CULTURAL FLOWS

ABORIGINAL WATER INTERESTS FOR ESTABLISHING CULTURAL FLOWS: PRELIMINARY FINDINGS

NATIONAL CULTURAL FLOWS RESEARCH PROJECT

There's a connection there from the Mundaguddah [Rainbow Serpent] waterhole to the Gooraman Swamp, and that's of cultural significance. And that's the difference between the environmental flow and the cultural flow. Because getting water to Gooraman Swamp is fulfilling our cultural purposes. If we look at the two, some of it will overlap. So, for example, the Mundaguddah waterhole and Gerrara Springs will fall into the environmental flow category. Because if you … fill that waterhole up, and you'll have enough water flowing down the system, then there are a number of waterholes, the connection to this place here. [Gooraman Swamp] is his home. The connection then allows him to travel. It's the same – there are all different names for him all through the Murray. There's a common connection.... We need the cultural flow to fulfil our spiritual side of it, into Gooraman Swamp.

Fred Hooper, Murrawarri Nation, Chair of Northern Basin Aboriginal Nation

Water is our way to independence… Water is a way of getting our community away from the welfare system. And that's where we see – that this cultural license and water allocation could do that. Instead of having to go to the government asking for funding, for infrastructure or anything else, we will be able to pay for it ourselves with what we can make ourselves from the cultural license.

Ian Woods, Nari Nari Tribal Council

This report has been prepared by Rural Solutions South Australia for the Cultural Flows Planning and Research Committee as part of the National Cultural Flows Research Project, developed by and for First Nations with the aim of helping to embed First Nations' water allocations in Australia's water management framework. Funding for the Research Project has been generously provided by the Murray Darling Basin Authority, the Commonwealth Environmental Water Office, the National Water Initiative, and the Department of Families, Housing, Community Services and Indigenous Affairs. Report authored by Dr John Mackenzie.

Cover photo: Arthur Mostead – Early morning on the Darling River, North Bourke, courtesy of Murray-Darling Basin Authority. Artwork 'Cultural flows' by Luke Penrith. Cover graphic design by Mazart Design Studio.

Key Acronyms

AEO – Aboriginal Environmental Outcomes

AHD - Australian Height Datum

AWA – Aboriginal Waterways Assessment

CAL - Cultural Access Licence

CEWH – Commonwealth Environmental Water Holder

CHI – Cultural Health Index

CoAG – Council of Australian Governments

FPIC - free, prior and informed consent

FSL - Fully Supply Level

GIS – Geographical Information Systems

GPS – Global Positioning System

IPA – Indigenous Protected Area

M&E – Monitoring and Evaluation

MDBA – Murray Darling Basin Authority

ML – Megalitre (1 million litres)

ML/D – Megalitres per day

MLDRIN – Murray Lower Darling Rivers Indigenous Nations

NAILSMA – Northern Australia Indigenous Land and Sea Management Alliance

NBAN – Northern Basin Aboriginal Nations

NCFRP – National Cultural Flows Research Project

NNTC –National Native Title Council

NWI – National Water Initiative

PAR - Participatory Action Research

RSSA – Rural Solutions SA

Key Definitions and Terminology

Term	Definition
Aboriginal	The people who are the original inhabitants of the land.
Aboriginal Environmental Outcomes	The term "Aboriginal environmental outcomes" has been proposed to describe and communicate the benefits to Aboriginal people that can be derived from environmental watering. Aboriginal environmental outcomes result from healthier rivers and wetlands, for example improved fish populations, more reeds that can be harvested and increased bird breeding events. In essence, Aboriginal environmental outcomes provide tangible physical benefits to community and country (Definition of Aboriginal environmental outcomes, pamphlet). This definition was endorsed by representatives of the Murray Lower Darling Rivers Indigenous Nations (MLDRIN) and Northern Basin Aboriginal Nations (NBAN) and is recognised by the Murray Darling Basin Authority (MDBA), Victorian Environmental Water Holder (VEWH) and Department of Environment, Land, Water and Planning (DELWP).
Adaptive management	A rigorous and evidence-based approach to the management of natural resources, including water, that seeks continuous improvement by ensuring that management actions adapt in response to changes or to feedback. An adaptive management approach would identify targets towards the achievement of sustainability and public benefit, but also include a monitoring system to measure progress and achievements against the targets, and a response system that enables modifying interventions in response to the findings.
Affective values	Affective values in relation to water describes the qualities of the resource that sustain important personal and psychological functions, such as aesthetic appreciation, ambience, inspiration, sensory responses, ecological appreciation, spiritual realisation and emotional well-being.
Authorised Knowledge Holder	a person, normally a Traditional Owner, who has been provided cultural and/or traditional knowledge of a particular place or thing through customary law and is recognised by the Traditional Owner community to have the authority to speak on or share that particular knowledge where appropriate.
Collaboration	Collaboration is a condition that takes place when people work together to address a shared problem or concern with a commitment to a beneficial outcome. Collaboration requires the shared input or pooling tangible and intangible resources (such as information, knowledge, money or labour) to solve problems which no party can solve individually.
Community	A group of people living in the same place or having a particular characteristic in common (e.g. people living in a suburb or town).
Cultural flows	Water entitlements that are legally and beneficially owned by Indigenous Nations of a sufficient and adequate quantity and quality to

	improve the spiritual, cultural, environmental, social and economic conditions of those Indigenous Nations. This is our inherent right. This definition was endorsed by representatives from thirty-one Indigenous nations at a joint meeting of the Murray Lower Darling River Indigenous Nations (MLDRIN) and the Northern Basin Aboriginal Nations (NBAN) -The Echuca Declaration, September 2010 (NCFRP 2016).
Deliberation	Deliberation is a form of participation in collective decision-making which allows for information exchange, sharing diverse perspectives and their significance, careful consideration of different opinions and joint evaluation of alternatives.
Emic	A method of social and cultural research that involves analysis of cultural phenomena from the perspective of one who participates in the culture being studied. See etic.
Environmental flows	Environmental flows describe the quantity, timing, and quality of water flows required to sustain freshwater and estuarine ecosystems and the human livelihoods and well-being that depend on these ecosystems.
Etic	A method of social and cultural research that involves analysis of cultural phenomena from the perspective of one who does not participate in the culture being studied. See emic
Key Contact	The nominated key contact for each case study area, as provided in the case study area applications to the National Cultural Flows Research Project.
Nation	A large body of people united by common descent, history, culture, or language, inhabiting a particular area.
Nation facilitator	Nominated member from each case study area Nation that will receive support and training to participate in the facilitation of research engagement activities. The nominated Nation Facilitator will support the Project Team to conduct engagement sessions and workshops in a culturally respectful and appropriate manner, to suit local needs and issues; and the two-way flow of information and ideas between the Project Team and participants / Traditional Owners.
Participatory action research	An applied research methodology in which research and practice are mutually reinforcing, such that the findings of research directly inform the practice, or the observations from practice direct the objectives of research.

Procedural equity	The perception and experience of fairness in a resource allocation decision by ensuring that the process of arriving at that decision does not favour any group or interest, or disadvantage any group or interest.
The Project	The National Cultural Flows Research Project.
Research Committee	National Cultural Flows Planning and Research Committee.
Research partner	A Traditional Owner, individual of the Research Committee and/or community nominated participant who is recognised as speaking for country. Individuals may be involved in any/all aspects of the National Cultural Flows Research Project.
Relational values	Relational values describe the complex cultural attributes or contributions of a site or feature of the resource that sustains, represents or embodies a relationship to historical or spiritual connection with the landscape, identity, genealogy, law and custom as a whole.
Social learning	Social learning describes the process that occurs when people learn by engaging one another, sharing diverse perspectives and experiences, and developing a common framework of understanding and basis for joint action. As distinct from individual learning, the deliberation and dialogue that comprises in social learning allows people to share diverse perspectives and experiences, which can also build relationships.
Stakeholder	A person with an interest or concern to any and/or all aspects of the National Cultural Flows Research Project.
Sustainable Diversion Limit	The amount of water that can be taken for town water supplies, industry, agriculture, cultural flow and other human or 'consumptive' uses, while ensuring there is enough water to achieve healthy river and groundwater systems.
Traditional Owner	The Aboriginal person or people who possess rights, interests and responsibilities for an area of country. These rights, interests and responsibilities are defined by traditional law and custom and are also handed down through this customary law. Traditional Owners are recognized as having a primary interest in the land and their existence is not contingent on recognition of such under white law.
Values	Values can be considered as normative assessments about what is important, desirable or ethical. Values are typically categorised according to a series of descriptors that reflect who holds those values (for example, community values, Aboriginal values, core values) or a taxonomy of knowledge domains (environmental, social, economic, cultural). Values become social or cultural as a consequence of their similar expression across populations (social) or of their coherence into relatively stable forms that provide the basis of a group identity and common practice (cultural).
Water allocation	The specific volume of water allocated to water access entitlements in a given water year or allocated as specified within a water resource plan.

Water plans	Statutory plans for surface and/or ground water systems, developed in consultation with all relevant stakeholders on the basis of best scientific, cultural and socio-economic assessment, to provide secure ecological outcomes and resource security for users. Water planning describes the activities and processes undertaken to prepare a water plan, or to contribute to the adaptive management of a water plan.

EXECUTIVE SUMMARY

The National Cultural Flows Research Project ("the Project") is about developing rigorous and defendable knowledge, with the aim of securing water entitlements for the benefit of Aboriginal people across Australia (NNTC, 2014). This research relies on the participation of members of the Aboriginal Nations at two case study sites within the Murray Darling Basin to investigate and measure the cultural values of water to Aboriginal people. The Project will assess both tangible and intangible facets of water delivered to achieve cultural outcomes, with the primary focus of developing methodologies that will record and assess Aboriginal cultural values and uses regarding watering requirements.

The Project consists of the following components (NCFRP 2014):

- One: Describe the Aboriginal cultural water values and needs across Australia (completed January 2014).
- Two: Develop and use methodologies to describe and measure the cultural water uses, values and needs of particular Australian Aboriginal communities – the Nari Nari near Hay, New South Wales (NSW), and the Murawarri at Weilmoringle in northern NSW.
- Three: Quantify water volumes to meet cultural values and needs (both Nari Nari and Murrawarri) and scientific assessment of a trial flow at Toogimbie Aboriginal Protected Area (IPA), near Hay NSW.
- Four: Develop and implement a monitoring methodology of the ecological and socioeconomic, health and wellbeing outcomes of cultural flows and analyse how they compare with environmental flow outcomes.
- Five: Recommend policy, legal, and institutional changes that will enable the implementation of cultural flows.
- Six: Building the capacity of Aboriginal organisations to build support for cultural water provisions and to implement recommendations for improved local and national water management, planning, policies and laws.

This report compiles the preliminary findings from the work conducted as part of Component Two of the Project: the trial of methods to describe and measure the cultural water uses, values and needs of two Australian Aboriginal communities. Specifically, the preliminary findings presented in this report respond to the objectives of the Project, as detailed in Section 1 Table 1, to:

- Develop a case-study specific methodology for the identification of Aboriginal interests in water, with the potential for national application;
- Demonstrate the application of that method in the development of a conceptual model of the relationship between water regime and those water interests, including cultural assets, values and uses; and
- Demonstrate the further application of the method to the development of flow objectives, preliminary water requirements and indicators to set and assess cultural flows.

A number of research and development activities will be undertaken in the coming quarter in order to progress Component 2 of the Project. Subject to the review of these preliminary findings, these activities may significantly alter the findings of this report.

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1 INTRODUCTION

The National Cultural Flows Research Project ("the Project") seeks to trial, evaluate and recommend rigorous and defendable methods and knowledge for water reform with the aim of securing water entitlements for the benefit of Aboriginal people across Australia (NNTC, 2014). This research relies on the participation of members of the Aboriginal Nations as research partners at two case study sites within the Murray Darling Basin to investigate and measure the cultural values of water for Aboriginal people. Fundamentally, the objectives of the Project have been designed by Aboriginal people to meet identified needs and priorities. The Project specifically seeks to promote Aboriginal management of water resources and helps protect Aboriginal rights under Aboriginal and statutory law.

To achieve this, the Project will assess both tangible and intangible facets of water delivered to achieve cultural outcomes, with the primary focus of developing methodologies that will record and assess Aboriginal cultural values and uses regarding watering requirements. This information will be used as an evidence base to demonstrate the range of environmental and public benefit outcomes that can be attained through the establishment of an allocation for "cultural flows" under a statutory water plan. The definition of "cultural flows" that has been adopted for the purposes of the Project was endorsed by representatives from 31 Indigenous nations at a joint meeting of the Murray Lower Darling River Indigenous Nations (MLDRIN) and the Northern Basin Aboriginal Nations (NBAN) and presented in The Echuca Declaration, September 2010 (NCFRP 2014) as:

> *…water entitlements that are legally and beneficially owned by the Indigenous Nations of a sufficient and adequate quantity and quality to improve the spiritual, cultural, environmental, social and economic conditions of those Nations. This is our inherent right.*

The Project seeks to assess the range of public benefits and environmental improvements from water delivered to achieve cultural outcomes in partnership with two Aboriginal Nations: the Murrawarri at Weilmoringle in northern New South Wales (NSW) and the Nari Nari at the Toogimbie wetlands, located near Hay in NSW. The approach is built around a water planning and adaptive management framework, and will conduct a watering trial, combining cultural, ecological and hydrological components. The long-term view is that the information collected from this project will inform future Australian water resource planning and implementation processes more generally and will provide further evidence for the need of a National Cultural Flows Framework. Critically, this work will seek to address the gap between the accumulating knowledge and understanding of water-related values and practices, and the limited capacity for this knowledge to translate into substantive water planning or management initiatives for the protection and enhancement of these identified values.

Oversight of the Project is by the National Cultural Flows Planning and Research Committee (the Research Committee). The Research Committee represents its member organisations: MLDRIN; NBAN and the Northern Australia Land and Sea Management Alliance (NAILSMA) along with representatives from the office of Commonwealth Environmental Water Holder (CEWH), Murray Darling Basin Authority (MDBA), National Native Title Council (NNTC) and nominated state government agencies

The Project consists of the following components (NCFRP 2014):

- One: Describe the Aboriginal cultural water values and needs across Australia (completed January 2014).
- Two: Develop and use methodologies to describe and measure the cultural water uses, values and needs of particular Australian Aboriginal communities.

- Three: Quantify water volumes to meet cultural values and needs and scientific assessment of trial flows.
- Four: Develop and implement a monitoring methodology of the ecological and socioeconomic, health and wellbeing outcomes of cultural flows and analyse how they compare with environmental flow outcomes.
- Five: Recommend policy, legal, and institutional changes that will enable the implementation of cultural flows.
- Six: Building the capacity of Aboriginal organisations to build support for cultural water provisions and to implement recommendations for improved local and national water management, planning, policies and laws.

Table 1 outlines the research activities and steps undertaken in the preparation of this report.

Table 1: Research objectives, stages and activities in Preliminary Findings report

Research objectives	Research steps and activities
Develop and trial a methodology to identify historic and contemporary cultural uses and values relating to water.	• Evaluate outputs from Component 1 and other relevant literature to inform the development of the methodology to identify historic and contemporary cultural uses and values relating to water. • Review scientific literature and the outcomes of projects covering similar research topics (e.g. MDBA Aboriginal Waterways Assessment project; NSW Office of Water studies) and explore possible linkages and value adding to the outcomes of these projects. • Prepare a draft methodology in consultation with the research committee members and case study representatives. • Trial the draft methodology with case study site representatives to record historical and contemporary cultural use and values of water. Nation Engagement Strategies will inform this process.
Develop conceptual model(s) of the relationship between water regime and cultural assets, values and uses	• Develop a series of criteria/questions to identify what the Research partners and nominated participants would consider a 'successful cultural flow'. This will be an iterative process with the Research partners and participants • Conceptual models will predict cultural and other (e.g. social) outcomes of watering. These are to be refined in an adaptive management cycle once the cultural watering trial is completed at Toogimbie. The conceptual models will help in the setting of objectives and selection of indicators for the monitoring component of the cultural watering trials (see Item 13). • Iteratively set management objectives and questions to be tested in watering trial. • Identify limitations of having a single trial flow allocation and consider the expected outcomes of multiple flows through future allocations, allowing for ongoing monitoring as opposed

	to the single assessment being undertaken in the current watering trial (reflected in the conceptual models, if possible).
Develop methodologies to measure indicators to assess cultural flows	• Confirm (through engagement with Research partners), a set of indicators, values and measurements to be used in assessing the effects of cultural flows. • Identify/consider overlaps in environmental and cultural indicators; for example indicators of resilience and hydrological connectivity, (Note: ecological indicators will be selected to support the cultural assessment and are not the key focus of the research - see also Section 2.3 for more about Indicators). • Use the criteria and indicators to develop an agreed indicator framework (in consultation with the Research Committee and the Research partners of Toogimbie and Gooraman Swamp). • Develop a methodology to utilise the indicators to assess the effects of a cultural flow.

These preliminary findings will be used in consultation with the research partners and Traditional Owners in Toogimbie, to set the management objectives for the flow trial. This will include clarifying the management context and desired flow regime for the water trial, and to set priorities in order to help trade-off any conflicting water needs or insufficient water availability.

In the case of the Murrawarri, where a flow trial is beyond the scope of the Project, these findings will be used to enable the informed deliberation of the community to determine the relative importance of values and aspirations for the water resource, and how this assignment varies within and across the community. This will allow the community to participate in future trade-off negotiations and setting management and cultural flow objectives, should a cultural flow or other Aboriginal water entitlement be available in the future. In both cases, improved understanding of the impact of water management scenarios on cultural aspirations and values will help the communities to review the acceptability of planning decisions and to identify opportunities for mitigation actions.

The findings in this report will be further developed through the course of the Project to document the relationships between river flow regimes and Aboriginal uses, values, benefits and cultural practices in a way that accurately depicts the cultural relationships to water in the case study communities. Where possible, generalisable conclusions from this work will be used to help inform a national cultural flows framework. This is an iterative process that will be continually improved through the duration of the Project. In particular, research partners will inform the most appropriate representation of these relationships in public documents and other outputs from this research.

This paper is divided into three sections:

1. Presents the methodology developed, trialed and refined in the case study locations for the identification of cultural uses, values and aspirations.
2. Documents the findings from the case study locations in terms of cultural flow objectives, indicator frameworks, monitoring information and the preliminary assessment of water requirements.
3. Identifies key learnings to date from the case study, including the national implications, challenges and opportunities.

The methodology developed and implemented to date for identifying and reporting on water related cultural values, uses and aspirations was intended to achieve four specific outcomes in the case studies:

1. To achieve an understanding of the historical and contemporary cultural uses and values of, and cultural aspirations for, water at the two case study sites, such that the uses, values and aspirations can be appropriately represented;
2. To describe connections between the hydrological regime, water availability and cultural practices and aspirations at the case study sites;
3. To develop rigorous and defensible methodologies to describe and quantify these water uses and values to enable an integrated assessment of the resource and facilitate hydrological modeling; and
4. To contribute to a monitoring and evaluation framework that can be used to measure the effectiveness of the cultural water trial at Toogimbie.

The proposed methodology is also intended to have national application or relevance as a means to support Aboriginal people to define their own cultural flow requirements. To fulfil this overarching objective, the methodology would need to provide:

- Transparent and replicable techniques for the identification and quantification of uses, values and aspirations;
- Effective integration within the water planning regime and with other technical assessments informing management objectives; and
- Quantifiable targets, standards and indicators that can be used to evaluate the success of cultural flow objectives.

Both the methodology documented in this report, and the engagement practice associated with the Project more generally is informed by a commitment to best practice in Aboriginal research and engagement. This includes: a strictly upheld requirement of free, prior and informed consent (FPIC) for all research partners; intellectual property protection; capacity building; and the purposeful pursuit of research outcomes that explicitly benefit Aboriginal people in response to needs identified by Aboriginal people.

The research includes the application of Participatory Action Research (PAR) principles, a research process that recognises and respects Aboriginal peoples' rights, responsibilities and ownership of the research. PAR is a process for change, driven by those most affected by the topic, where the researchers become facilitators of social learning and dialogue, rather than experts or possessors of privileged knowledge. In this process the Research Committee, Project Team, Nation delegates and case study communities are equal partners in the research process. Our commitment to PAR principles is reflected in the approach which has prioritised:

- Engaged enquiry with the Aboriginal and other research partners as co-researchers;
- A flexible and responsive process that may encompass building trust and developing a common understanding;
- Collaborative identification of the research problem, preferred methods of gathering data, and interpreting meaning; and
- Achieving a beneficial outcome that meets the needs of the Traditional Owners.

Critically, the finalisation of these preliminary findings remains subject to the approval of the nominated representative group in the case study locations and the other research partners. This report will be refined as required to meet the conditions of approval of those partners.

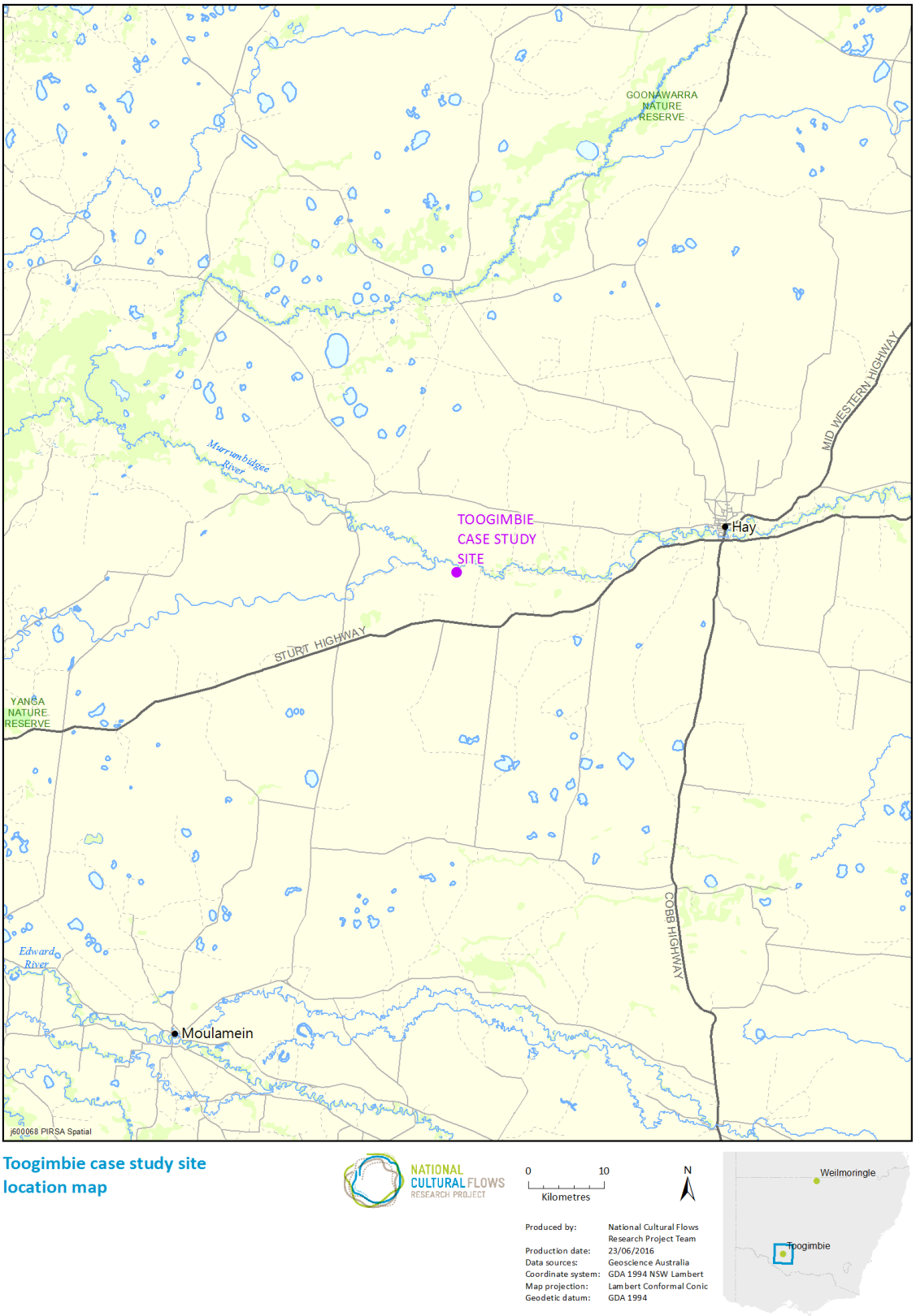

Figure 1: Location of Toogimbie Case study site in relation to topographic features

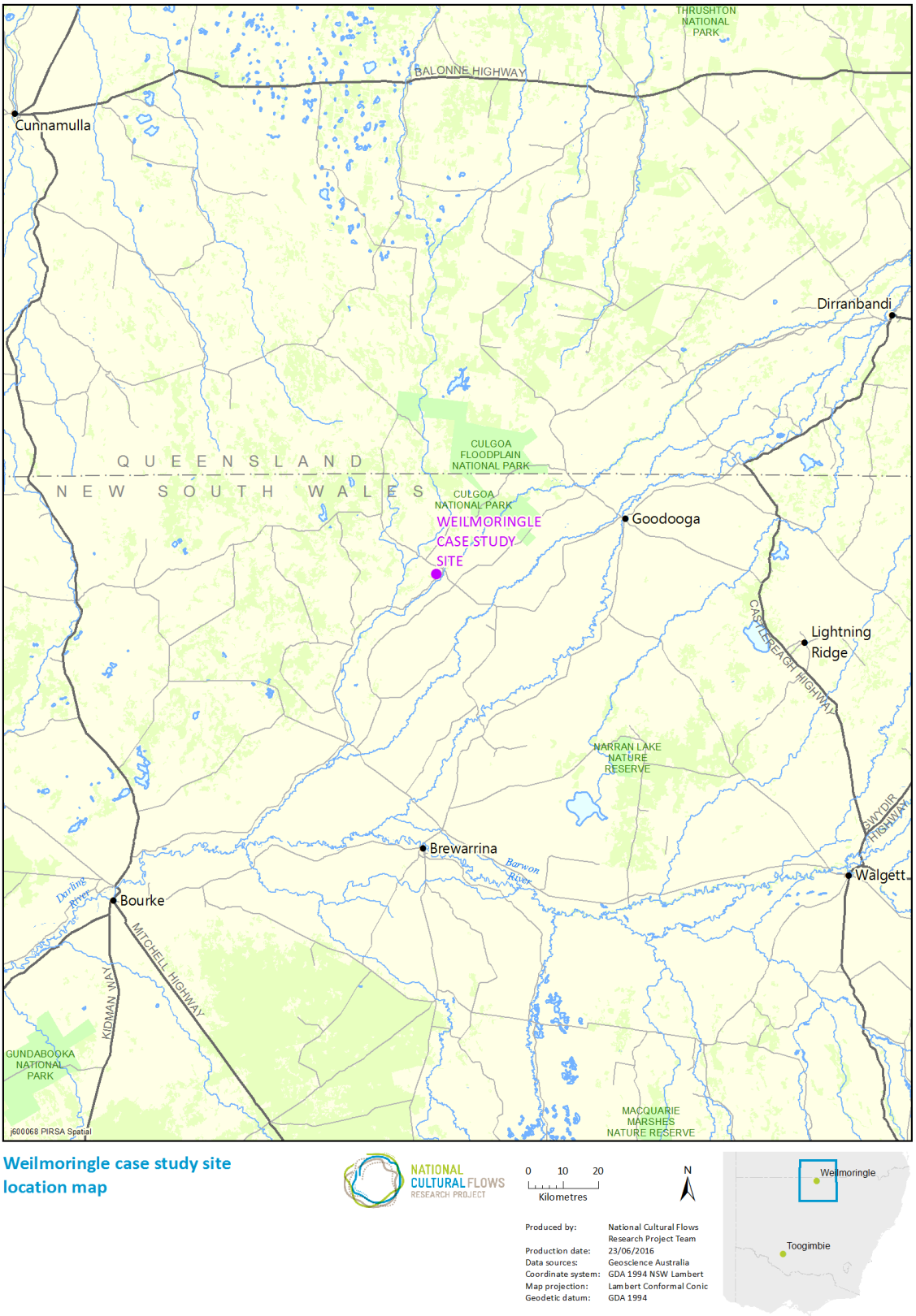

Figure 2: Location of Gooraman Swamp (at Weilmoringle) case study site in relation to topographic features

1.1 Definition of Cultural Flows

Historically, Aboriginal peoples' rights to water have largely been excluded from Australia's complex water planning and management regimes. Although the *Native Title Act 1993* (Cth) includes water rights as a part of Native Title rights, only rights to use water for domestic and personal purposes have been recognised by the court (NWC 2014). The *Native Title Act 1993* (Cth) does not provide for a right to negotiate over water.

The inclusion of the interests of Australia's diverse Aboriginal population in water reform was assented to by all levels of government in Australia as part of the 2004 Intergovernmental Agreement on the National Water Initiative (NWI). The NWI is the principle document driving the national water reform process in Australia, and the first instance in which Aboriginal interests in water had been formally recognised in national water policy. Sections 52 to 54 of the NWI make explicit the requirement for Aboriginal participation in water planning. In addition, these sections establish an onus on the Australian and state governments to ensure that catchment-based water allocation plans incorporate Aboriginal social, spiritual and customary objectives, and strategies for achieving these objectives (Council of Australian Governments [CoAG] 2004). These sections reflect a response to calls for improving the involvement of Aboriginal communities and the protection of Aboriginal water rights and interests in national water reform by peak Aboriginal organisations and Traditional Owners around the country.

The inclusion of these sections in the NWI creates a distinct class of stakeholders in the Traditional Owners and Aboriginal communities in the area subject to a water plan. These sections commit the governments of Australia to acknowledging and protecting the special category of values that Aboriginal stakeholders possess as Traditional Owners of the country's water resources. To date, however, there are no national guidelines to ensure the inclusion of Aboriginal rights or interests in water reform, and the explicit inclusion of Aboriginal interests in water plans has been uneven and rare, according to reviews conducted by the National Water Commission (NWC 2014; NWC 2007: 39). These reviews have found that most governments have made advances in recognising the need to address Aboriginal water issues and in the engagement of Aboriginal people in water planning. However, the review also found outstanding challenges to the allocation of water for Aboriginal purposes.

The desktop review of Aboriginal involvement in water reform in Australia published in 2014 highlighted the significance of Aboriginal knowledge and practice in achieving the ambitious program of water reform:

> *Indigenous Australians have managed their lands and waters sustainably for thousands of generations. Through their spiritual, cultural and customary connections to the landscape, they have acquired a deep knowledge and understanding of Australia's water systems. Incorporating this knowledge into Australia's water management approaches represents an opportunity for all governments to recognise Indigenous water issues and improve the sustainable management of our water systems.*

Currently, Australia's water policies require all levels of government to have regard to the recognition and protection of Aboriginal values in water resources management. However, there is insufficient rigorous and defendable information to enable jurisdictions to fulfil this requirement in a way which is meaningful for Aboriginal people.

A key demand from Aboriginal organisations around the country to ensure the protection of Aboriginal interests in water is for the allocation of Aboriginal-specific water entitlements, for cultural or commercial purposes. The 2002 report on Aboriginal onshore water rights produced by the Lingiari Foundation for the Aboriginal and Torres Strait Islander Commission found that one of

the four points of convergence across multiple Aboriginal groups was their expectation of a right to "exercise their spiritual, cultural, social and economic rights through access to water for commercial use" (Lingiari 2002: 76). In the same year, the Boonamulla Statement was developed out of a two-day workshop on natural resource planning for representatives of Aboriginal communities in New South Wales in 2002. The workshop was convened to prepare a statement about Aboriginal peoples' expectations of the New South Wales Government's planning process for water, catchment management and native vegetation. Included in the ten goals for resource management expressed in this statement was that:

> *access to water should be seen as a matter of social justice allowing Aboriginal communities priority access to the water market (i.e. through provision of allocation of water licences to Aboriginal people through an appropriate management structure such as a Trust).*[1]

This aspiration was re-iterated in MLDRIN Response to the Living Murray Initiative (MLDRIN 2003). This submission, which represented agreement across ten Aboriginal Nations in the Murray-Darling Basin, included a recommendation that a water allocation be made available to each of these Nations to enable them to exercise their custodial responsibilities for river management. At the discretion of each Nation, it was proposed that the water could be used to increase environmental flows, or to help generate a more independent economic base for their people (MLDRIN 2003: 7).

More recently, the call for Aboriginal-specific water entitlements, particularly in the context of the MDBA has been framed in terms of 'cultural flows'. The most current accepted definition of 'cultural flows', and the definition adopted in the Project, is:

> *Water entitlements that are legally and beneficially owned by Indigenous Nations of a sufficient and adequate quantity and quality to improve the spiritual, cultural, environmental, social and economic conditions of those Indigenous Nations. This is our inherent right. (NCFRP 2014)*

This definition was endorsed by representatives from 31 Indigenous Nations at a joint meeting of MLDRIN and NBAN under the Echuca Declaration in September 2010. Central to this definition is the requirement that these entitlements be legally and beneficially owned by Aboriginal Nations, and that the use of the water be unrestricted, and determined by those nations to improve quality of life for Aboriginal people. This revised approach is justified in relation to both access to enforceable property rights and to the achievement of social justice. The trajectory of water reform in Australia has tended towards an increased reliance on market mechanisms such as trading to determine trade-offs for water use and redress instances of over-allocation. Non-participation in the water market in this context is tantamount to non-participation in the primary mode of decision-making, and is unlikely to provide security to Aboriginal interests in the absence of enforceable property rights. The NWI seeks as its primary motive the establishment of resource security, and for consumptive water this tends to be about establishing security of entitlements to existing users. In this context, Aboriginal rights and interests in water resources are not guaranteed, but determined in competition with other users with recognised interests and potentially access to expanded purchasing power (Altman and Jackson 2009).

The current approach to cultural flows reflects the needs of Aboriginal communities to have their interests and rights in water given the commensurate status and security of legally enforceable tenure granted to other consumptive water users, rather than being defined on the basis of environmental or cultural heritage requirements. The limited attention to the establishment of cultural flow entitlements for Aboriginal people to date is linked to the assumption that Aboriginal interests in water are limited to the protection of cultural heritage or fulfilled by adequate

[1] The Boonamulla Statement is available online at: http://www.landcarensw.org/Boomanulla.doc

environmental allocations. This assumption, although consistently refuted in the position statements and submissions of Aboriginal groups and organisations around the country, has tended to prevent consideration of the commercial interests that Aboriginal communities may have in developing water resources. As has been frequently asserted by the research partners in this project, commercial activity is an inseparable component of culture, and attempts to define cultural use as distinct from commercial interest is artificial.

The current definition of cultural flows is also used to mark the distinction between outcomes for Aboriginal people derived from environmental water as opposed to cultural water. The term "Aboriginal Environmental Outcomes" (AEO) is used to capture the benefits to Aboriginal people obtained intentionally or incidentally as a consequence of environmental flows or environmental water. Some of the values that Aboriginal people have may be protected or enhanced by environmental flows, and this highlights the importance of including Aboriginal people in environmental flow assessment and in ongoing environmental water management. For example, environmental flows may be used to increase populations of culturally significant fish species or be used to ensure the continued health of vegetation species in key water sites. These outcomes are not assured in the setting or management of environmental flows in the absence of adequate Aboriginal participation. Best practice water planning must ensure the allocation of water for the environment also considers cultural water requirements, which would include water of sufficient quantity and quality to improve the social, economic and environmental condition of Aboriginal nations.

However, as illustrated in Figure 3, Aboriginal environmental outcomes are conceptually distinct from cultural flows. Cultural flows are water entitlements legally owned and beneficially managed by Aboriginal Nations. This water may be used to assist in the achievement of AEOs, but this is entirely at the discretion and according to the needs of the Aboriginal Nation itself. Should that cultural flow entitlement be managed in such a way to accrue an economic return, which benefit will be obtained by the Aboriginal Nation holding the property right in the water entitlement.

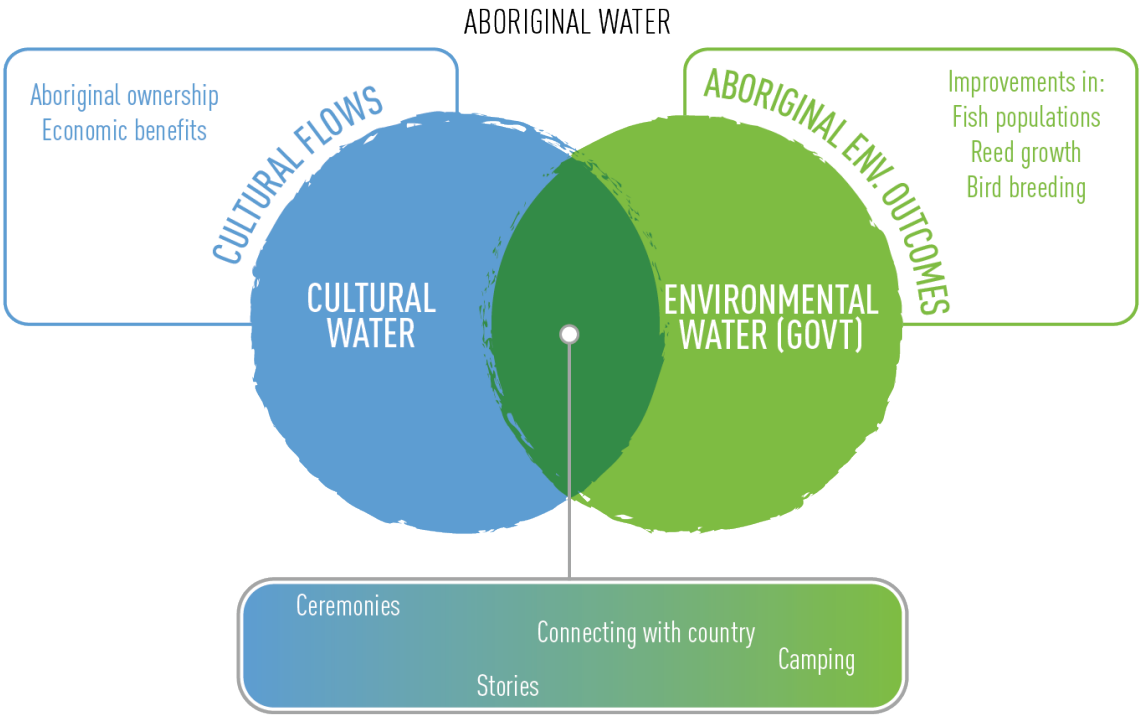

Figure 3: Distinction between environmental and cultural water endorsed by MLDRIN and NBAN (Aboriginal Environment Outcomes Pamphlet, n.d.)

It is noted that the ownership and control of a cultural flow water entitlement leads to specific and measurable benefits of Aboriginal people in and of itself. For example, there are identified identity, esteem and empowerment benefits associated with the increased capacity to fulfil cultural obligations to care for and manage Country. Similarly, the increased visibility as a recognised and valued stakeholder by government and others involved in water management has flow-on benefits for governance, planning and leadership. When understood in the context of potential economic returns from the entitlement, the full value of cultural flows, including but not limited to the environmental value, for Aboriginal households, communities and Nations becomes apparent.

1.2 Towards a conceptual model

Conceptual models can take a number of forms. They are often defined as a type of diagram which shows of a set of relationships between factors that are believed to impact or lead to a target condition; a diagram that defines theoretical entities, objects, or conditions of a system and the relationships between them. In the context of this project conceptual models will illustrate the response of cultural and ecological values to the delivery of cultural flows.

The research conducted for this Component of the Project was to lead to the development of a conceptual model or models of the relationship between water regime and the water interests, including cultural assets, values and uses, in the two case study areas. From the outset, it was recognised and acknowledged by the research partners that cultural protocols for the exchange of this kind of knowledge may have a determining impact on the structure and content of the conceptual models. Similarly, it was also acknowledged that the collation of findings in an appropriate and accessible form for research partners and others may be represented in a variety of alternative formats, such as narratives, art works, performance, mapping and through language. In this report, the conceptual models presented were developed in collaboration with the research partners. However, these models are to be interpreted as preliminary, and in the case of the Murrawarri, the basic structure of the model has not yet been approved by the research partners.

1.3 Cultural use and values typology

Aboriginal water values are deliberately defined in an open and emergent way for the purposes of this project. These values are noted to include cultural assets, aspirations and uses of a water resource across multiple time horizons, including mythological, traditional, historical, contemporary and aspirational. These interests are to seen to include all of the ways in which Aboriginal people value and use the water resource, how that water supports or sustains culturally important sites and practices, how it shapes and is shaped by beliefs, and the reliance on that water for the realisation of human well-being, identity, livelihood, quality of life and social cohesion.

Defining the scope of values to be serviced, protected and enhanced by the cultural flow is the first critical step in ensuring the adequacy, benefit or significance of the water allocation provided for this purpose. Terms used to describe the relevant values are alternatively assessed according to benefits, needs, significance and dependence. Each of these concepts invites a subtly different frame for analysis. The salience of a typology to better characterise Aboriginal water interests is an issue of activity inquiry in the Project. It is noted that such a characterisation will be the product of some combination of an adapted existing typology and the consultative process. The development of value typologies for water allocations has historically adopted one of two different approaches:

- Values are defined by participants in a process in terms that are meaningful and relevant for them (emic)
- Values are defined by a researcher or other external observer and applied to the community from an 'objective' perspective (etic)

Here, a typology of cultural values is proposed as a point of reference and as a prompt to elicit the full suite of water values where possible. The typology is presented as Table 2. The values outlined in the typology are implied in the conceptual models developed to date, however there is potential for these to be used to re-iterate or refine value statements with the research partners. The typology is provided here with the following caveats.

First, typologies should be used with caution to the extent that they may exclude values relevant to experience and expectation of local communities. Affective, custodial and relational values, for example, must be defined and articulated in the specific locations and according to the preferences of the Traditional Owners or their appropriate representatives. Similarly, prior research conducted for the Project identified the need to avoid concepts of value being artificially constrained by Western distinctions between economic and cultural, scientific and spiritual, and numerous other potential and non-applicable dichotomies. There is also a tendency for typologies to reflect disciplinary biases. Each discipline brings to the consideration of values its own criteria, strategies and techniques that it uses to assess values. Different approaches will regard some values as more legitimate or relevant, and will emphasise some and exclude others.

There is also a risk that pre-formulated typologies may limit the scope for the inclusion of values. Typologies may be assumed to exhaust the range of reasonable or legitimate values that participants can hold in relation to water. The more affective values are difficult to articulate in a format conducive to a typology, and remain unaccounted for if a list-based approach is adopted as definitive.

Prior cultural values assessments have tended to focus on the non-extractive and beneficial uses of water, for purposes such as recreation, lifestyle amenity, landscape preferences and for maintaining conditions for the harvest of aquatic resources (FPWEC 2011). In addition, values associated with specific sites and locations have been emphasized, due to the relative ease at which geo-referenced values can be accommodated within modelling applications and technical assessments. The approach specified here looks to expand the definition of cultural assessment to include, for example, custodial values (such as moral or cultural obligations for the care of the landscape for present and future generations), future use values (including commercial and enterprise development aspirations) and well-being values (such as the qualities of the resource or locations that contribute to physical and mental health, therapeutic activity, well-being and quality of life).

Table 2: Values relevant to the determination of a cultural flow requirement

Values relevant to the determination of a cultural flow requirement
Practice-based values: qualities of the resource or locations that is necessary to support personally, socially or culturally important practices, such as recreational use, resource harvest or religious and ceremonial practices.
Future use values: including commercial or enterprise development aspirations
Place-based values: places that are dependent upon the resource that are significant or valuable for their existence.

Affective values: qualities of the resource that sustain important affective qualities, such as aesthetic appreciation, ambience, inspiration, sensory responses, ecological appreciation, spiritual realisation and emotional well-being.
Custodial values: moral or cultural obligations for the care of the landscape for present and future generations. Custodial values include values associated with bequest, future options and the transmission of knowledge and learning.
Well-being values: the qualities of the resource or locations that contribute to physical and mental health, therapeutic activity, well-being and quality of life.
Relational values: contributions of a site or feature of the resource that sustains, represents or embodies a relationship to historical or spiritual connection with the landscape, identity, genealogy, law and custom as a whole.
Identity values: sites or features of the resource that contribute to self or group identification.
Social cohesion: sites or qualities of the resource that contribute to community connectedness, social interaction, trust, inclusion, sense of belonging and the reduction of conflict within a community.

1.4 Identifying water requirements

The intended outcome of this approach is to identify the community aspirations and long-term objectives that can be achieved through access to a cultural water allocation, and with sufficient detail to determine the specific water requirements or water regime conditions necessary to achieve those objectives. This process is necessarily iterative, as community objectives for water use and availability are assessed against feasibility and risks associated with the provision of that water. In order to facilitate the development of water requirements in a transparent and replicable way, the following steps are required:

1. First, the community aspirations, uses and values for the water resource are elicited, appropriately represented, and expressed as cultural flow objectives. For these purposes, cultural flow objectives refer to agreed high-level goals for the management of a cultural water entitlement, and identify the elements of the cultural flow regime required to service, protect and enhance Aboriginal water values and help meet community aspirations.
2. Information gathered on Aboriginal water values is used in conjunction with background ecological and hydrogical information to develop a conceptual model to demonstrate the connections between the hydrological regime, water availability and the cultural flow objective.
3. This information is used to specify the detailed hydraulic (width, depth velocity) and hydrological (ML/d) requirements necessary to achieve the cultural flow objectives.
4. Hydraulic and hydrological modelling is undertaken to assess whether the flow objectives can be achieved within the constraints of the resource. If it is not feasible, the cultural flow objectives can be re-iterated or refined, with improved understanding of the available options and constraints.
5. Management actions to achieve the cultural flow objective are developed. This could be in the form setting of sustainable yields and diversion limits for consumptive water, in the specification of license requirements or altering existing flow rules, in formulating specific management zones around significant sites, or in the design and operation of water supply

infrastructure. In most cases, the cultural flow objectives will require the allocation of water from the consumptive pool. Nonetheless, this stage should use the existing information to provide a range of management alternatives.

6. Subject to the demand and security of the resource, it may be necessary to model the impact of the provision of the cultural flow on the system as a whole, including the risks of the proposed management arrangement on environmental water and the security of the resource.
7. Finally, the flow rules are implemented and the responses (ecological, social, cultural) are monitored. Based on the findings from this monitoring and evaluation, these stages are re-implemented to continually improve the delivery of cultural water.

Component 2 of the project completes the first two steps of this adaptive management cycle. The methodology to determine cultural flow objectives, and the preliminary findings from the trial of this methodology in the case study areas are documented in the following sections of this report.

2 METHODOLOGY

A range of approaches to the determination of Aboriginal water interests and cultural values objectives have emerged over the last decade in response to community demand and national policy priority. The methodology developed and trialled in this case is based on the review of some of these methods, including international approaches where relevant. Among these approaches, the Cultural Health Index (CHI) developed in New Zealand (Townsend *et al.* 2004), the NSW Department of Water's Aboriginal Water Initiative and the Aboriginal Waterways Assessment (AWA) developed for use in Aboriginal communities by the MDBA, have the clearest application to this project.

Given the objectives of this Project, however, these approaches are not immediately applicable. The methodology here seeks to provide a structured process to assist the research partners to define their own cultural flow objective, and to design water management scenarios to achieve the targeted outcomes associated with that objective. In order to achieve this, the methodology must ensure that the full suite of socio-cultural values associated with the resource and its management are identified, including (and especially) the relationships and dependencies between those values. Further, the relationship between these values and the resource needs to be modelled to ascertain how these values will be impacted by changes in water availability and to the management regime. The approach has been deliberately designed to link up with and complement existing tools and methods, specifically AWA and the Aboriginal Water Initiative. This is intended to increase the likelihood of uptake of this approach beyond the life of this project.

This method outlines a structured means for integrating multiple lines of inquiry and the outcomes of established social inquiry techniques to identify, prioritise, and incorporate socio-cultural values in a water planning and management context. Working closely with each group through deliberate and structured processes, including trust and capacity building, are necessary to yield specific information that can ensure identification, prioritisation and inclusion of water-dependant socio-cultural values. This approach acknowledges that no single tool exists for a comprehensive identification of values, and similarly no techniques of valuation are currently capable of establishing a total value of water that can include all aspects of its importance, significance and benefit. Instead, there are a wide range of techniques and methods from the social science and economic disciplines that are suited to particular aspects of value assessment.

Through an adaptive framework, it is possible to articulate how the array of individual assessment and decision-support methods can contribute salient input to the planning process as a whole,

through identifying the informational requirements and demonstrating the inter-linkages and dependencies between the nested planning stages of assessment, management and evaluation.

The method consists of three stages:

> **1. Scoping:** analytical assessment based on available data or previously published research to identify the extent of the socio-cultural assessment required and the need for further investigation. Scoping will identify: the appropriate research partners; current trends in resource use and association; drivers of change (economic, land-use, demographic, environmental decline); and attitudes towards and resources for managing change.
>
> **2. Surfacing:** participatory and deliberative processes initiated to identify the suite of values, issues and concerns of the nominated research partners related to water. Consultation and participatory activities are matched to the engagement preferences of the nominated representatives in the case study locations. Protocols for the use of information and data obtained are developed and agreed by participants, included descriptions of how that is to be used.
>
> **3. Synthesis:** gathered information collated into diagrammatic, geographical information system (GIS) or narrative form for review by the research participants and partners. Deliberative and knowledge exchange tools are used to support research participants to come to an overall understanding of the range of values, how they are inter-related, and where trade-offs might be required. These processes are used to encourage a shared understanding of this overall assembly of resource-dependant values and to facilitate common agreement about the extent to which changes in water availability may impact on those values. Outcomes from the synthesis may include the articulation of a shared priority of values; however it may be sufficient for the representative groups to come to an appreciation of the values to be considered.

Through this method, and with the support of the research team, the research partners will decide on the how the information will be collected, recorded and presented, and the indicator framework for monitoring and the interpretation of the results in the case study areas.

2.1 Scoping

Scoping activities take place prior to and in conjunction with project inception and the obtaining of prior and informed consent of research partners. Scoping activities have tended to involve analytical assessment based on available data or previously published research to identify the extent of the socio-cultural assessment required and the need for further investigation. Scoping will seek to identify: the appropriate research partners; current trends in resource use and association; drivers of change (economic, land-use, demographic, environmental decline); and attitudes towards and resources for managing change. Scoping activities conducted in the case study areas also included deliberative process during the inception meetings to identify resource management goals, project aspirations and engagement preferences of the research partners. These discussions helped to clarify and determine the expectations of research partners and the choice of methods for eliciting and representing cultural values in subsequent stages of the research.

2.1.1 Research questions and information needs

Key questions guiding the scoping activities are:

- Who is in the landscape, and how are they interacting with that landscape?
- How are they interacting with each other?
- What are the forces of change and adaptation evident in the landscape?
- What resources do the community possess to respond to changes in the landscape?

Table 3: Semi-structured interview protocol

Theme	Questions
Value Questions	What are some of the places, species, or features are important to you about this site? Can they be mapped? How do they depend on water? What are some of the ways you use this site that are connected to water? Are there cultural practices that are important connected to here? Are there current or future uses that you can imagine? In what ways are these things important to you? For example, are they important for: • health (like medicinal plants, camping places)? • spirituality (like storyplaces or songlines)? • education (like learning, language, passing on knowledge)? • ceremony (such as men's or women's sites)? • resources (hunting, fishing, drinking water)? • recreation (swimming holes, meeting places)?
Condition, Trend and Pressure Questions	What condition are these places and features in? How is the site overall? How are they changing – for better or for worse? How were things different in the past? How do you feel about the ways that things are changing? What are some of the reasons for these changes? What are the pressures or threats that might lead to other changes in the future?
Aspiration Questions	What condition would you like them to be in for the future? How would you like this to be in 5 years? In 10 years? How would you like to leave them for your grandchildren? What are some of the changes you would see if things were on the right track? How would this place be different?
Planning Questions	What do we need to do to get them in that condition? What can we do now? How can changes to water access help make those changes?

2.1.2 Intended Outputs

- Baseline community profile including cultural aspirations for the resource, condition, trends, attitudinal information and risks to potential values.

2.1.3 Interlinkages and Project Dependencies

- Scoping activities will inform community consultation processes and the composition of representative groups if relevant.
- Data collation will assist in monitoring changes to the community (including health, wellbeing, demographic, quality of life and economic changes).
- Information and data obtained from monitoring and evaluation is used to supplement the community profile over time.

2.2 Surfacing

Methods for scoping and surfacing of values are well-established within social science research and natural resource management practices. Appropriate inquiry tools should produce credible findings, be transparent and consistently applied across different constituencies, and be contextually relevant and acceptable to the community. Such tools can be divided into three different categories:

- Analytical: methods to collate and interpret existing data and information sources
- Participatory: methods to involve the community in providing data and information
- Deliberative: methods to facilitate group processes where data and information can be exchanged and negotiated across diverse constituencies

General social science research tools such as interviews, focus groups, surveys and data analysis are all relevant for the scoping and surfacing stages, and there is extensive literature available on the use of these methods. The methods used to surface, specify and record of aspirations, uses and values and how these are represented were determined in consultation with the research partners in each of the two case study locations, subject to their preferences for engagement and consultation, and is further detailed in the discussions of findings below. All cultural knowledge and intellectual property (IP) identified through this stage of inquiry will be protected as per the Intellectual Property Research Agreement, which has included:

- ensuring that there is clean and clear ownership of IP through the process of FPIC (and signing of the Heritage Materials (IP) consent form as per the Service Agreement);
- making clear to all project team members their responsibilities in relation to IP management including, where appropriate, the maintenance of research records and the handling of research results prior to disseminating the IP;
- taking note of the rights and needs of stakeholders involved in the research;
- having ways of addressing cases where IP impinges, or potentially impinges, on the cultural, spiritual or other aspects of Aboriginal communities (refer to Service Agreement); and
- providing guidance in relation to potential conflicts concerning IP management, ownership, promotion, dissemination, exploitation and, where appropriate, protection of IP.

2.2.1 Research questions and information needs

- What are the range of benefits that people derive from the resource?
- In what ways do people depend on the resource to meet their needs?
- What places, sites, activities, and relationships in the landscape do people value, and how are these related to water?
- What features of the aquatic ecosystem are those values dependant upon?
- How are these values distributed socially and spatially?
- How do these values differ over time (seasonally, annually, planning horizon)?
- How do these values change at different scales (place-based, catchment, region) and how transferable are values across these scales?
- What is the relationship between the values held by different groups?
- Are they mutually supportive, co-dependent or exclusive?
- How do changes to these values impact on or affect other values?
- How dependant are these values on the current water management regime?
- If these values and practices are exclusive, what criteria are relevant for assessing which will be prioritised, included or excluded (replaceability, uniqueness, rarity, abundance)?

2.2.2 Intended Outputs

- Representative suite of identified aspirations, uses and values and their relative importance to the research partners at each site, with specific time, place and scale dimensions.
- A shared understanding of the relationships between the identified values that can be represented by narrative, diagramatic or visual form.

2.2.3 Interlinkages and Project Dependencies

- Information and data obtained from monitoring and evaluation will be contribute to assessing ecological responses and allow a comparison of cultural and ecological outcomes over time.
- Values are used as basis for synthesis to map correlations and relationships.
- Instances where the water requirements associated with identified values cannot be extrapolated or are uncertain are identified as knowledge gaps.
- Full extent of values identified will be useful for developing indicators to determine water regime requirements as well as outcomes as a consequence of providing cultural flows.
- Synthesis diagrams can be used to support integration assessment tools by specifying perceived causal relationships.
- Synthesis diagrams or models represent the community understanding of the system as a whole, which is necessary for the establishment of shared objectives.
- Assessment of the feasibility of management options may use the causal links to identify changes to values under different management scenarios.

2.3 Synthesis: Integrated Assessment

In third stage, the identified value relationships are used as the basis of an integrated assessment. Integrated assessment involves both relational modeling and participatory processes to generate a functional representation of the system that can be used to support decision-making, communication and, in some applications, prediction. Representation is interpreted broadly. The outcome from the system-building stage is a model or set of models which are capable of integrating technical and values information and can be used to demonstrate changes to value-components under different water scenarios. Simulation either through a software application or

through discussion and deliberation is used to develop a consensus understanding of the effects of alternative water regimes on values relationships. The value representations obtained through the inquiry stage are refined and used to populate the elements of the model. The model of the system serves dual purposes of technical integration and as a communication tool.

The rationale underlying the system-building stage is that the inclusion of socio-cultural values in the adaptive management cycle will be more relevant if the processes for identifying such values and quantifying their water requirements is embedded within other assessments typically conducted for the production of water plans. This includes environmental, hydrological and social and economic assessments. This recognises the interrelations and dependencies that socio-cultural values have with the other facets of water management. It is also based on the assumption that articulation and precision about values is necessary for them to be incorporated into trade-off negotiation and decision-making, including how they are impacted by changes in water availability. It is also central to measuring and evaluating the effectiveness of any changes to water management, and to compare and contrast cultural flow outcomes with ecological outcomes.

Explicit quantification of water requirements associated with values may not be required at this stage. It may be sufficient instead to specify thresholds or qualitative constraints that would create risks to those values. For example, it may not be necessary to determine the precise quantity of water to service recreational requirements, but it may be possible to determine depth, flow and quality thresholds that would prevent recreational use if exceeded. However, even this level of specification may not be required. Many of the tools available to support this type of integrated assessment can incorporate qualitative data, opinions and uncertainty. Ideally, the model should be sufficiently detailed to be capable of demonstrating impacts and effects of different water regimes – provided the areas and degrees of uncertainty are specified.

2.3.1 Research questions and information needs

- How are the identified values related to environmental water, stream flow and water availability?
- How do those socio-cultural values intersect and interact with the ecological, economic and social dimensions of the resource?
- How do changes in the availability of water impact on those values?
- Under what range of scenarios are those values risked or impacted by changes in water availability?
- What quantities of water are necessary to meet the array of socio-cultural values?
- If quantities are not determinable, what are the specifications of the water requirements, in terms of magnitude, timing, duration and water quality?
- What are the thresholds and tipping points for ensuring that those values are maintained?
- What are the threats and pressures on the delivery of water for socio-cultural purposes, and to what extent are water allocations decisions able to influence or mitigate against those threats and pressures?

2.3.2 Intended Outputs

- A co-developed model of the system that integrates socio-cultural values with biophysical and economic information;
- Agreed statement of objective(s) to be achieved, including values to be enhanced or sustained, and the relationships between those objectives;
- Specified water requirements or water regime conditions necessary to achieve those objectives; and

- Agreed indicators to monitor the impact of the cultural flow against the cultural flow objectives.

2.3.3 Interlinkages and Project Dependencies

- Integrated model of the system is used to develop scenarios that examine impacts of alternative management options.
- Areas of uncertainty identified as limitations to the model form the basis of inquiry that can be redressed through research or monitoring.

3 CASE STUDY LOCATIONS AND CONTEXT

From the outset, the methods for surfacing and specifying aspirations and values associated with the cultural flow requirements were indicative rather than prescriptive. It was envisaged that the finalised methods, and the particular research techniques adopted, would vary across case-study areas and in response to the needs of the research partners at each site. In both case study locations, an inception meeting was held with the Project team and research partners in order to provide an overview of the project, confirm expectations, engagement and participation needs and to clarify roles and responsibilities. The purpose of these meetings were to establish and satisfy the requirements of each of the research partners for FPIC.

During the inception meetings, the project team also worked through a deliberative process to identify resource management goals, project aspirations and engagement preferences of the research partners. The final choice of methods in each location was refined as a result of the findings from this scoping work, and was subject to negotiations within the project delivery team and the final approval of the research partners. As a result, this group will effectively decide on the selection of data collection techniques, assessment methods and monitoring indicators based specifically to the needs and contexts of the case studies.

Methods were selected having reference to the following criteria:

- **Community and traditional governance arrangements:** the tool(s) and approaches adopted will be attentive to and consistent with the traditional and community governance arrangements for management of country and heritage, including the recognition of authorisations and decision-makers.
- **Level of desired community involvement:** community involvement consists on a spectrum from consultation to partnership.
- **Preferences for involvement:** different groups have preferences for working collaboratively, including via private interviews, group discussions or facilitated forums.
- **Issues to be addressed:** the level of agreement of priorities amongst a group may require tools more suited to achieving consensus or, in extreme cases, resolving conflict.
- **Knowledge requirements:** the tool(s) adopted will also depend on the research partners' knowledge and experience of water planning and management, and more complex tools may be preferred with highly experienced groups.
- **Time required for implementation/Cost of implementation:** time and cost are major considerations and hard limitations on the tool selection.
- **Scale:** scale is relevant not only to the selection of tool, but also to the depth of the analysis required in the case study areas.
- **Expertise required:** we will prefer those tools that do not require expertise outside of the project team.

The following section provides a background to the two case study locations and summarises the methods used to date in each location.

3.1 Toogimbie Wetlands

The Toogimbie Station is situated on the broad floodplain of the lowland Murrumbidgee River (uppermost area of the Lowbidgee floodplain) downstream from the rural town of Hay, in western NSW. It is a former pastoral property dating from the introduction of farming to the region in the late 1800s (DEWR 2007). In March 2004, the Toogimbie Indigenous Protected Area (IPA) was formally declared, and has since been continually owned and managed by the Nari Nari Tribal Council. Toogimbie Station covers approximately 7,000 hectares, of which 5,000 hectares is the declared IPA conservation Area. The remaining lands are leased for agricultural purposes. The site is managed by the Nari Nari Tribal Council through culturally informed land management practices to promote environmental restoration of the largely degraded site, whilst ensuring the protection and enhancement the local Aboriginal culture and history. Management practices are in line with World Conservation Union Category IV - Habitat / Species Management Area, managed mainly for conservation through purposeful intervention. Toogimbie IPA also demonstrates the characteristics of a culturally-defined ecosystem within the Category IV classification, given the associations between the cultural management strategy and the regional biodiversity. Toogimbie has a critical role in landscape scale conservation by protecting key ecological assets, including species and habitats, in an area that has undergone substantial modification.

The Toogimbie IPA landscape includes flat former pasture lands contrasting with eucalypt-lined creeks and waterways, and a nearby floodplain. Particularly important to the Nari Nari people is Toogimbie's wetlands, which are home to iconic species and traditional medicines. These wetlands are in the northern section of the site located adjacent to the Murrumbidgee River, and comprise approximately 2000ha. The climate is made up of temperature extremes in summer and winter, but relatively consistent rainfall patterns (e.g. monthly winter-spring rainfall of approximately 31 to 35 mm, summer-autumn monthly rainfall of approximately 26 to 30 mm; source: Bureau of Meteorology). The natural flow pattern of the river is for high flows in winter and spring fed by upland areas that include the Australia Alps, followed by low flows in summer and autumn. However, upstream water storage and flow regulation means that overbank flows that would sustain important river, floodplain and wetland flora and fauna are now of reduced frequency and duration (MDBA 2012a and 2012b).

The Hay area was once part of a major aboriginal trade route and large social and cultural network (DEWR 2007). Much of the cultural history of the local aboriginal people was disrupted by European settlement. Toogimbie IPA activities seek to preserve important assets such as protecting scarred trees, campsites and burial mounds, as well as helping to reconnect the people to their land. Toogimbie IPA represents both a visual and spiritual link between the health of the land, its water systems and its people.

Toogimbie's lignum wetlands along the Murrumbidgee River are part of the region's first lignum floodplains to be set aside for conservation purposes (DEWR 2007). These freshwater seasonal wetlands support many local plants and animals—a 2002 fauna survey (Pennay et al. 2002) found 96 different fauna species including 62 bird, 15 native mammal, 10 reptile and 3 frog species. Tree and shrub species include river red gum, black box and smaller species such as boree or weeping myall, river cooba, dillon bush and nitre goosefoot (DEWR 2007).

The Murrumbidgee River is the second largest river in the Murray-Darling Basin and is home to more than 25 per cent of the Murray-Darling Basin's population. Land use is dominated by dryland grazing and cereal based cropping, which account for more than 75 per cent of land use in the Murrumbidgee River Valley. An additional 5 per cent of the catchment is irrigated, producing rice,

grapes, citrus, vegetables and other crops and livestock (MDBA 2014). The Murrumbidgee catchment (Figure 1) also includes the Ramsar listed site of Fivebough and Tuckerbill Swamps, and two wetlands of national importance - the Mid-Murrumbidgee Wetlands and the Lowbidgee Floodplain (Environment Australia 2001, NSW OEH 2014).

Cultural, environmental and irrigation assets within the Murrumbidgee system can be watered by releases from Blowering and Burrinjuck dams, but water delivery is constrained to in-channel flows that inundate the main river channel and low lying wetlands and creek systems with commence-to-flow thresholds occurring below bankfull height (Commonwealth of Australia, 2012a, 2014). Low-lying wetland assets include the Mid-Murrumbidgee wetlands, and areas of the Yanco-Billabong Creek system and Old Man Creek system. Pumping water directly to wetlands is possible in some cases, including at Toogimbie Station.

Water infrastructure on Toogimbie station has allowed the Nari Nari Tribal Council to water the wetlands in a way that emulates the historical flood regime prior to upstream development. Key to the restoration of the Toogimbie wetlands has been the Nari Nari's access to a 2150ML Cultural Access Licence (CAL). A CAL is one of the two types of Aboriginal specific-purpose licences for Aboriginal people available under the NSW Water Management Act. It is one of only two such licences that have been granted under the Act. In this instance, the on-site pumping and channel infrastructure complements the enclosing effect of a series of levees that establishes four 'cells' on the wetlands, three of which can currently be watered annually. The water available under the CAL has been used over the past decade to flood the wetland for the purpose of culturally-informed wetland rehabilitation, since the grant of the license in 2005.

Initial discussions with the Nari Nari Tribal Council during the inception meeting identified key areas of concern around the use of the CAL. These licences are only available to Aboriginal persons or Aboriginal communities and provide water for personal, domestic and communal use including manufacture of traditional artefacts, watering of domestic gardens, hunting, fishing and gathering, recreational, cultural and ceremonial purposes. The conditions of these licenses explicitly prohibit their use for economic gain, despite the high transaction and delivery costs associated with accessing the water. Cultural access licenses do not have the same guarantee of property right as other entitlements, and the licenses must be renewed annually. Additionally, the availability of cultural water is subject to demand by neighbouring irrigators. This means that it is typically only available in the winter, which is suboptimal for wetland restoration and plant growth. The license does not permit carry-over, which limits the ability to retain water for a larger flood event and encourages watering every year, which may not emulate the historical and pre-development wet-dry cycle.

For this case study, the research partners identified a clear role for the project to demonstrate the public benefit outcomes, including environmental outcomes, of the work done to date on the site. Further, there is a clearly articulated need from the community for access to additional water for the purpose of site rehabilitation, with greater control over the ownership and delivery of that water, including quantities, timing and resource requirements.

3.1.1 Inquiry and assessment methods in Toogimbie

Research partners at the Toogimbie site expressed a strong preference for deliberative group discussions as the preferred method of information sharing with an emphasis on working towards consensus. Facilitated group discussions both on site and in a workshop context were identified as the data gathering activity for this study area. The group also has a high level of knowledge and experience associated with planning and management of the site, including with the use of program logic approaches to monitoring. Prior to the deliberate processes undertaken to identify and determine the water requirements for the Toogimbie IPA, existing data and information

compiled for the site were reviewed. Given the history of land management of the site, there are a number of sources of information provided by research partners that were used to assist in the determination aspirations, uses and values of the site connected to the water resource. The group decided that an extension of their existing program logic for the site would be a suitable framework for the development of a conceptual model for cultural flows in this context. The table below documents summarises the research conducted to date.

Table 4: Methods used in the Toogimbie Case Study

Field trip	Meeting objectives	Methods used
March 2016, Hay Local Aboriginal Land Council Office, Hay NSW and Toogimbie IPA.	Provide an overview of the project, including expectations, roles, engagement and participation Satisfy research partners requirements for free, prior and informed consent Identify resource management goals, project aspirations and engagement preferences of the research partners	Group presentation Facilitated group discussion Site visit
May 2016. Toogimbie IPA.	Identify and document aspirations, uses and values and their relative importance to the Traditional Owners	Back to country visit Semi-structured group interview
June 2016, Hay Local Aboriginal Land Council Office, Hay NSW and Toogimbie IPA.	Review and clarify cultural information gathered to date Compile/collate information collated into visual, diagrammatic, or narrative form for review by the research participants and partners	Site visit Facilitated program logic workshop

3.1.2 Program Logic approach

As a result of work conducted for the IPA management plan, the Nari Nari Tribal Council have prior experience in the use of a 'program logic' approach to the monitoring and evaluation of their land management interventions on the site. Nari Nari Tribal Council prepared a MERI (Monitoring, Evaluation, Reporting & Information) Strategy as part of planning works in 2012, and this strategy plan now forms part of the wider Plan of Management. Through the preparation of this strategy, previous workshops had articulated long-term visions and management aspirations for the site, as well as management and landscape goals across long, intermediate and short term time horizons. This strategy had not been specifically articulated in terms of the water resource or with regard to cultural flow allocations, however it was decided in consultation with the Toogimbie research partners to build on the existing work to express cultural flow aspirations for the site to ensure continuity and consistency of effort.

Development of a program logic provides a participatory and rapid approach to producing a conceptual diagram that represents relationships between actions and end-state aspirations. A program logic effectively summarises and represents group knowledge of a given system through a collaborative process of defining the elements of a system (for example, water quality, species abundance or community health) and the relationships between these elements. In natural

resource management, program logic is used to demonstrate the chain of reasoning to show how intended consequences of actions and investments achieve short, intermediate and long term outcomes. The process produces a simple, clear graphic representation that helps communicate the intentions of a program or initiative, and engenders dialogue and understanding. These can serve as the basis of numerical or detailed scientific models, particularly if the dynamic relationships between the elements are specified. This latter category is sometimes referred to as "spidergrams" (Lynam et al 2007; Lynam et al 2002) or as 'webbing and chaining" in the social assessment methods literature (Taylor et al 2004: 64-65). Due to the specification of links between elements, the resulting model provides a simple means of modeling causal relationships where changes to one variable propagate throughout the other element in the model, or to identify key areas where multiple objectives cluster or are highly dependent on one variable. Complex relations are able to be depicted in an accessible way, and rapidly reconfigured through the course of group discussion.

A significant appeal of the program logic model is that it enables the identification of relevant indicators of long-term change in the instance where such change is beyond the scope of the monitoring effort. It serves to make the assumptions underlying activity explicit so that these can be assessed against existing evidence, or identified as opportunities for research and further inquiry. In this way, program logic supports the integrated assessment stage of determining cultural flows and provides a framework for monitoring or evaluation.

A program logic model was identified as the preferred conceptual model in this instance given the familiarity of the group with the approach, its conceptual salience to all research partners, including authorized knowledge holders and scientists, and the increasing adoption of this approach in natural resource management activity more generally. During the June field visit, a program logic for the synthesis of cultural flows was developed by the research partners in a facilitated workshop. The model was pre-populated with a series of system variables or elements, derived from prior discussions and semi-structured interviews. These were then supplemented by additional linking elements, and the relationships between these elements were identified and reconfigured through the progression of facilitated group discussion.

3.2 Gooraman Swamp

Gooraman Swamp is located on the floodplain of the Culgoa River in northern NSW, approximately 20 kilometers southwest of the Culgoa National Park. The Culgoa River is a branch of the Ballone River that rises in southern Queensland. The river flows in a southwesterly direction for approximately 490 kilometres from downstream of St George in southern Queensland to its confluence with the Darling River in NSW, between Bourke and Brewarrina.

The regional climate is semi-arid, with an average annual rainfall of approximately 410 mm (Bureau of Meteorology data, unpublished), and typified by cool winters and hot summers. The rainfall pattern is that of a summer-rainfall region, with highest mean rainfall in January-February and lowest rainfall in winter-spring.

Gooraman Swamp and the nearby Weilmoringle township are situated within the western district of the Darling Riverine Plains Bioregion. The bioregion is characterized by extensive floodplains of 10 major rivers: the Barwon-Darling, Culgoa, Birrie, Bokhara, Narran, Gwydir, Namoi, Castlereagh, Macquarie and Bogan. It has been estimated that 10 to 20% of the native vegetation in the Western Division has been cleared for agriculture, which is less such disturbance than other parts of the bioregion (NPWS 2003, 2003). The area surrounding Weilmoringle is comprised of Northern Riverine Woodlands, which is a habitat type that includes river red gum woodlands along river frontages and extensive coolibah–black box woodlands on the floodplains of the Culgoa River. As noted by the NPWS (2003, 2002) and Hunter (2005), the riverine woodlands on the Culgoa River

floodplain (particularly in the nearby Culgoa National Park) are the largest and least disturbed area of contiguous Coolibah woodland left in NSW.

Gooraman Swamp is a deflation basin perched on the floodplain of the Culgoa River. The local vegetation consists of river red gum and black box wood within and at the margins of the wetland, interspersed with coolabah. Gooraman Swamp is approximately 28 hectares in size and has a volume of approximately 320 ML at a full supply level (FSL, 125.6 m AHD).

Water delivery to Gooraman Swamp based on overbank flows from the Culgoa River is problematic and requires further investigation and agreement with the Murrawarri community, the NSW and Queensland governments, as well as upstream and downstream water users and other stakeholders (NCFRP 2016f).

An alternative to the overbank flows, would be through the installation of low footprint infrastructure (e.g. pumps and PVC pipeline) to enable water delivery into Gooraman swamp when flows in the Culgoa are above baseflow but below bankfull. This option requires further consultation with the Murrawarri community.

3.2.1 Inquiry and assessment methods in Gooraman

Murrawarri research partners indicated a desire for a broad array of information gathering techniques, including site visits, one to one interviews, video documentation and facilitated discussions, in order to best capture the existing site knowledge and values. There was a stronger emphasis on diverse methods to involve the community in providing data and information, highlighting the importance of this information in informing trade-off decisions about future cultural water and the legacy value of documenting this information beyond the project.

Table 5: Methods used in the Gooraman Swamp Case Study

Field trip	Meeting objectives	Methods used
March 2016, Weilmoringle.	Provide an overview of the project, including expectations, roles, engagement and participation Satisfy research partners requirements for free, prior and informed consent Identify resource management goals, project aspirations and engagement preferences of the research partners	Group discussion Site visit
May 2016, LedKnapper Nature Reserve, Northern NSW.	Identify and document aspirations, uses and values and their relative importance to the Traditional Owners	Participant observation (Back to Country weekend) Group presentation and forum One to one and small group interviews Video documentation

To date, one on one and group interviews have been conducted with key research informants and knowledge holders. These interviews were recorded by video and/or audio recording. Supplementary analysis has been undertaken where relevant data sources are available. The data

from the transcribed interviews and other documentations have been used to generate a conceptual model according to the same program logic used in the Toogimbie case study. The resulting conceptual map at the time of preparing this report has not been approved by the research partners at the Gooraman site. Therefore, substantial revisions are envisaged through the course of upcoming field research.

4 RESULTS

4.1 Community aspirations for cultural flows

4.1.1 Toogimbie

Water requirements for the Toogimbie IPA centred upon the Toogimbie wetland as a site of cultural significance for contemporary cultural practice and the transmission of inter-generational knowledge, through environmental restoration and Aboriginal land management. Water is vital to the rehabilitation of the wetlands, and the Aboriginal land management practices on the site are conducted as part of the fulfilment and demonstration of broader social arrangements and cultural practices. Although it was acknowledged by the research partners that the knowledge of stories and cultural history was variable, there is a deep commitment to and understanding of the way in which culture is enacted and re-enacted as practice whenever members of the community are on the site, and that "cultural practice always happens when people are on country". In this way, the management aspirations reflect the significance of Toogimbie as a site of cultural regeneration and as a place of education, learning, well-being and capacity.

The importance of the Toogimbie wetlands in building personal and cultural resilience for the Nari Nari is reiterated throughout the documentation relating to the site that express its values ecological and social values. Centrally, the Nari Nari Tribal Council have identified their vision and long-term aspirations for the Toogimbie IPA site in the Plan of Management:

> *"The Tribal Lands will be a place of pride for Aboriginal people. The land will be protected, its cultural and natural values enhanced, creating a quality environment for present and future generations".*

These natural and cultural values are further specified in the Management Plan as:

- Significant nesting and breeding area for wetland birds
- Shrubland and plains country managed for noxious and feral species
- Riparian zones, stream bank areas and the Murumbidgee River – habitat for native aquatic and mammal species
- Future potential of wetland to attract regional threatened species
- Maintenance of bush medicine and food sources for generations to come
- Refuge for wildlife in a developed landscape (farmland, irrigation, river regulation)
- Sense of ownership, pride and connection to Country
- Physical reconnection to culture and Country
- Location of significant sites, including burial sites and occupation sites
- Socio-economic potential for community
- Traditional harvest (Fish/hunt/gather foods and medicine)
- Cultural knowledge, stories, experience as a community

Although these values are not expressed specifically in relation to water, there is an implicit relationship between the fulfilment of these management goals and access to water. The use of the cultural water allocation has been the driving force and limiting factor of efforts on the

Toogimbie site to re-instate the original vegetation and biodiversity for environmental and cultural benefit. The deliberative workshop context was used to determine the interdependency between these aspirations and values and the water resource, and to assess the impacts of changes in water availability on the capacity of the Nari Nari to achieve these outcomes.

Three overarching aspirations directly attributable to a cultural flow were identified:

- Pursue permanent protection of the wetland site under the Ramsar Convention.
- The achievement of economic independence through enterprise development and water trading.
- Sustainability of the site as an educational facility for intergenerational transfer of cultural knowledge and practice and as an exemplary demonstration site of Aboriginal management of Country.

All three aspirations were dependant on access to sufficient water of appropriate quality to regulate the movement of water across the entirety of the wetland on the IPA site, and with a goal for that water to be returned to the river with improved quality. This was as essential to landscape rehabilitation efforts, and would in turn improve water quality on site and in the river, improve aqua-ecology and create economic opportunities for the Nari Nari linked to ecological, scientific and cultural tourism. Economic opportunities were also identified in the temporary trade of entitlements when water was not required, or to provide water access to Aboriginal communities downstream. As was consistently expressed by a number of research partners, access to an additional water allocation is seen as “way out of welfare and as a way of getting people on country and involved in on-ground projects.”

Intermediate ecological outcomes were identified particularly in relation to the aspiration of achieving a Ramsar listing for the site. Ecological outcomes were also linked to the role of the site in providing a demonstration site and a source of inspiration for Aboriginal and non-Aboriginal people as a working example of cultural management of Country. Priority ecological outcomes were identified as:

- Establishment of conditions to enable breeding event of Black Swans, which were identified as a priority and iconic species for the site
- Improved habitat for migratory waterbirds, colonial nesting or shrubland nesting birds, including an established rookery
- A permanently watered site in an environmentally appropriate location on the site
- An increase in established permanent vegetation, primarily red gum, lignum, saltbush, nardoo, old man weed, and common reed.
- Increased animal population, especially of threatened species such as the Southern Bell Frog, but also animals of historical and cultural importance such as kangaroo, emu and koalas.

A greater prioritisation of these intermediate outcomes is necessary to identify their feasibility, or whether these goals are complementary or mutually exclusive. It should be noted that the target species for rehabilitation on the wetland site variably have cultural and conservation significance.

Employment, training and education was critically linked to cultural management of the wetland and its contribution to the maintenance and regeneration of cultural knowledge and practice. Selective cultural tourism activities, including use of the site for science and research tourism, was seen to complement these goals. Although the employment and education outcomes were valued by the research partners on their own terms, specific mention was made of the way these contribute to mental health and personal self-esteem of local people, especially young people. In the longer term, these outcomes were linked to long-term sustainability of management interventions, to the emergence of new community leaders and to improved community

governance. These in turn created the conditions for improved knowledge and the retention of knowledge, both integral to the cultural regeneration aspirations of the community. The importance of maintaining control of the management of the site is has a deeper cultural significance due to cultural obligations for the maintenance of artefact, burial and occupation sites, and connected to the belief in the continuing spiritual presence of ancestors in the landscape.

The contribution to public beneficial health outcomes were linked to greater access to traditional medicine, but also the wider benefits associated with mental health improvements of Aboriginal people on Country, to the reduced influence of drug dependence of community members involved.

In addition to a cultural flow entitlement of sufficient quantity to enable the watering of the fourth cell to deliver the full suite of socio-cultural benefits, the group identified three foundational activities necessary for the effective application of a cultural flow:

- Improvement to cell embankments and pumping and piping infrastructure to appropriately manage watering regime
- Improved access to the site, through the construction of boardwalks and viewing platforms
- Improved hosting facilities on site, including accommodation

The identification of aspirations, uses and values, and the linkages between these, are summarised in the program logic – provided as Figure 4 overleaf.

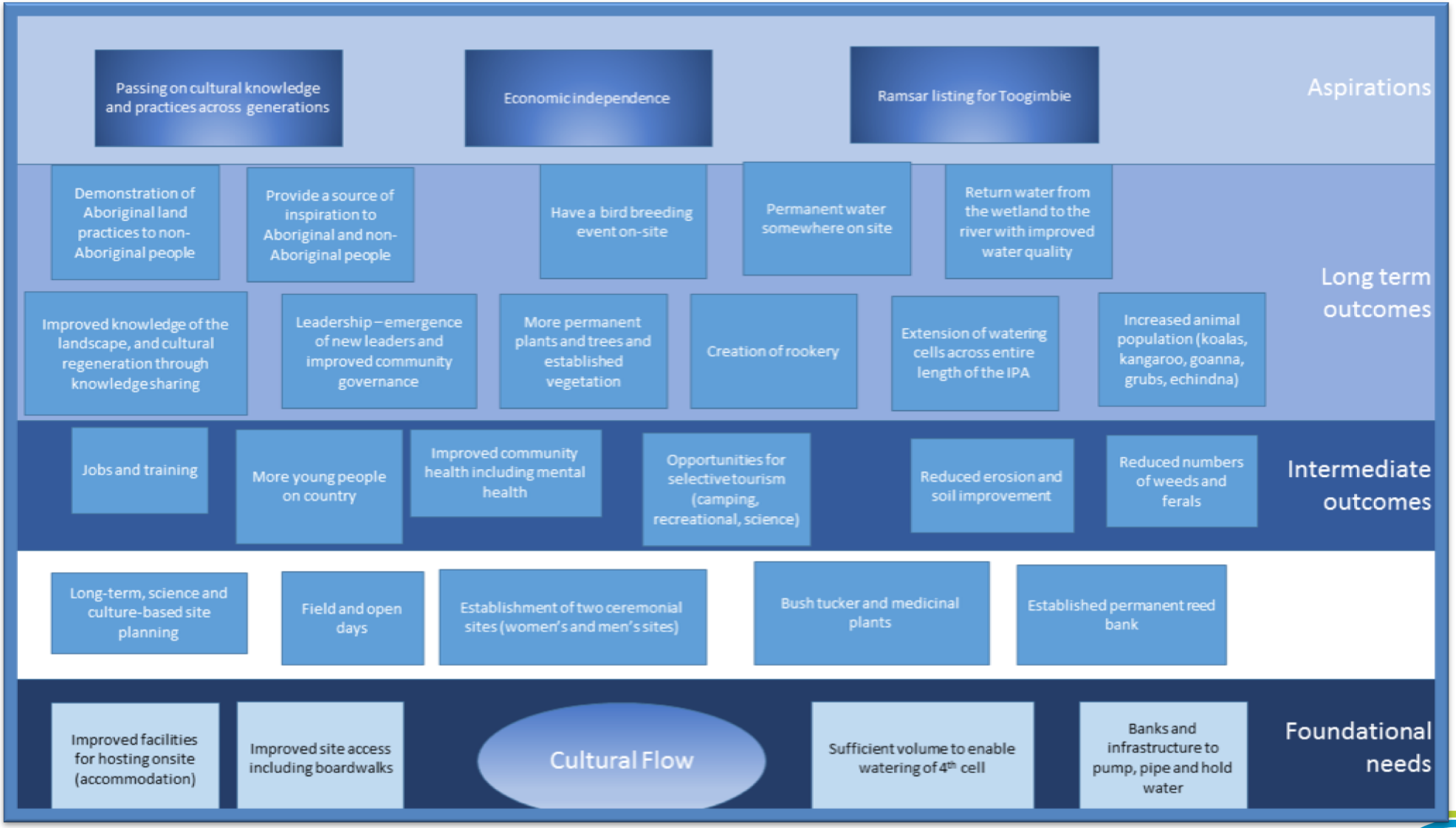

Figure 4: Conceptual model of Toogimbie IPA cultural values

Immediate to short-term activities identified and subject to the availability of additional cultural water are especially relevant to the project, given that the scope of the Project study design is limited to the evaluation of a single-intervention watering event. These are the outcomes most conducive to short-term monitoring, and include:

- On site gatherings, including field days, open days, back to country visits, workshops, trainings and volunteer days
- Improved site planning through evidence-based cultural and scientific information
- Establishment of ceremonial sites, including a men's and women's site
- Increased bush tucker and medicinal species
- Establishment of a reed bed
- Reduced soil erosion
- Reduced numbers of feral species and weeds

The program logic model presented as Figure 2 has been used a conceptual basis to articulate the relationships between cultural flows and Nari Nari aspirations for the management of Country. In the following sections, this model will be used to determine cultural flow objectives for the site for both the cultural flow trial and for the site's longer term water management goals, and the indicator framework for monitoring and evaluation of cultural watering outcomes.

4.1.2 Gooraman Swamp

In contrast with the Toogimbie site, the Murrawarri aspirations for water management at the Weilmoringle site relate primarily to correcting the negative impacts of the current flow regime, and specifically those impacts on the culturally significant sites, processes and practices derived from the historical flow regime of the Culgoa River. A cultural water requirement was seen as crucial to the restoration of that historical water regime, including the patterns of flooding and the wet/dry cycle associated with significant off-river sites such as Gooraman Swamp. It was recognised by all Murrawarri partners that the changed conditions of the river due to upstream development was having a negative impact on both environmental values instream and for the riparian ecology, and that this in turn had a cultural and social impact on the community. However, there was not an emerging consensus in the interviews about the preferred cultural flow objectives or the preferred water management scenario. Different opinions are evident within the group regarding how a cultural flow entitlement could be best used to redress the ongoing degradation of Aboriginal water values at the site, and there is an opportunity for the Project to provide an evidence base to better inform the community about the feasibility, consequences and risks of the varying cultural flow options.

Aboriginal hydrological knowledge of Murrawarri is connected to the *Mundaguddah*, the name that the Murrawarri give to the Rainbow Serpent. The *Mundaguddah* travels across Murrawarri Country through the subterranean channels, thereby linking together a series of significant water sites through Murrawarri country and throughout the Murray-Darling system. In particular, the presence and movement of the *Mundaguddah* relies on sufficient quantities of water present at an important waterhole in the Culgoa River, the Gerrara Springs and Gooraman Swamp. Each of these sites has associated cultural practices, obligations and established cultural prohibitions linked to water availability, and research partners noted that all three water sites have been varyingly impacted by upstream development. The importance of cultural flow, as opposed to changes to environmental water, is evidenced specifically in relation to the cultural water requirements of Gooraman Swamp:

> *To get water in the river – that's why I wanted to link both Gooraman Swamp and the* Mundaguddah *water hole, because there is a correlation. There's a connection there from the* Mundaguddah

> *waterhole to the Gooraman Swamp, and that's of cultural significance. And that's the difference between the environmental flow and the cultural flow. Because [getting water to Gooraman Swamp] is fulfilling our cultural purposes. If we look at the two, some of it will overlap. So for example, the* Mundaguddah *waterhole and Gerrara Springs will fall into the environmental flow category. Because if you get in the Culgoa, down to Weilmoringle, and you fill that waterhole up, and you have enough water flowing down the system, then there are a number of waterholes, the connection to this place here. [Gooraman Swamp] is his home. The connection then allows him to travel. It's the same – there are all different names for him all through the Murray. There's a common connection. (pers. comm. F. Hooper, 22/06/15)*

In the absence of a cultural water allocation, water delivery to Gooraman Swamp based on overbank flows from the Culgoa River during flood events is entirely dependent on diversion and storage of flood flows upstream of Weilmoringle.

Given the importance of the Gooraman Swamp, Murrawarri Traditonal Owners have cultural obligations to maintain the ecological health of the site. However, the modified system has impeded the Traditional Owners capacity to fulfil these obligations. In particular, there is a responsibility to maintain the health of the river red gums, as spirit trees, which represent the continuing presence of the ancestors in the landscape and establish means of communication with those ancestors. There is a deep spiritual significance to the health of the river red gums at Gooraman Swamp, which depends on a flow regime that is no longer satisfied in the altered system.

> *That spiritual connection is hard to explain under this system. Because the environmental system is about the ecology. This is about the spirit. So that's our religion to a certain extent. Part of our religion. That would be the equivalent of a church - kind of. That would be connected to other stories as well. That's why this research is important, because of what it can show. (pers. comm. F. Hooper, 22/06/15)*

Although the exact requirements will be subject to further inquiry and confirmation, it is generally agreed by the Murrawarri research partners that a return of the pre-1990 frequency of natural inundation of Gooraman Swamp would satisfy the needs of the Traditional Owners of that site.

Research partners also identified a wide range of ecological and cultural values at the site that would be re-established and protected as a consequences of the restoration of Gooraman Swamp to its historical flow patterns. For example, having water in Gooraman Swamp was the key driver of the return of migratory birds to the site:

> *Once you fulfil the water requirements of Gooraman Swamp, it also triggers all of these Aboriginal environmental outcomes. Because once the swamp is full, the birdlife come back. A lot of the people from Weilmoringle were evacuated out during the 2011 floods. So they have never seen the results of the flood at the swamp. We'd sit there of an afternoon, and there would be thousands and thousands of birds just coming back to nest. It was full for probably nine months, or it at least had water in it for eight or nine months. I don't know whether you've seen all the old nests in the trees? It's also a breeding place for all different types of birds. Including migratory birds that came in, like pelicans, brolgas coming back. (pers. comm. F. Hooper, 22/06/15)*

Other culturally significant values included the proliferation of bushfood species, including iconic fauna species relied upon for hunting and the availability of plant species for medicine & practice.

It was also seen as vital to the resumption of Aboriginal and traditional land management at the site. The appropriate conditions for seed gathering, the re-establishment of fire management techniques and the reduction in weed species were all connected to getting water to the Swamp at the appropriate time and duration. Traditional land management by authorised Traditional Owners on their own Country was seen as integral to improved cultural esteem and identity

benefits that are connected to the fulfilment of cultural management, and this is consistent with the experience of cultural management of Country around Australia. In this case, increased cultural management includes the obligations to downstream communities to maintain the home and protect the spirit of the *Mundaguddah*. These obligations were referred to in multiple interviews, and it is evident that the lack of capacity to fulfil those obligations has had an impact on the spiritual and emotional life of the Traditional Owners in the community.

Cultural management of Country is linked to the long-term aspirational goals of Murrawarri partners, who articulated strong connections between the health of the water sites, access and availability of those sites for cultural practice, and the intergenerational exchange of knowledge. These values were cohesive in the context of community members across generations spending time together on Country. The act of being on Country was seen to generate positive mental and physical health benefits, and into the longer term was seen as the primary factor supporting the retention of the Aboriginal population in the area.

> *When you come back on Country, it's like an energy that comes from the earth and flows through your body. It regenerates you. And that's what happens when people come home, when they come back from the city. Because when they are in the city, they are on other people's Country. When they are on Country, they are learning about their own culture. They're learning in a way that's educational and cultural... Coming home, coming back on Country – it regenerates kids. They feel that they can be free. But in the city they're restricted by laws, restricted by another culture, restricted by another lot of processes and they are trying to navigate those processes. Through our culture, you can install certain disciplines without them really knowing or understanding the details or the intricacies. And that's the way that Aboriginal people are taught. We weren't taught all the intricacies about how things work – it was learning through being on country, doing things on country. (pers. comm. F. Hooper, 22/06/15)*

Quite independent of the use of the cultural water entitlement for the protection of sites and the enhancement of cultural value, Murrawarri partners recognised the importance of having a water entitlement in and of itself as a means for improved Aboriginal participation in water reform. It was seen as a means to "get a seat at the table with the other water holders" and a step towards a more formalised relationship and level platform for negotiation with government agencies and other water users in decision-making about water management. This is part of the aspiration of the community for training and jobs for Aboriginal people in managing water trading, environmental flows, compliance and enforcement, providing water services or conducting environmental monitoring. For example:

> *Through this, and through creation of monitoring programs, that money stays in the region. One of NBAN's aspirations is establishing a training college for monitors of the system within the northern part of the Basin. Very similar to what they are doing in the Great Barrier Reef. Through their native title negotiations with the Queensland and Commonwealth governments, they are now becoming the environmental police of the Great Barrier Reef… They're training aboriginal people in all the marine operations to make sure that the people working are fully trained in all the environmental aspects, and all of the cultural aspects as well. And one of our aspirations through the Murray Darling Basin Plan is that we can become the monitors and environmental police and the cultural police of the northern part of the Basin. So Aboriginal people are contracted by the Government - so that a stretch of river that runs through Murrawarri lands and the Murrawarri Nation can be monitored by Murrawarri people, to say that these are the benefits and these are the results that are coming through. That includes working with scientists. For example, I know there is a scientific project on Mundaguddah waterholes and fish habitat. There's an importance about how we get involved in that work and how that money can be brought into the region to get Aboriginal people employed. So there's a twofold process – it's about looking after our environment, our traditions,*

> *our sites and our places, but it's also looking at how we can build now to keep people in the bush, on country, employ them and give them that quality of life. (pers. comm. F. Hooper, 22/06/15)*

This is further evidence of the importance of cultural water for building the capacity of Aboriginal Nations for self-reliance and greater sovereignty:

> *It's hard to explain the benefits of it, but you are much more contented when you can live in two worlds. We have white society imposing their culture on us, and we're still trying out how do we fit into that system. It's hard for us to fit into a system that we don't understand, when we come from a system that's thousands and thousands of years old. Our people are still trying to adjust to that system as well. (pers. comm. F. Hooper, 22/06/15)*

Murrawarri partners raised concerns about the potential risks of diverting water from the river baseflows, and the impact that this would have on cultural and social values associated with the river itself. Partners expressed an interest in better understanding the impacts of watering Gooraman Swamp on the water availability flow, and especially the fish populations, water quality and swimming conditions, of the Culgoa River. This information was considered important should a cultural water allocation become available to the community in the future. The river supports community cohesion outcomes associated with fishing and the harvest of traditional foods and medicines. These were seen to have effects flow on effects for community health, decreased crime, supplementing household income through harvest. The association and community interaction engendered by a healthy fish population and riparian corridor was seen to have a high degree of impact on quality of life and contribute to the desirability to maintain connection to country:

> *Going down getting bushfoods, there's a big reliance on bushtucker, in terms of health outcomes, but also in social impact as well. Because the social impact is less crime. Which is an economic impact on the government and the town. I think they're not looking at that. All they are looking at is prevention through prison. And if you are looking at prevention through prison, all the evidence shows that it isn't working. That's why the research we are doing here can show that from a cultural perspective, we can fulfil some of the other objectives. (pers. comm. F. Hooper, 22/06/15)*

Also:

> *If you have a bank flow come down, you take care of the all of the stuff within a 30 metre riparian alley down the river, so people can collect bushtucker. You can achieve that with additional water in the Culgoa river.*

As with the cultural practice associated with Gooraman Swamp, there are significant cultural connections between fishing, cultural education and the continuity of culture:

> *So if they want to go down to the river to fish for cod, or yellowbelly or catfish or whatever, they can do that. They don't have to go to the big dams or anywhere else, they can do it on their own river…*
>
> *…*
>
> *A lot of them go down and catch fish straight from the river, gut them and throw them straight on the gridiron and cook them up with Johnny Cakes. And that's education too, because they do it as a family. Not just one or two people. The whole family goes down together. Sometimes, you get most of the community down doing it, all fishing at the same time. So I just get the sense from the social side of it, measuring the amount of activity on the river if there's water coming down.*
>
> *…*
>
> *They go hunting – a lot of them would be out looking now looking for emu eggs. In Spring, around September, they're out looking for quandongs. All of that stuff, that's the two-way education that*

> *unfortunately kids don't get access to in the city. We're a bit lucky because we've got that access to the bush, and you can throw all the kids into the car and go looking for bush tucker, and that education is still there. It's a different type of education. It's life skills education, but from our perspective. It's about knowing where to get bushtucker, as opposed to reading it out of a book. There is that two way education going on, but it's not within the curriculum of the education system. (pers. comm. F. Hooper, 22/06/15)*

Through the process, it was also suggested that the work conducted for this project could be used to generate a cost-benefit analysis that compared the public investment in education and health programs for Aboriginal people in the region with the cost of a cultural water allocation. It was suggested that many of the outcomes that are intended to be achieved via government programs can be achieved more effectively and more cost-effectively by a cultural flow allocation.

Based on the interviews and group discussions conducted to date, the project team have compiled a tentative conceptual model developed for the Murrawarri that uses the same program logic framing as that used for the Nari Nari. This is provided overleaf as Figure 5.

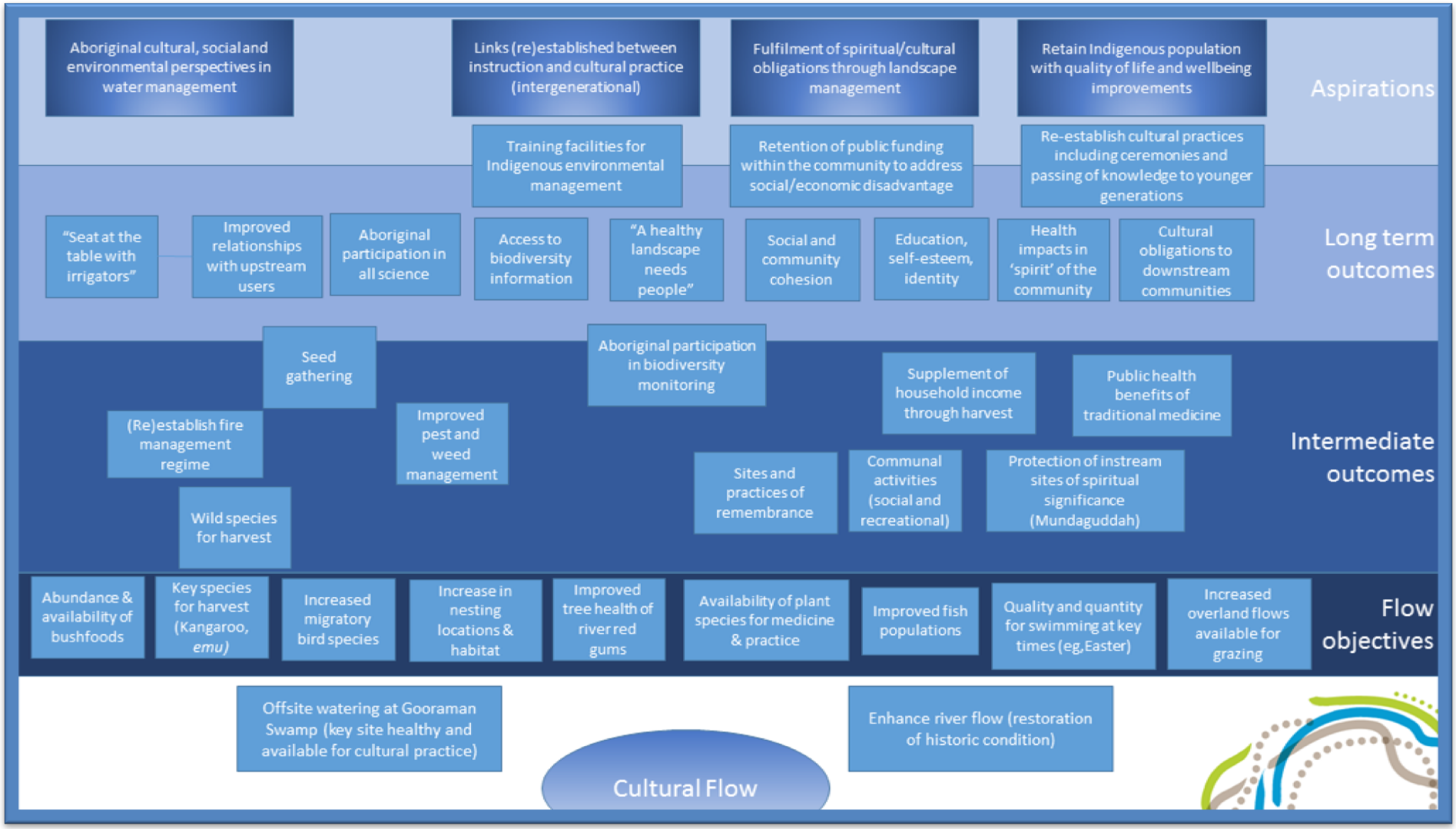

Figure 5: Conceptual model of cultural flows for the Murrawarri

4.2 Quantifying water needs for cultural uses and values

4.2.1 Toogimbie

The intended outcome of this approach is to identify the community aspirations and long-term objectives for cultural water with sufficient detail to determine the specific water requirements or water regime conditions necessary to achieve those objectives. Ultimately, the identified aspirations will need to be expressed as cultural flow objectives for the site that can be translated into hydrological and hydraulic terms. This is so that the requirements can be described as flow events of a certain magnitude, frequency, extent, duration, depth, velocity, water volume or other relevant variable. In most of the assessments of cultural water requirements conducted in Australia to date, it is common for the findings to show that Aboriginal values are best satisfied under pre-development flow regimes. This is anticipated, given that the historical Aboriginal cultural uses and values around water sites and resources would have developed commensurately with water availability and environmental condition. In this case, however, the return to a pre-development or 'natural' flow regime will not meet the cultural flow objectives specified by the research partners.

This is due to the specific purpose of the cultural flow in the rehabilitation of the wetland in order to protect and re-establish conditions for key species or habitats in ecosystems under contemporary developmental pressures. The use of cultural water is not intended to restore the Toogimbie wetland to a pre-development condition, but to manage the landscape in order to re-establish species and conditions of cultural and conservation significance. In this instance, there is a need for greater specification of the cultural flow objectives in order to set the specific hydraulic (width, depth velocity) and hydrological (ML/d) requirements, and to test the feasibility of those requirements against the hydraulic and hydrological modelling to see what is possible.

Two cultural flow objectives options are presented for consideration:

a) Obtain a sufficient volume of water to fill the fourth cell as a result of the movement of water across the entirety of the wetland on the IPA site, to enable that water to be returned to the river with improved quality, or
b) Establish a water regime conducive to the breeding cycle of Black Swan and other iconic waterbird species

For the purposes of the water trial to deliver cultural flows to Toogimbie IPA in the second half of 2016, the cultural flow objectives will need to be expressed in a short to medium time frame. The proposed flow objective for the trial is:

- Establish a water regime to increase the abundance, extent and condition of identified wetland vegetation species in the three existing cells – lignum, nardoo, common reed

This objective will contribute to medium term goals of reducing the extent of weed species, improving soil condition and reducing erosion in the wetland site, and contribute to the establishment of more permanent vegetation on site.

In all cases, these options represent a critical stage in the program logic, where the range of identified social, economic and cultural benefits and outcomes cluster. At this stage, however, these options have not been reviewed by the Nari Nari Traditional Owners and research partners. Once these cultural flow objectives have been finalised with the Research Partners, ecological and hydrological modelling will be conducted to determine the water and management requirements, and the feasibility of those requirements. These objectives may need to be iteratively refined based on the modelling and recommendations. The indicator framework for both the long-term

M&E planning for the site and the monitoring and assessment of the flow trial in the Project will be presented based on these objectives.

4.2.2 Gooraman Swamp

For the Murrawarri, the identified priority Aboriginal values would be enhanced and protected by any intervention that could assist the return to a pre-development or 'natural' flow regime. Given that there is ongoing discussion with and within the community about the preferred management scenario for a cultural flow allocation, there are two potential cultural flow objectives to be considered:

a) Re-establish the historical (that is, pre-1990) flood pattern at Gooraman Swamp through off-stream watering to ensure that the site is healthy and available for cultural practice
b) Supplement environmental water and flow to enhance river flow to restore the historical and pre-development condition

These cultural flow objectives are not mutually exclusive, and it may be possible for both objectives to be targeted in alternate years or over an appropriate timeframe. The viability of achieving multiple cultural flow objectives will be partially determined by the water requirements to achieve these. Again in this case, future consultation will result in greater specification of these cultural flow objectives in order to set the specific water requirements, and to model the feasibility of achieving those requirements. One proposal for determining the water requirement for Gooraman Swamp is to determine the ideal inundation regime for River Red Gum health. The River Red Gums are seen to be the keystone species that connects the cultural and ecological values, and the water needs for River Red Gums are well understood by ecologists:

> *We need the cultural flow to fulfil our spiritual side of it, into Gooraman Swamp because of the trees. Because of the red river gums. The Red River Gums have the same significance as the spirit trees…. When you sit under Red River Gums in these places, the old people talk to you through the leaves. (pers. comm. F. Hooper, 22/06/15)*

Alternately, the water requirements for Gooraman Swamp could be determined by reference to the historical hydrological data or to local knowledge. Research partners suggested that prior to the upstream diversions, Gooraman would receive water once every three years and that this was the basis for the health of the system:

> *It's dependant on cultural flows getting to Gooraman. On average, once every three years. Now, on average once every ten years. Based on … some investigations [we have accessed]. We had records of Weilmoringle station – I don't know if we still have them – but my partner went through it, and she found on average it used to flood once every three years. And now, with all the development upstream, that water is not coming through. (pers. comm. F. Hooper, 22/06/15)*

However, in this case, the major impediment to this cultural flow objective is not the determination of water requirements, but the difficulties associated with the practical requirements to get water into Gooraman Swamp according to research partners' expectations. A number of the Murrawarri research partners expressed deep concerns and opposition to the establishment of infrastructure, including pumps, piping or diversion channels, to physically deliver water from the Culgoa River to Gooraman Swamp.

> *We can focus on keeping the river healthy, so if you can get water down the system, you can install mechanisms to pump into Gooraman Swamp if you need to, if that's one of the aspirations. But to get it into Gooraman Swamp, you'd need to have some kind of irrigation pump down at the river.*

> *We don't really want an irrigation pump down by the river. So if you can get more water into the system, you might have more flood events.*

This limits the means of implementing cultural flows at the site to incidental overbank flow associated with natural river floods. In order to meet the cultural flows objective for a more frequent inundation of Gooraman Swamp, there will need to be a either a non-infrastructure based option for the delivery of water, a low impact alternative designed to meet community standards for landscape protection, or changes to the management regime of the river system as a whole to allow more frequent flood flows. These options are subject to further investigation by the research team, and alternatives will be presented to the Murrawarri research partners during future field visits.

The cultural water requirements to enhance river flow is linked to targets that realise the social benefit of communal activity and social interaction at the river made possible by the presence of key food and plant species and water quality conditions during specific times of year.

> *But our social obligations, in terms of the outcomes for Aboriginal people along the river, can be achieved by shepherding water down the river for an environmental purpose.*

The social benefits from the river improvement are not limited to the Traditional Owners, but are seen to benefit the larger community of Weilmoringle and communities further downstream:

> *If we can shepherd the water down we get the social impacts as well. Because when there is water in the Culgoa, everyone is fishing. It keeps everyone occupied as well. We are talking about social impact and the educational impact. It's like when you take the kids out with you on country. You are still practicing culture, you are just using a different mechanism to do it. (pers. comm. F. Hooper, 22/06/15)*

Water requirements to meet this cultural objective could be determined with reference to the flow regime associated with:

- Increased fish populations of key harvest species including cod, yellow-belly, catfish
- Hydraulic factors (including depth and water velocity) and water quality targets associated with optimal swimming conditions in community swimming locations.

As with the Nari Nari case, the program logic approach has helped to identify the dependence of a range of identified social, economic and cultural benefits and outcomes on key variables, and in the Murrawarri study, many of the these values are linked to conditions in the Culgoa River conducive to fishing and swimming. At the next meeting with the Murrawarri, these cultural flow objectives, as well as the range of options available to inundate Gooraman Swamp without the establishment of infrastructure, will be presented for review and consideration. This will enable greater specificity of the cultural flow requirements to facilitate the necessary ecological and hydrologically modelling.

4.3 Indicator framework

4.3.1 Toogimbie

The program logic model has been used isolate key themes that link cultural flow to long-term community aspirations, and to propose measures of success and monitoring indicators to determine achievement against these objectives. The following tables outline the short to medium (intermediate) outcomes and indicator framework for a cultural flow event at Toogimbie (Table 6 and 7). These indicators will be further refined and framed in the context of a series of key evaluation questions in the Project M&E plan for Toogimbie. For the purposes of the flow trial, the

short term indicators will be the most salient, and will be used to demonstrate before-after impacts of the single inundation event.

Table 6: Short term monitoring framework for Toogimbie

Time Horizon	Objective	Measure of success	Indicators
Short term	Long-term, science and culture-based site planning	Improved on-site management through access to new information and long term planning	Involvement in research, collaborations with science, conservation cultural or research organisations, new planning initiatives
	Site events	Aboriginal people involved in activities on Country, with an emphasis on young people. Could include field days, open days, school tours, back to Country, volunteering	Number of events, duration, number of participants, number of young people involved, participant satisfaction
	Bush foods and bush medicine plants	Improved abundance and condition of priority floodplain vegetation	Abundance and/or extent of nardoo, and old man saltbush, lignum community
	Establish a permanent reed bed	Self-sustaining reed bed established for improved water quality and customary use (including weaving)	Abundance and condition of common reed and cumbungi
	Improved soil condition	Soil erosion reduced and groundcover established	Extent and condition of groundcover, extent of weed species, register of council complaints

Table 7: Intermediate outcome monitoring framework for Toogimbie

Time Horizon	Objective	Measure of success	Indicators
Intermediate outcomes	Jobs and training	Employees and volunteers at Toogimbie obtain permanent employment	Employees at Toogimbie, former Toogimbie workers in long-term employment, number of long-term unemployed people working at Toogimbie
	Community health and well-being	Improved quality of life (personal and social) outcomes for community members involved	Drug and alcohol convictions, volume or estimated economic value of traditional harvest, self-reported health status, relative inclusivity of site activities
	Youth engagement	Opportunities for young people to participate in on Country activities	Number of cultural events hosted, number of youth engaged, participant satisfaction, involvement of parents/grandparents, volunteer hours
	Enterprise development	Cultural, conservation and science tourism at Toogimbie	Number of vistors, length of stay, revenue generated, ratio of Aboriginal/non-Aboriginal participants
	Increased biodiversity	Increase on-site animal population	Abundance of iconic species including kangaroo, emu, koalas, goanna, echidna
		Increase habitat for species of conservation significance	Abundance and breeding of Southern Bell frog, frog species diversity
		Increased migratory and other waterbird activity, including Black Swans	Abundance and diversity of relevant waterbirds, habitat improvement, breeding activity

4.3.2 Gooraman Swamp

In the Murrawarri example, the indicator framework is intended to establish a robust baseline to enable changes resulting from the future availability of a cultural flow to be captured and attributed to cultural water. Given that there are two distinct cultural flow objectives that are being considered by the community, these are presented as separate indicator frameworks. This information is part of the larger body of work to enable the community to get access to sufficient information to manage tradeoff with water decisions once a cultural flow allocation is made available to the Murrawarri. The indicators identified here will be further refined and framed in the context of a series of key evaluation questions in the Project M&E plan for Gooraman Swamp, although given that there is no flow trial associated with the site, these frameworks can be more thoroughly developed in consultation with the Murrawarri research partners (Tables 8 and 9). It

also allows for a framework that is more focused on the intermediate outcomes of cultural water, rather than the short-term changes and impacts resulting from a single flooding event.

Table 8: Intermediate outcome monitoring framework for Gooraman Swamp

Time Horizon	Objective	Measure of success	Indicators
Intermediate outcomes	Healthy River red gum population	Improved tree condition and long term viability of river red gum species at Gooraman swamp	Tree condition of river red gum population
	Availability of traditional foods and medicines	Improved abundance and condition of priority plant species at Gooraman Swamp	Abundance and/or extent of gidgee, native orange, quandong, snotty gobbles, quinine
	Bird species	Increased migratory and other waterbird activity	Abundance and diversity of relevant waterbirds (pelican, ibis, brolga, emu), habitat improvement, breeding activity
	Cultural management of Country	Re-established traditional fire regime as part of land management	Extent of fire management activity, reduction in weed species
		Seed collecting	Number of seed harvesting events, number of people involved, estimated volume, involvement of young people

Table 9: Intermediate monitoring framework for Culgoa River

Time Horizon	Objective	Measure of success	Indicators
Intermediate outcomes	Communal activity (social and recreational)	Increased fishing activity	Volume or estimated economic value of fishing/harvest, well-being surveys, survey of catch per unit effort
	Availability of traditional foods and medicines	Improved abundance and condition of priority plant species in Culgoa riparian zone	Abundance and/or extent of gidgee, native orange, quandong, snotty gobbles, quinine
	Fish population	Increased population of food species available for harvest	Cod, yellow-belly, perch, survey of catch per unit effort

4.4 Methods for monitoring and assessment

4.4.1 Toogimbie

For monitoring to be effective at Toogimbie, there is a need for it to be linked to existing monitoring effort, and ideally embedded within the practice of rangers, volunteers and workers on site. Similarly, it should be substantively linked to the formal reporting requirements of the IPA where possible. Rangers and others involved in the current conservation work conducted by the Nari Nari currently collect field digital data and ground photography on hand-held mobile devices using a purpose-designed CyberTracker. The Global Positioning System (GPS) field data collected in this way has been more recently supplemented with unmanned aerial vehicle (drone)-captured video and still aerial photography.

The conceptual model developed by the community demonstrates that the range of benefits from the use of water for site rehabilitation have included personal development, cultural regeneration, economic returns, public health and environmental improvement. Not all of these outcomes can be measured on site, and additional indicators that may involve data from monitoring activity of other organisations may be necessary to fully substantiate the public benefits of the cultural flow trial.

Improvements to the hydrological and hydraulic monitoring are an additional envisaged outcome from the flow trial. The key unknown factor is water loss into the sediment forming the bed of the wetland, which may have a significant impact on the quantity of water required to achieve the designated cultural flow objectives. A useful monitoring technique could involve the use of the Nari Nari Tribal Council's drone to capture images of the flood extent during key intervals of the cultural watering, and compare the actual flood extent with the modelled expectation. This will enable more accurate specification of the site's water requirement beyond the scope of the Project.

In general, the monitoring framework has identified key roles for on-site monitoring as:

a) Monitoring of communal events at the site (including attendance, duration, youth involvement, Aboriginal/non-Aboriginal involvement, volunteering, satisfaction)
b) Monitoring of fauna and flora of cultural or conservation significance (southern bell frog, black swans, emus, old man weed, lignum, etc.)
c) Monitoring of weeds and pests (box thorn, grounsel, pond weed, foxes, rabbits etc.)
d) Monitoring of employment status of Nari Nari employees (employment at Toogimbie or long-term employment at other locations)
e) Monitoring of harvest activities at Toogimbie with estimated actual or implied economic value (hunting, fishing, bush medicine, art and crafts, artefacts etc.)
f) Monitoring of water associated with small, medium and large inundation events

Additional off-site monitoring which could be relevant to establishing the evidence base to demonstrate the wider benefits of cultural water access could include:

g) Monitoring complaints to Council, EPA or other relevant body associated with dust and erosion from Toogimbie
h) Monitoring drug/alcohol issues or court convictions in the region
i) Self-reported physical and mental health status of local community

Additional monitoring instruments in the form of surveys to capture satisfaction of participants of events hosted at Toogimbie and to assess community health and well-being will be prepared by the Project for use in the monitoring effort. Consultation with the research partners will be essential to ensuring that this information is collected in an ethical and culturally appropriate manner.

4.4.2 Gooraman Swamp

The delivery of a cultural flow to Gooraman Swamp is not currently possible and outside the scope of the Project, given current water availability and delivery constraints in the Balonne River system, which includes the Culgoa River. This may change in the future should additional cultural flow allocations be made available. As a result, it is recommended that the monitoring effort for this case study be used to establish baseline condition of the indicators that represent the benefits expected with the delivery of cultural flows. It is assumed that robust condition assessment prior to the delivery of cultural water will help to demonstrate the benefits of cultural flows at Weilmoringle in the future.

The next stage of the research for the Gooraman Swamp will confirm the accuracy of the conceptual model and develop a corresponding indicator framework in deliberation with the research partners. Based on the research conducted to date, there are a number of potential keystone indicators that the range of identified community benefits from cultural water depend upon. The condition and status of these indicators are also those most likely to respond to cultural water. It is suggested that monitoring effort focus upon:

a) Monitoring of tree condition and viability of the river red gum population at Gooraman Swamp
b) Monitoring of the abundance and extent of traditional food and medicine species at Gooraman Swamp, and the harvest activities associated with those species (such as gidgee, native orange, quandong, snotty gobbles and quinine)
c) Monitoring of the practices associated with cultural management of Country, including communal and learning associated with cultural management activities (including fire management, seed collecting, weed management)
d) Monitoring of social and recreational activities associated with the Culgoa River (including attendance, duration, youth involvement, community satisfaction).

Given the significance of fishing for the community in terms of satisfying a range of social, economic and cultural benefits, fish population in the Culgoa River could serve as an important indicator. However, the techniques available for fish population monitoring are not likely to be suitable in this location. Instead, it is proposed that future deliberations with the Murrawarri research partners will identify more appropriate approaches, which may include volume or estimated economic value of catch, a well-being self-assessment surveys or a survey of catch per unit effort.

5 EVALUATION AND KEY LEARNINGS

5.1 Toogimbie

Preliminary findings confirm that a cultural flow allocation for the Nari Nari is necessary to achieve their aspirations for environmental restoration and for culturally informed land management practices. These aspirations cannot be achieved with current cultural water allocation provided under the Cultural Access Licence, and financial and economic barriers prevent the achievement of these outcomes from the purchase of water from the consumptive pool.

Community experience shows that the range of benefits accruing from the allocation of water for cultural flows include personal development, cultural regeneration, economic, public health and environmental improvement. Although these public benefit outcomes are expressed anecdotally, they are based on the experience and evidence of successful management of the IPA over the past decade. These management outcomes have been dependant on the application of water from the CAL. Significant limits on the use of this water, including the restrictions that prevent that water from being used for any commercial purpose, prevent the full achievement of these social outcomes with the existing allocation. It is firmly believed within the community that additional water would extend the achievements to date, and these outcomes can be achieved more sustainably and more cost effectively than other publicly funded programs to address educational and health outcomes for Aboriginal people in the region.

There is an important role in this project to provide a compelling evidence base to demonstrate the range of community benefits from the use of cultural water. There will be a limit to precisely how much can be attributed to the single watering event from the flow trial in the Project, however a longer term monitoring program can establish a framework to show how the application of cultural water in the short term can satisfy a public benefit test. These outcomes are quite separate from the benefits accruing from the environmental monitoring, which can also be demonstrated in this project. It was noted by the research partners that current reporting requirements for the IPA do not adequately capture the full range of socio-cultural benefits and outcomes from the way that the site is managed, and there is a further opportunity here in developing a monitoring and evaluation framework to capture this also.

Discussions relating to the Toogimbie wetland further highlighted the risks associated with assuming that cultural flow determinations would sufficiently address all Aboriginal interests in water. Aboriginal interests relating to water also concerned water quality, aqua-ecology, environmental watering, trading and management of the landscape as a whole.

The work conducted with the Nari Nari to date has also surfaced some outstanding questions raised in relation to the governance of a cultural flow allocation. For the Nari Nari Tribal Council, the experience with the water entitlement under the CAL has highlighted the importance of determining the governance of the allocation at the outset. Research partners were open to the idea of an independent and non-government administrating authority, but recognised the process of establishing an acceptable body would require ongoing consideration. Decisions about who can hold the entitlement, and how its use will be decided are not incidental, but fundamental to ability of a cultural flow to achieve its goal as a permanent water entitlement for the benefit of Aboriginal people.

5.2 Gooraman Swamp

With the Murrawarri, the research conducted to date confirms that the Aboriginal values associated with key water sites and with the river system itself are best protected and enhanced under a pre-development flow regime. The spiritual, social, educational and cultural values connected to water depend inextricably on the pre-condition of a healthy river ecosystem. In this context, cultural water is necessary as a supplement to the existing flow regime to better mimic traditional, pre-development flow patterns – either in the context of restoring a flooding cycle to Gooraman Swamp or to enhance river flow.

There is a role for the research in this project to provide accurate evidence to the community to assist them with understanding of the range of cultural water management scenarios, and the impact that these options would have on water availability and other water values. This information is critical to enable an informed discussion to manage tradeoff with water decisions once a cultural flow allocation would be made available.

The Gooraman Swamp case also demonstrates that consideration of the risks associated with cultural flows must also include the impacts of infrastructure and delivery of that water. In both case studies, but with the Murrawarri in particular, concerns were raised about the impact of infrastructure for the delivery of cultural water, including pumps, pipes, channels and so forth, on the landscape. Both groups expressed interest in development of naturally inspired water regulation and delivery infrastructure, and while beyond the scope of this Project, this may be an opportunity for future research.

The use of the program logic as the basis of the conceptual model has enabled greater clarity for the purposes of establishing water requirements and identifying relevant indicators in this case study also. However, it is important to note that this approach has not yet been reviewed or approved by the research partners, and the community acceptability of this model is not assessed.

The Murrawarri case also demonstrates the very real practical and logistic impediments associated with the establishment of a cultural flow entitlement. Having access to a water entitlement is ineffective if the community lacks the water service and delivery infrastructure and the resources to manage that water entitlement. This case study provides an opportunity to assess the full cost of implementing a cultural flows regime in a community with a limited history of participation in water management, and to provide a better understanding of how this could be funded. Although there is some infrastructure on Aboriginal lands at Toogimbie, for example, this is likely the exception. This information is critical to the national picture to ensure that this discussion of a cultural flows framework is comprehensive, and does not lead to the creation of expectations that may not be deliverable.

Lessons from this case study further highlight the potential limitations of the methodology in its application to a national context. In both of the case studies for this project, the Indigenous community have access to land holdings where a water entitlement can be used, an ongoing cultural connection to Country and to cultural management practices of the Country, and well defined authority and established within the community for decision-making on water matters. Under these conditions, the proposed method has been applied successfully to date. However, refinements to the method may be required in circumstances where:

- the Indigenous community does not have access to security of land tenure;
- ongoing cultural connections to Country and to the management of Country have been compromised by dislocation and dispossession of Traditional Owners;
- Traditional Owners with authority to speak about water are remote or otherwise difficult to locate;
- the community has limited experience with natural resource planning and management, or limited capacity to participate in resource management planning activities; or where
- research and planning associated with cultural water may impact on native title determinations or other legal proceedings.

Adapting the approach presented here to ensure its applicability in these scenarios is a key component of the next stages of the project.

6 NEXT STEPS

A number of research and development activities will be undertaken in the next quarter in order to progress Component 2 of the Project. Subject to the review of these preliminary findings, these activities may significantly alter the findings of this report. The next stages of the research program with the Nari Nari Tribal Council will:

- Review and confirm/amend the proposed cultural flow objectives in consultation with the Nari Nari research partners
- Incorporate revised objectives into the ecological and hydrologically modelling to quantify water and management requirements, and the feasibility of those requirements.
- Refine and finalise the flow objectives as required based on the modelling outcomes
- Develop robust, culturally appropriate monitoring instruments (surveys) to enable self-reporting of community health and well-being
- Identify sources of data from government and non-government sources to populate cultural indicator framework and establish off-site baseline assessment of confirmed cultural and ecological indicators

In the Murrawarri case study, research activities will:

- Review, refine and finalise the conceptual model developed for Gooraman Swamp and the Culgoa River with the Murrawarri research partners
- Conduct a deliberative workshop with Murrawarri research partners to elicit cultural flow objectives and thresholds and a corresponding indicator framework from the approved conceptual model
- Identify water requirements associated with the cultural flow objectives with reference to the ecological and hydrological modelling undertaken for Gooraman Swamp
- Commence baseline assessment of cultural values according to agreed indicator framework

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