					
Barramundi					
Sleepy Cod					
Eel-tailed Catfish					
Cherabin					
Turtle					
Stingray					
Duck					
Goanna					
Shark/ Sawfish					
Other: ……					

When will we back in the Fitzroy?

Marcus and Pippa will be returning to the Fitzroy in September 2009 for more household surveys. Emma will also be doing some recording of river knowledge in October and November. We look forward to seeing you then!

Thank you!


Pippa Featherston


Marcus Finn


Emma Woodward

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TRaCK brings together leading tropical river researchers and managers from Charles Darwin University, Griffith University, the University of Western Australia, CSIRO, James Cook University, the Australian National University, Geoscience Australia, the Environmental Research Institute of the Supervising Scientist, the Australian Institute of Marine Science, the North Australia Indigenous Land and Sea Management Alliance, and the Governments of Queensland, the Northern Territory and Western Australia.

TRaCK received major funding for its first phase of research through the Australian Government's Commonwealth Environment Research Facilities initiative; the Australian Government's Raising National Water Standards Program; Land and Water Australia; the Fisheries Research and Development Corporation and the Queensland Government's Smart State Innovation Fund. In 2011 TRaCK received funding from the National Water Commission to undertake targeted projects as part of a 'synthesis and adoption' year to ensure research findings are relevant and more widely available.

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Australian Government
National Water Commission

For more general information about TRaCK

visit www.track.gov.au
email track@cdu.edu.au

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Tropical Rivers and Coastal Knowledge