Early Investment Opportunity: Werai 'The Forgotten Forest'

as part of the Reconnecting River Country Program

Purpose

Present an investment opportunity for First Nations people that is supported by a rigorous scope of works, costings, and resources to realise economic, cultural, and social benefits from enhanced environmental water delivery in the Werai Forest.

Background

The Werai forests are of great cultural significance to the Wamba Wamba and Perrepa Perrepa Traditional Owners. The Werai forest group is 11,326 hectares (ha) in area and comprise Werai (9,163 ha), Banagalite (1,223 ha), Barratta Creek (221 ha), Morago (627 ha) and Stevens Weir (92 ha). The Werai forests are recognised as regionally, nationally, and internationally important forests and wetlands. Collectively, the forests are known as Werai or Werai Forest.

- In 2003, Werai Forest was listed under the Ramsar convention as part of the NSW Central Murray Forests group. The forest is a potential breeding and recruitment hotspot for native fish and waterbirds.
- The Werai group of forests are also recognised as wetlands of national importance on the Directory of Important Wetlands in Australia.
- Land use and occupancy mapping has identified over 12,000 sites of cultural significance to First Nations people in the Werai Forest.

While the Barmah-Millewa and Koondrook-Perricoota, Gunbower Island forests have been identified as 'Living Murray' icon sites. Werai was excluded from this listing. Traditional Owners now refer to Werai as the **Forgotten Forest**. The declining ecological condition of the Werai forests is a direct result of reduced winter-spring flooding. In Werai, 92% of the river red gum forest was found to be near stressed, highly stressed or dead (Harrington and Hale, 2011).

Traditional Owners describe this loss of habitat, biodiversity, and cultural relationships as a contemporary experience of dispossession (pg16, Cultural water and the Edward/Kolety and Wakool river system (aiatsis.gov.au))

> *History shows the increases in water regulation have progressively impacted on the environmental and cultural landscapes alike, each mirroring the others decline. Reinstating more traditional and natural flood patterns across the Werai lands will simultaneously improve the health and wellbeing of the Werai lands and its Traditional Owners (ref: Werai Plan of*

The Yarkuwa Indigenous Knowledge Centre is developing a management plan for the Werai Forest Indigenous Protected Area as part of a process to transfer management and ownership to the Werai Land and Water Aboriginal Corporation. This transfer of the Werai Forest back to the Traditional Owners

recognises the local Aboriginal people's strong connection to the Ramsar site. Yarkuwa Indigenous Knowledge Centre River Rangers have successfully undertaken projects to restore and improve the condition of the Ramsar site such as pest control, invasive species removal and turtling monitoring.

Replacing out-dated water management infrastructure and improving the flooding regime (timing, frequency, extent and duration) for the Werai Forest are priority management actions that could support Traditional Owners' aspirations for Werai to become a cultural knowledge precinct for the mid-Murray River region, while also achieving significant ecological and economic benefits - the *Gayini of the Murray*.

Description

The Werai Forest is currently managed by the National Parks and Wildlife Service but will soon be managed as an Indigenous Protected Area.

The Niemur River is a 160 km long anabranch that commences from the Edward/Kolety River (approximately 20 km downstream from Stevens Weir) and returns flow to the Wakool River at Stony Crossing. The Niemur River is free flowing and contains high snag densities, so restoring connectivity (to the Edward/Kolety River downstream from Stevens Weir) and an appropriate flow regime (including overbank flows during winter and spring and low autumn-winter flows) will help to restore native fish populations including Murray cod.

Flows greater than 800 ML/day begin to inundate the Niemur River floodplain including the Niemur Forest (part of the Murray Valley National Park). Niemur Forest is a renowned nesting site for JAMBA, CAMBA and ROKAMBA migratory species including the great egret and white-bellied sea eagle.

The Niemur River, Tumudgery Creek, Reed Beds Creek, Moonya Lagoon and Werai Forest are potential breeding and recruitment hotspots for native fish and waterbirds.

***Figure 1**: A series of photos featuring old, dilapidated infrastructure, its impacts, and a Traditional Owner assessing the health of Country (On Country Assessment May 2022)*

Issues

Significant reductions in the frequency, extent and duration of natural flooding regimes have negatively impacted the ecological and hydrological function of the Werai forests. Appropriate flow regimes will help to enhance the traditional values of the Werai forests. If appropriate flow regimes are not urgently restored, then the limits of acceptable change will be exceeded as described in the central Murray Forests Ramsar site ecological character description. This could lead to the declassification of the Ramsar listing.

The Werai Forest did not feature in environmental works and measures program for The Living Murray (TLM) program (it was not included in the short list of "icon sites"), or the SDLAM (Sustainable Diversion Limited Adjustment Mechanism) program.

For Traditional Owners, the declining condition of the Werai Forest risks a loss of their culture, lore, language, identity, and rights. Inherited knowledge can easily be lost between generations, particularly when opportunities for young people to learn and experience culture on-Country is limited because of the severely degraded nature of the forests.

> *We would come out to the forest and stay; we wouldn't need to bring a thing. We could eat, drink and practice culture. The picnic was already here…. It was the supermarket for our people* (On Country Assessment, May 2022)

The Traditional Owners have systematically documented the impact of the declining condition of the forests in submissions to government reviews and enquiries. They have actively supported and participated in research into factors supporting ecological condition and tirelessly advocated for improved water delivery.

The primary operating objective of the Tumudgery Creek, Reed Bed Creek, Moonya Lagoon, and Niemur River Offtake regulators is to prevent water from passing into these natural watercourses during periods of low flow (i.e. when flows downstream from Stevens Weir are less than 2,700 megalitres per day).

The Tumudgery Creek and Reed Beds Creek regulators allow water into Werai forest and are only opened when flows are forecast to exceed 2,700 ML/day downstream from Stevens Weir. Flows of this magnitude are only achieved when Murray River flows exceed 15,000 ML/day downstream of Yarrawonga Weir. The commence to flow of the Tumudgery and Reed Beds creeks is approximately 800 ML/day downstream of Stevens Weir. Water start to spread into Werai when Edward River fllows exceed 1,800 ML/day. However, the current watering regime of Wera , and its creeks and wetlands, is inappropriate because the regulators cannot be opened during periods of low flow <2,700 megalitres per day. In addition to this, the frequency and duration of overbank events >2,700 megalitres per day have been steadily declining over the past century due to a combination of river regulation and drought or climate change. This has had significant negative impacts on the ecological and hydrological function, and traditional values, of the forests.

> '*Nothing more* depressing *than water high on one side and dead turtles on the other'* (On Country Assessment, May 2022)

Furthermore, the Niemur River Offtake Regulator is a major barrier to fish passage to the Edward/Kolety River downstream from Stevens Weir. Replacing the Niemur Offtake Regulator would allow native fish to move freely between the Edward/Kolety and Niemur rivers, which will be particularly important during hypoxic blackwater events when large-bodied native fish (such as Murray cod) are searching for waterbodies that have sufficient dissolved oxygen levels. Flows in the Niemur River discontinue over most of autumn and winter when flows downstream from Stevens Weir are less than 800 ML/day and when the Stevens Weir pool is lower than the commence to flow level for Colligen Creek.

Flows from Tumudgery Creek only enter Werai Forest when the Edward/Kolety River (downstream from Stevens Weir) exceeds 2,000 ML/day. Therefore, the section of Tumudgery Creek between the offtake and the forest could be managed as a large permanent lagoon and native fish nursery if the existing structure were replaced with a lower sill and lay-flat gates.

The sills of the Tumudgery Creek and Niemur River Offtake regulators were built more than one metre above stream bed level, so the commence to flow into these waterways is much higher than the natural stream bed profile.

Moonya Lagoon is a large ox-bow lagoon that could be managed as a native fish nursery (potentially for small-bodied wetland specialist native fish) if the existing pipe culvert regulated structure were replaced with a box culvert regulator with a single lay-flat gate.

Large volumes of organic matter accumulate across drought stressed floodplains. High concentrations of dissolved organic carbon (DOC) are then transported into river systems when large floods occur after extended dry periods. Microbes in the water consume the DOC. The respiration rate of the microbes dramatically increases along with increasing water temperatures. This results in the depletion of oxygen in the water (measured as dissolved oxygen) when high concentrations of DOC enter rivers, creeks and lagoons, especially when water temperatures are high. This phenomenon is called hypoxic blackwater and caused mass fish kills in the Murray and Edward-Wakool-Neimur river systems in 2010 and 2016.

Hypoxic blackwater has a cumulative effect as floodwaters continuously pass-through large areas of drought stressed floodplain. One of the most effective measures to reduce the severity of hypoxic blackwater is to maintain healthy river red gum forests. Healthy river red gum stands produce around half the leaf litter loads compared with stressed forests. Therefore, improving the flow regime for Werai (and other large floodplain forests) will help to reduce the impacts to regional native fish populations from hypoxic blackwater.

> *These forests were our economic base for thousands of years and now provide no economic return for my people while at the same time making many non-Aboriginal people wealthy. My people's spiritual and religious connection to county are directly linked to, and cannot be separated from, the environment.*
> Jeanette Crew, Mutthi Mutthi elder.
> *(page 5* Cultural water and the Edward/Kolety and Wakool river system (aiatsis.gov.au))

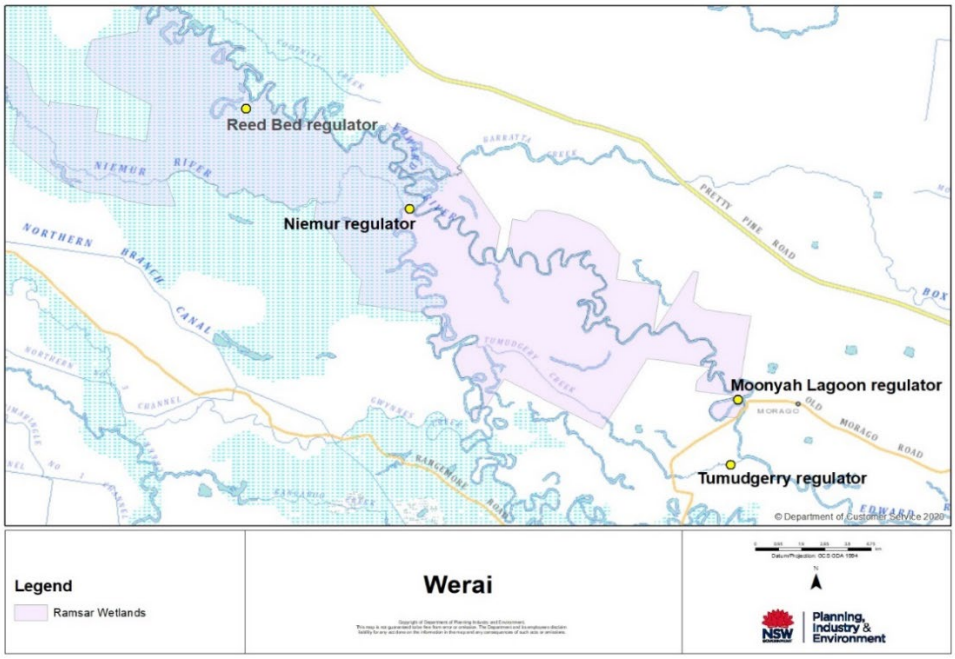

***Figure 2**: Werai Forest area*

A.

B.

C.

D.

***Figure 3**: A) Tumudgery Creek Offtake Regulator, B) Reed Bed Creek Offtake Regulator, C) Niemur River Offtake Regulator, D) Moonyah Lagoon Inlet Pipe*

Details – scope of works

Reconstruction of three (3) priority regulators (refer to Figure 2)

i. Tumudgery Creek Offtake
ii. Reed Bed Creek Offtake
iii. Niemur River Offtake

Issues with current regulators – the regulators are aging WaterNSW assets with known Workplace Health & Safety (WHS) issues related to drop board management that do not meet contemporary operating requirements. The WHS issues are a reason why the regulators cannot be operated when Edward/Kolety River flows are >2,000 megalitres per day from Stevens Weir. These structures are barriers to fish passage.

Option - Replace the existing structures with new regulators with lower sill heights to facilitate lower flow commencement and fish passage when regulator gates are open. This would improve connectivity between the rivers and Werai Forest, especially during low flow periods (< 2,700ML/day downstream from Stevens Weir)

Water Savings – The new regulators and water delivery accounting mechanisms will provide environmental water managers greater flexibility to deliver water into Werai, especially during periods of low flow. This will improve the effectiveness and efficiency of water for the environment. New structures will restrict leakage and unseasonal inundation of the forest over summer and autumn.

Metering – will allow for efficient delivery of environmental water during regulated flow conditions and assist in the implementation of effective prerequisite policy measures that are proposed for Werai during regulated flow conditions.

Moonyah Lagoon Regulator–(Part of above Werai Forest Niemur River Proposal) - Replace the existing regulated pipe culvert structure with a new box culvert regulator with a lay-flat gate.

Issue with Current Structure – The current inlet structure is a regulated small-diameter pipe culvert and earthen bank that separates the Moonya Lagoon from the Edward/Kolety River. The new structure will be replace the existing structure in the same location within the Werai IPA. There is currently no capacity to measure flow through the existing structure. The adjoining landholder has an unregulated licence and pump on the lagoon, which means that any water entering the lagoon during an environmental or operational flow event in the Edward/Kolety River can be extracted in accordance to the NSW pools policy[1]. (i.e. 80 per cent of the water in the lagoon cannot be extracted). This policy must be enforced by the NSW Government. The existing structure is a barrier to fish passage between Moonya Lagoon and the Edward/Kolety River.

Benefits

Cultural Benefits

- Physical, emotional and wellbeing health benefits associated with positive ecological outcomes
    a. Bushfoods, medicines, and fibre supplies for continuation of cultural practice and regeneration of cultural knowledge
    b. Healthy river sites to visit with old people and children, enabling inter-generational knowledge transfer, social cohesion, future community resilience

[1] *NSW Office of Water 2011,* Macro water sharing plans – the approach for unregulated rivers. Access and trading rules for pools. NSW Office of Water, August 2011

- Economic opportunities presented by healthy Country such as:
    a. the provision of ecological services, educational and training activities, ecotourism, cultural and arts practices, cultural programs, and camps.
    b. Research sites and fee-for-service research activities.

- Empowerment and social licence for Traditional Owners to care and speak for healthy Country
    a. Meet cultural and social obligations, participate in river governance, enact responsibilities as stewards and custodians.
    b. Represent the river and cultural interests in government forums, provide expert advice, participate and lead river management policy and program design.

> *We maintain that the health of the environment has a direct connection to the health and wellbeing of our community. Access to resources, including food and medicine, are critical in working to close the gap between Aboriginal and non-Aboriginal communities.*
>
> David Crew, Yarkuwa
>
> *(p 19* Cultural water and the Edward/Kolety and Wakool river system (aiatsis.gov.au))

Ecological Benefits

- Improve condition and aid the recovery of river red gum forest and wetland vegetation communities by providing more frequent and longer duration reconnection events that meet the watering requirements for plant growth and reproduction.
- Improved fish passage through forest regulators, providing native fish with access to breeding and nursery habitat in forest creeks and wetlands. Improved movement opportunities and flow cues would benefit floodplain specialist native fish including golden perch and silver perch.
- Improved timing and frequency of flows in the Tumudgery and Reed Bed creeks will provide quality habitat for riverine specialist native fish including Murray cod, river blackfish and freshwater catfish (eel-tailed catfish).
- Support recovery of threatened floodplain specialist native fish populations, which require regular access to wetlands to complete their life cycles.
- Boost ecosystem productivity (availability of food for native fish and other biota) by mobilising carbon and nutrients through more regular wetland and floodplain connection.
- Maintain and improve waterbird breeding and foraging habitat and support colonial waterbird breeding events.
- Improving the frequency, duration and magnitude of flows in the Niemur River will also boost native fish populations. Traditionally, the Niemur River has been a stronghold for Murray cod, but populations have been reduced due to hypoxic blackwater events. Environmental flows will aid population recovery.
- Improved health of wetlands and floodplain forests and woodlands will benefit many species of native animals that rely on these habitats including small mammals, reptiles (turtles), frogs, and woodland birds.

Reconnecting River Country Program

The works identified for Werai Forest will support the successful implementation of the NSW Reconnecting River Country Program. The Werai Forest works align with works identified in other Early Investment Opportunity projects. The combination of all this work will allow for the effective and efficient delivery of environmental water at a system scale and at sites scales during extended dry periods.

Project Schedule

	FY2022/23				FY2023/24			
Werai Forest schedule	Q1 Jul-Sept	Q2 Oct-Dec	Q3 Jan-March	Q4 April-June	Q1 Jul-Sept	Q2 Oct-Dec	Q3 Jan-March	Q4 April-June
Strategic Assessment								
Concept								
Approvals (Inc Env, ACH (Aboriginal Cultural Heritage) and regulatory								
Delivery readiness (inc detailed design and procurement)								
Delivery Construction –Regulators								
Commissioning and handover								

Key milestones

- Award contract(s) – Jan 2023
- Project Completion – June 2024

Critical Path Priority

- Secure funding
- Survey and Geotech
- Design plans
- Approvals (ACHA and environmental assessments)
- Probity and tender evaluation processes
- Award contract/s
- Construction
- Commissioning of the works and handover after the defect liability period

Key schedule assumption

- Start date immediately after approval to proceed and assumed no major setbacks with key stakeholder consultation.
- Funding from the Commonwealth will be committed for construction prior to Q1 2023
- Aboriginal cultural heritage assessment (ACHA) process is conducted in a timeframe that is adequate for Traditional Owners

Tranches

1. Early investment opportunity works
2. Commissioning and handover, to WaterNSW to own, operate and maintain
3. Removal of additional constraints e.g. culverts, access roads, block banks
4. Operation of works and delivery of flows - primary users of the infrastructure and the delivery of Reconnecting River Country Program's outcomes will be Commonwealth Environmental Water Holders and Department of Planning and Environment – Environment and Heritage Groups until cultural water and flows become available

Costs

Summary of independent review of the costings

- *Assets 1-3 costs "appear about right" or "appears low". Assuming that the existing structures are replaced and the new structures including mechanical gates (not drop boards), fish passage*

(downstream), demolition of existing structures but not allowing for improvements for construction access. As these are WaterNSW assets, owner expectations are likely to be high and therefore suggest increase capital cost of all three regulators by $1M.

- *Moonyah lagoon outset cost was rated variably as "appears about right" or "appears too low". Suggest that the cost be increased by $3M to allow for fully regulated fish passage to the lagoon.*
- ***Overall suggest increase capital cost of the project by $6m***

SITE		ESTIMATE ($M)
WERAI FOREST REGULATORS	**$**	**13.0**
Tumudgery Creek Offtake Regulator	$	4.0
Reed Bed Creek Offtake Regulator	$	4.0
Niemur River Offtake Regulator	$	4.0
Moonyah Lagoon Inlet	$	1.0
CONSTRUCTION CONTINGENCY (40%)	**$**	**5.2**
CONSTRUCTION COSTS	**$**	**18.2**
PROJECT MANAGEMENT COSTS		
Concept & Detailed Design (10%)	$	1.8
Environmental Approval (2%)	$	0.4
Contract administration (5%)	$	0.9
Project management & owner costs (5%)	$	0.9
TOTAL PROJECT MANAGEMENT COSTS	**$**	**4.0**
TOTAL PROJECT COSTS	**$**	**22.2**
TOTAL PROJECT COSTS (Rec from independent review)	**$**	**28.2**

Risks

- Cost estimates underestimate actual costs.
- Water saving outcomes have yet to be quantified.
- Stakeholder and asset owner support required.
- Asset ownership and ongoing operations & maintenance to achieve ecological outcomes and associated water savings.
- Additional assets requiring attention may be identified downstream of regulators

Reference material (available on request and with permission of Traditional Owners)

- Cultural water and the Edward/Kolety and Wakool river system (aiatsis.gov.au)
- Werai Management Plan
- Werai Aboriginal Waterways Assessment
- Land Use and Occupancy Mapping
- Rivers, the veins of our Country (2019) – Murray Darling Basin Authority
- Murray River Country: an Ecological Dialogue with Traditional Owners – J Weir (2009)

Supportive parties

- Wamba Wamba and Perrepa Perrepa Traditional Owners
- Werai Land and Water Aboriginal Corporation
- Yarkuwa Indigenous Knowledge Centre
- Adjacent landholders
- NSW Department of Primary Industries - Fisheries

- NSW Department of Regional NSW - Local Land Services
- NSW Department of Planning and Environment – Environmental and Heritage
- NSW Parks and Wildlife Service
- Charles Sturt University (Letter of Support)
- Commonwealth Environmental Water Holder (Letter of Support)
- Ramsar (Letter of Support)

Attachment A Letters of Support or Correspondence