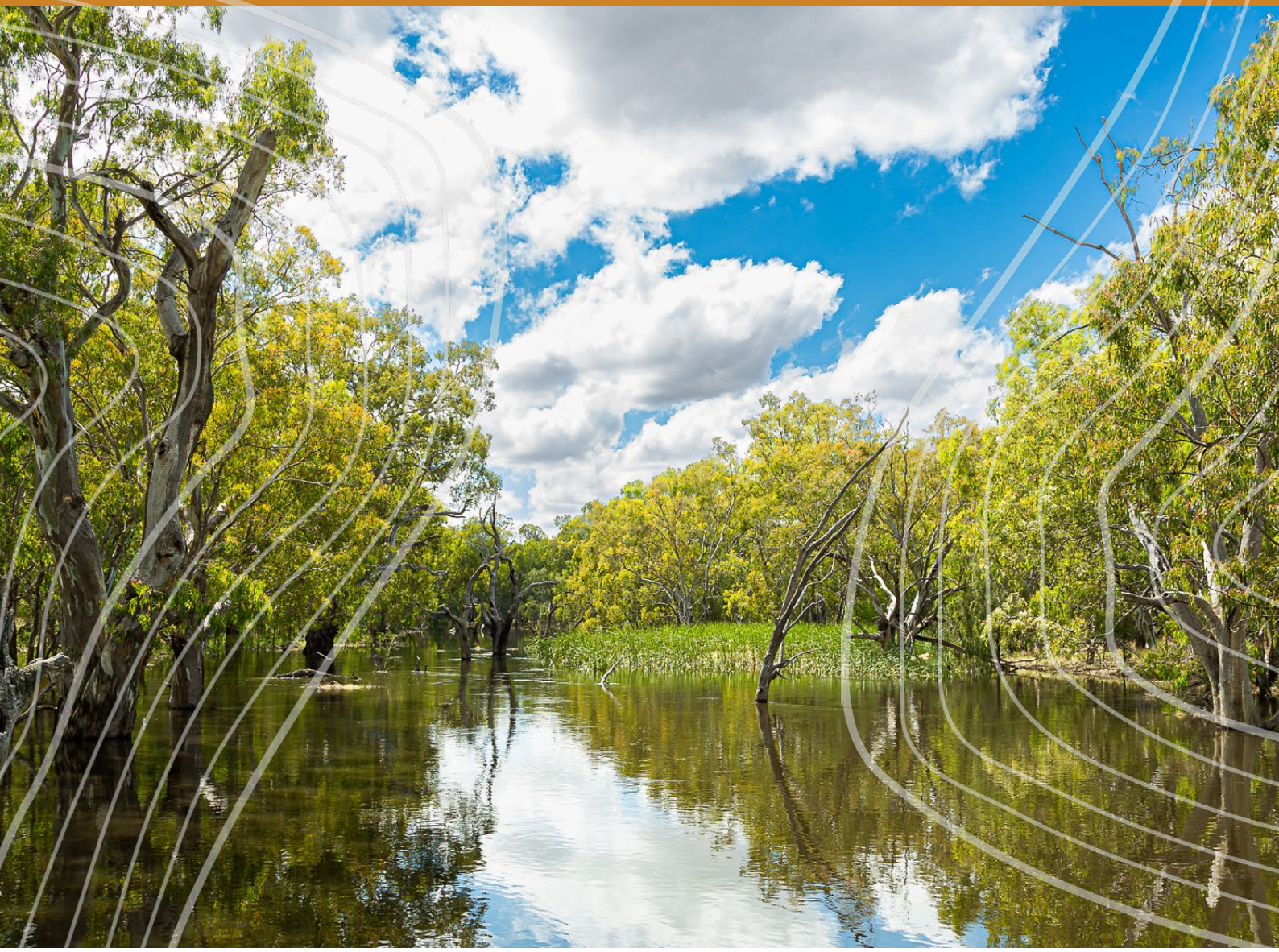
REFRESHING
CENTRAL BILLABONG

Waterway Management Plan

April 2023



NSW GOVERNMENT

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YACTAC

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Acknowledgement of Country

Refreshing Central Billabong works on Country that always was and always will be Aboriginal land. We acknowledge the Traditional Custodians of the land and waters, and we pay respect to Elders past, present and emerging.

The project team gratefully acknowledges Traditional Custodians, the Central Billabong community, the Target Area Advisory Group (TAAG), workshop attendees and other stakeholders for their valuable contributions to the development of this report. The project team also recognises JC Consulting who were contracted to undertake the community consultation and initial compilation of the Waterway Management Plan.

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Central Billabong

Contents

1 Introduction

The Refreshing Central Billabong Waterway Management Plan builds upon the significant and successful work already carried out and continuing by farmers, community groups, and government.

Yanco Creek and Tributaries Advisory Council Inc. (YACTAC) is the peak body for water resource advocacy and natural resource management in the Central Billabong. YACTAC's footprint is large, located between Narrandera and Moulamein, with over 800kms of creek frontage (including ephemeral creek sections) covering a distance of 250km from east to west. Over 150 landholders voluntarily contribute to the Yanco Creek System Natural Resource Management Plan (YCS levy) which is charged through Water NSW and administered by YACTAC. The levy commenced in 2006 and is used to maintain and improve the health of the creek system, therefore YACTAC have over 15 years experience in the natural resource management field within the Central Billabong.

The YACTAC Strategic Plan 2020-30 sets out a comprehensive vision (Water = Life) for the future of the Yanco Creek System including floodplains, distributary creeks, anabranches, and wetlands. Refreshing Central Billabong Waterway Management Plan builds and expands upon this to cover a broader area.

Refreshing Central Billabong will support delivering a range of initiatives over 10 years and beyond to improve waterway health outcomes.

The Waterway Management Plan offers:

- Pathways for farmers which support land management change and maintain profitability.
- Pathways for government, industry and community to work together to improve river health.

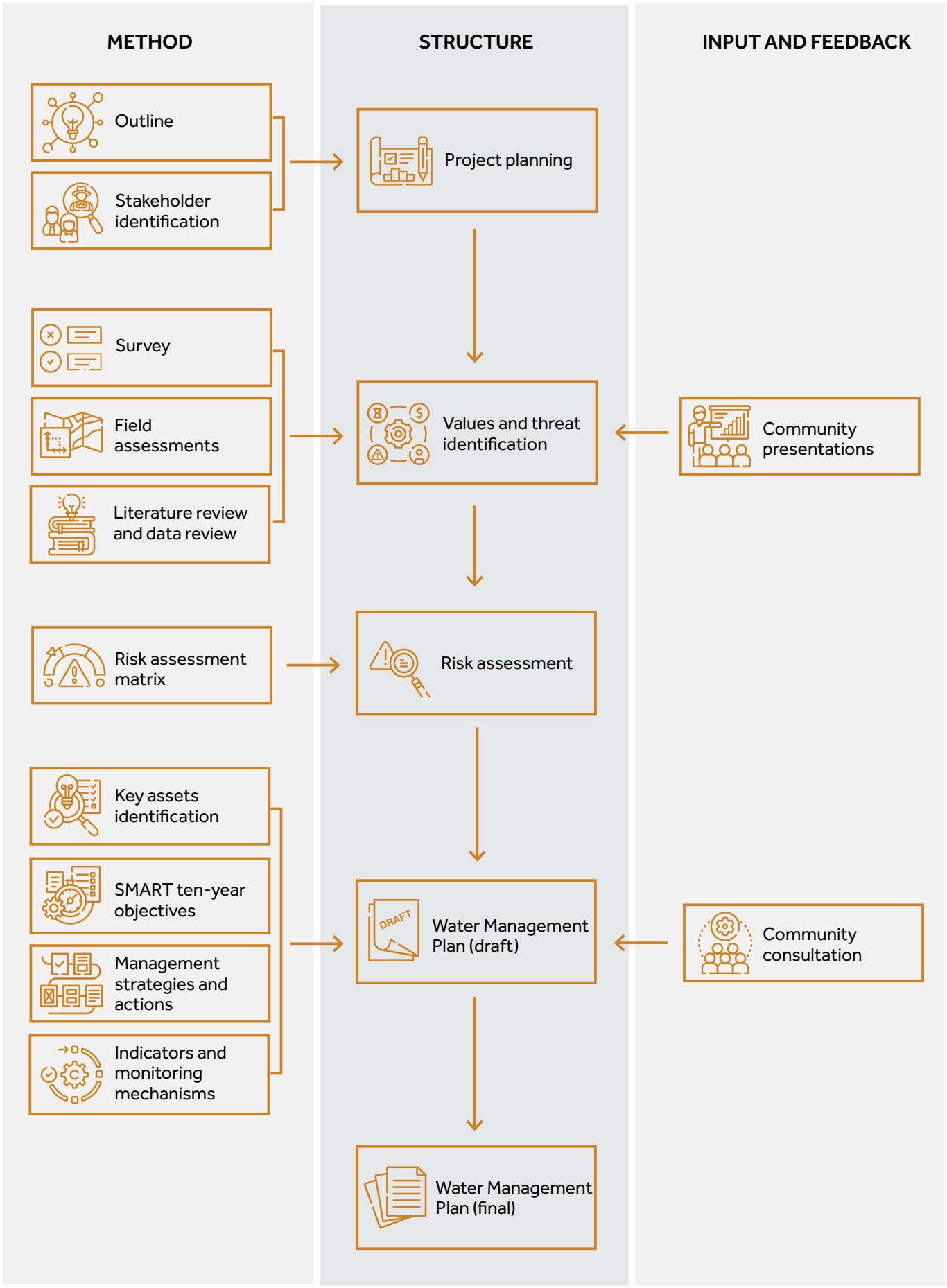
This is a community led plan which includes:

- Social, environmental, cultural and economic values of or along the waterways in the project area.
- Threats to these values.
- Specific, Measurable, Achievable, Relevant, Timely (SMART) objectives for key values
- Management strategies and actions.

The outcomes of the Waterway Management Plan over the next ten years, will be:

- Improved riparian and catchment land management, and river health in the Central Billabong driven by a strategic, integrated plan.
- A consistent, tested, yet flexible, process for the development of WMPs in NSW, leading to broader state-wide river health assessments.

CONSULTATION PROCESS



Over the next ten years, the Refreshing Rivers Program will be the main driver to implement this Waterway Management Plan.

By 2031, targets for this Program include:

- Improve water quality by 5% at key locations in the catchment.
- Increase the extent of riparian revegetation through the development of 20 land management plans with landholders.
- Revegetate 750 hectares of land adjacent to waterways.
- Regenerate (through weed control/ fencing/ pest control/ in-stream works/ground cover) 750 hectares of land adjacent to waterways.
- Install 5 devices, systems or products to improve water quality.
- Undertake 17 activities to address point source pollution.

Not all actions listed in the Waterway Management Plan are expected to be led by Refreshing Rivers, but this Plan will help guide investment priorities for multiple stakeholders including Government agencies.

2 Project area and environment

The Central Billabong covers a wide area of approximately 4,000 square kilometres. The Central Billabong network includes the Yanco, Billabong, Colombo and Forest Creeks.

The project area falls within the traditional country of the Wiradjuri, Bangerang, Barapa Barapa and Wamba Wamba First Nations people. For the Indigenous custodians of the region, the natural landscape features significant values and importance through continuous cultural, spiritual and heritage connections as well as traditional practices across the highly productive watercourses, numerous wetlands and floodplains.

The Central Billabong's diverse creek system supports the economy of the region by providing town water, irrigation and stock/domestic water as well as recreational and cultural opportunities for locals and visitors.

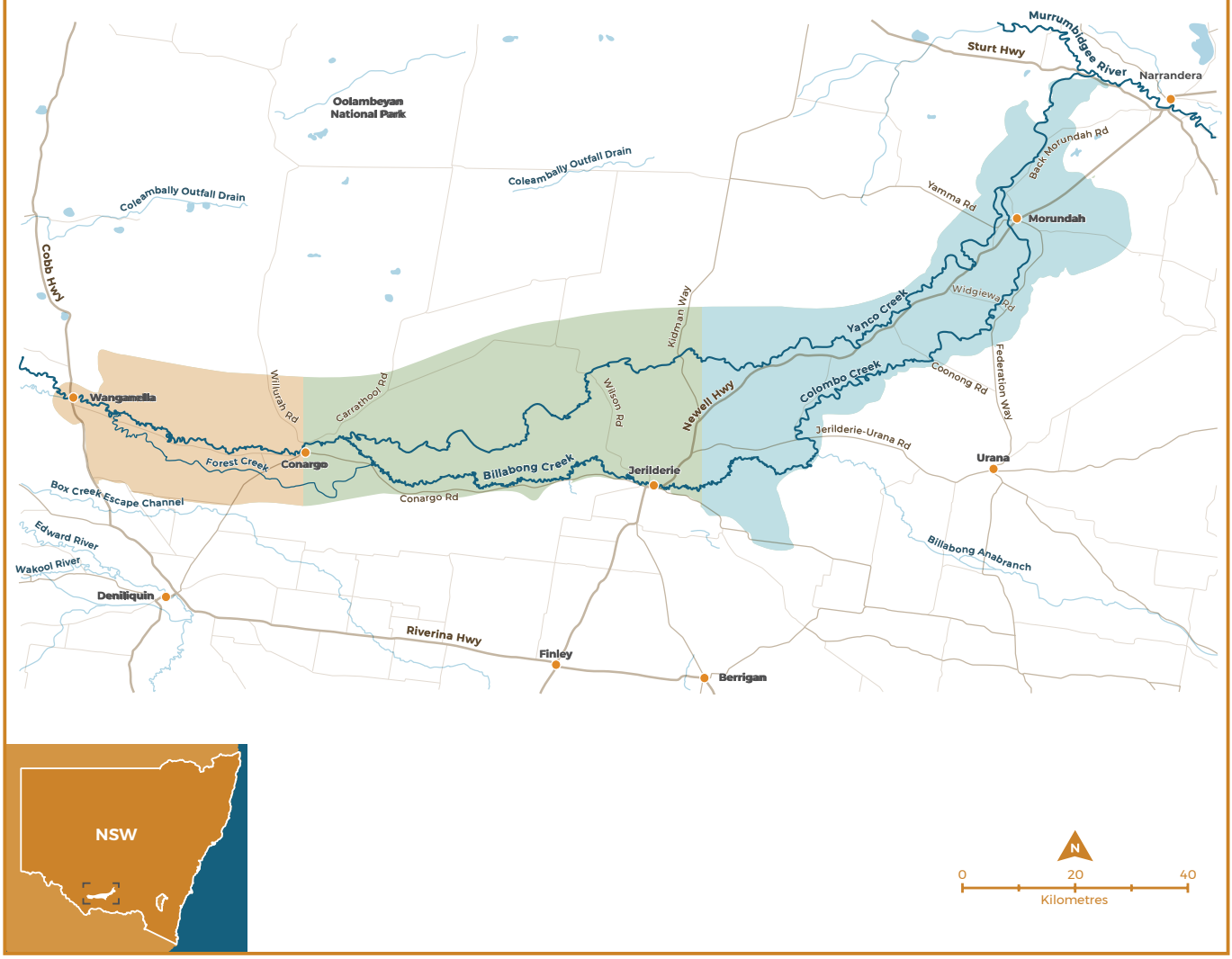
The Central Billabong is recognised for its environmental values and active environmentally conscious community. The creeks provide important habitat for plants and animals including perennially flowing water, good water quality, buffering riparian vegetation and dense in-channel snag habitat, as well as significant reed bed stands.

CATCHMENT ZONES

The Central Billabong has been divided into three zones (Upper, Middle and Lower) (Figure 2). These zones are not directly related to social or ecological jurisdictions but will be used for communication to stakeholders and prioritising works.

The Upper zone extends from Narrandera downstream to Jerilderie and encompasses the upper-middle Yanco, Colombo Creek, and the Billabong above Jerilderie. Middle zone extends from Jerilderie downstream to Conargo and encompasses the Middle-Lower Yanco, and Billabong Creek. Lower zone extends from Conargo to Wanganella and includes the Billabong Creek.

CENTRAL BILLABONG



KEY

Catchments

- Lower zone
- Middle zone
- Upper zone

- Main waterway
- Tributary
- Road
- Town
- State border

3 Vision

A range of stakeholder engagement, including one on one discussions, surveys, community events and target group discussions, were undertaken throughout 2022. These different approaches ensured that a wide range of values and knowledge was harnessed to be included in the plan.

A visioning process was used to support community and stakeholders in developing a clear and shared vision of what they want. The vision set by the community is:

A healthy working creek system with plentiful native fauna and flora supported by a vibrant and connected rural community.

Figure 1: Community vision for Central Billabong.

Key system values were then set within three vision pillars:

A Healthy System – permanent flowing water, clear water, native fauna and flora, no dominant pest species, diversity of species, self-sustaining-regulating natural cycles.

A People's System – engaged and involved community, unity, strong cultures and heritages (non-indigenous, indigenous), education, co-design and co-managed, communication, building and maintaining next generation.

A Productive/Working System - productive water and land, local employment, diversification, tourism (local, visitor), recreation, vibrant economy.

Each pillar was then broken down into a series of value statements highlighting the aspirations of the Central Billabong community within each pillar as shown in Table 1 below.

Table 1: Key system values within vision pillars.

A Healthy System	A People's System	A Productive/Working System
A permanent creek system with flowing water of good water quality.	A creek system that brings people together as one community, one voice.	A productive creek system which supports sustainable food and fibre production.
A creek system that supports a diverse self-sustaining flora and fauna.	A creek system that respects, celebrates and showcases all cultures and heritage.	A creek system that supports tourism and local employment opportunities.
A self-regulating creek system that can sustain itself through extreme events.	A co-managed creek system where community and government work together.	A creek system that encourages diversification, education and research.
A creek system that is not dominated by pest and invasive species.	A creek system that educates, empowers all to learn together and build capacity locally.	A creek system that is co-managed to satisfy multiple needs of people and nature.
 Above: Central Billabong wetland. Credit: Rob Lacey.	 Above: Cultural learnings with the Refreshing Central Billabong TAAG. Credit: Andrea Mitchell.	 Above: Cropping landscapes. Credit: Darren Grigg.

Above: Wanganella Store, with Simon Bain and Dan Hutton. Credit: Andrea Mitchell.

Above: Jerilderie workshop at Billabong Creek. Credit: Andrea Mitchell.

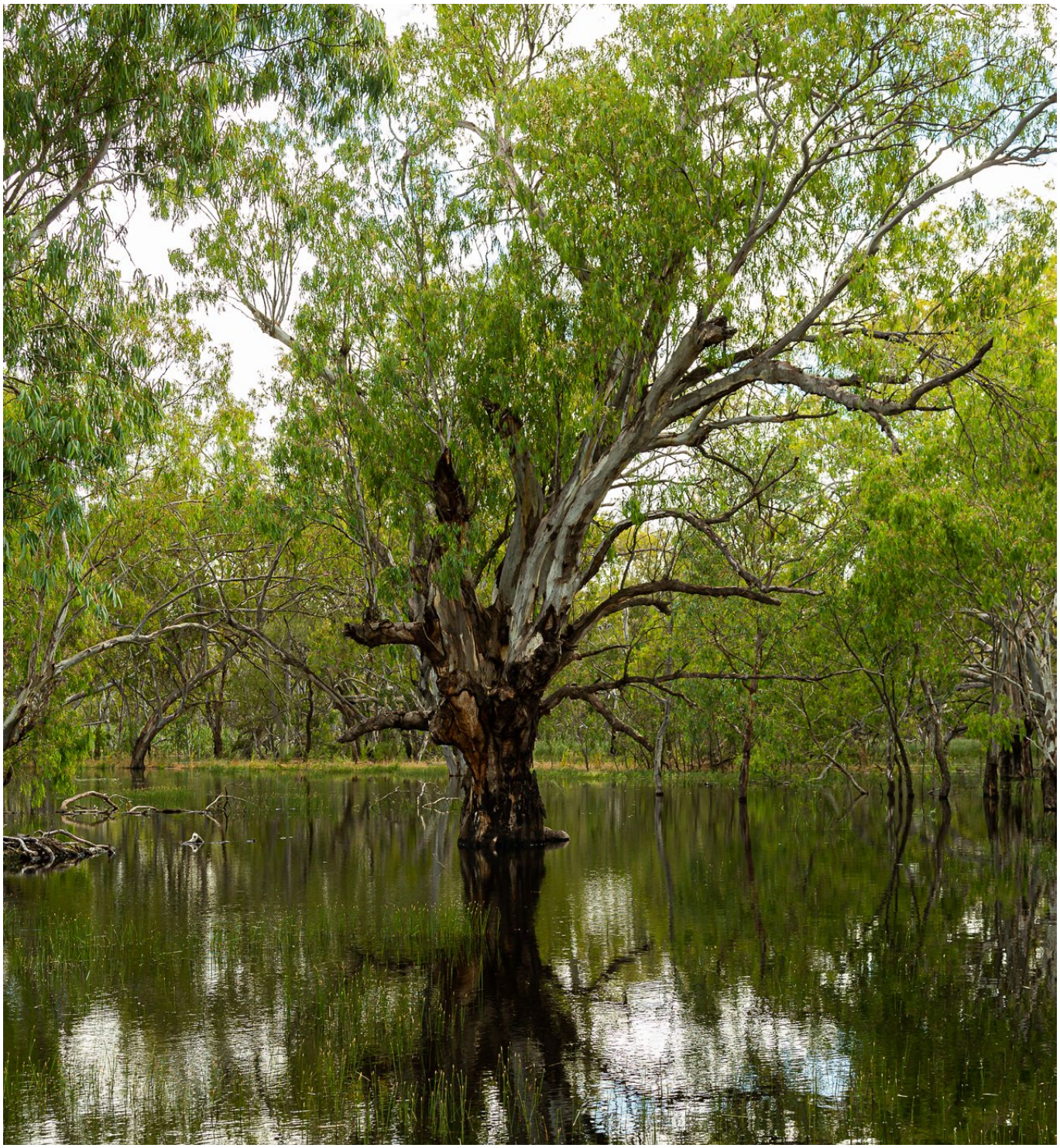
Above: Morundah workshop. Credit: Andrea Mitchell.

Above: Clearwater conversations in Jerilderie, community members and landholders discussing actions to improve waterway health. Credit: Andrea Mitchell.

Above: John Conallin, WMP consultant, at Conargo Public School, July 2022. Credit: Conargo Public School.

4 Values

In order to achieve the vision above, this Waterway Management Plan has set out some objectives for each of the system values.



Above: Red Gum flooded wetland. Credit Rob Lacey.

4.1 A HEALTHY SYSTEM (ENVIRONMENTAL VALUES)

The Billabong Yanco ecosystem comprises of:

- permanent aquatic habitats of the creek channels and weir pools
- intermittently flowing channels and anabranches that become active at high flows or after heavy localised rainfall
- riparian bank areas that regularly interact with flowing channels
- wetlands that retain flood and rain water
- floodplains that shed water when flood levels recede or after heavy localised rainfall.

Extensive environmental monitoring has already been undertaken in this region through university researchers, State Government and Commonwealth Government agencies. This Waterway Management Plan will build on this monitoring and assist with prioritisation of on-ground actions to improve conservation outcomes.

Above: Masked Lapwing, Pacific Black Duck, White-faced Heron, Yellow-billed Spoonbill. Credit: Michael Hamel-Green.

4.1.1 Threatened and rare fish

The Central Billabong is a unique system that supports one of only two known self-sustaining populations of the Nationally Endangered Trout Cod, and some of the last western populations of Eel-tailed Catfish. Fish surveys by Charles Sturt University 2021- 2023 detected 9 native species and 4 introduced species (no Trout Cod detected) (Turner et al. 2022). An integrated fish recovery plan is required to recover fish populations. Through community forums and collaboration, there is a need to be realistic about what a post European 'healthy' population of native fish would look like for Central Billabong system.

Trout Cod

Trout Cod (*Maccullochella macquariensis*) is listed as Endangered in NSW, and under the Commonwealth EPBC Act. In 2013, the 'Billabong Creek Fish Baselining Survey' detected a population of Trout cod in Yanco Creek (Sharpe et al. 2013). The species has suffered a drastic decline in range and abundance. Trout cod is associated with a particular suite of habitat and hydrological features including: moderate to water depth over two metres, fast flowing water, high snag complexity and very good riparian condition.

Above: Trout Cod. Credit: Gunther Schmida.

ASPIRATIONAL GOAL

Expand and protect Trout Cod populations across a range of habitats in the Central Billabong.

OBJECTIVES FOR THIS ASSET

By end of 2024:

- Work with stakeholders to identify Trout Cod abundance and population structure.
- Prioritise areas in the catchment where Trout Cod populations could be protected, enhanced or established.

By end of 2026:

- Develop a recovery plan for Trout Cod in the Yanco Creek.
- Work with stakeholders to develop a restocking program for Trout Cod at priority locations.
- Undertake in-stream habitat enhancement at prioritised areas such as re-snagging and fencing riparian zones.

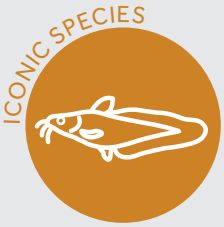
By mid-2031:

- Establishment of Trout Cod at minimum 50% of priority sites.

Eel-tailed Catfish

Eel-tailed Catfish (*Tandanus tandanus*), also known as the Freshwater Catfish, is listed as Endangered in NSW and Central Billabong has some of the last populations in western NSW. They can be found in a range of environments from rivers and creeks to billabongs and lagoons, preferring clear sluggish or still waters. The Eel-tailed Catfish is largely solitary feeding on yabbies, shrimp and other bottom dwelling organisms. One of the key threats to the species is the introduction of European Carp and Redfin Perch resulting in increased predation and competition for resources. Eel-tailed catfish, adults and juveniles, have been detected by Charles Sturt University researchers in the Central Billabong during 2021-23 monitoring seasons (Turner et al. 2022).

Above: Eel-tailed Catfish at Narrandera DPI Fisheries. Credit: AnnaTurner.



ASPIRATIONAL GOAL

Secure a viable local population of Eel-tailed Catfish in a range of habitats and locations across the Central Billabong.

OBJECTIVES FOR THIS ASSET

By end of 2024:

- Determine spatial distribution of adult Eel-tailed Catfish in Billabong, Yanco, Forest and Colombo Creeks.
- Identify priority reaches and actions for on-ground works that are required to maintain the population of Eel-tailed Catfish.

By end of 2026:

- Implement on-ground works to enhance and protect habitat for Eel-tailed Catfish in priority reaches.
- Re-stock Eel-tailed Catfish in priority reaches.

By mid-2031:

- Extend the distribution of Eel-tailed Catfish into priority reaches since 2024.

Murray Cod

Murray Cod (*Maccullochella peelii*) is listed as Vulnerable under the Commonwealth EPBC Act and have been identified as a significant species to the community. Murray Cod are highly adaptable and can exist in a range of habitats, from small clear, rocky upland streams to large, meandering, slow flowing and often silty rivers in the lowland reaches of the Murray-Darling Basin. Historical overfishing, regulation of waterways, introduction of willows and removal of snags have contributed to the decline in Murray Cod numbers. Murray Cod have been detected by Charles Sturt University researchers in the Billabong Creek during the 2021-23 monitoring seasons (Turner et al. 2022).

Above: Murray Cod at Narrandera DPI Fisheries. Credit: Anna Turner.

ASPIRATIONAL GOAL

Expand and protect habitat for Murray Cod populations in the Central Billabong.

OBJECTIVES FOR THIS ASSET

By end of 2024:

- Determine spatial distribution of Murray Cod.
- Identify priority reaches and actions for on-ground works that are required to maintain the population of Murray Cod.

By end of 2026:

- Implement on-ground works to enhance and protect habitat for Murray Cod in priority reaches.

By mid-2031:

- Extend the distribution of Murray Cod into priority reaches since 2024.

Golden Perch

Golden Perch (*Macquaria ambigua*) is also known as Yellowbelly or Murray Perch. Found in a range of environments but occurring most frequently in warm, turbid, sluggish waters commonly found in backwaters and billabongs. The species is decreasing due to alteration of flow regimes and the construction of weirs and dams. Golden Perch were detected by Charles Sturt University researchers in Forest Creek during the 2021-23 monitoring period (Turner et al. 2022).

Above: Golden Perch in Forest Creek. Credit: Andrea Mitchell.

ASPIRATIONAL GOAL

Expand and protect Golden Perch populations in the Central Billabong.

OBJECTIVES FOR THIS ASSET

By end of 2024:

- Determine spatial distribution of Golden Perch.
- Identify actions and priority reaches that may be required to maintain and increase the population of Golden Perch.

By end of 2026:

- Implement on-ground works to enhance and protect habitat for Golden Perch.

By mid-2031:

- Extend the distribution of Golden Perch into priority reaches since 2024.

4.1.2 Vegetation and connected corridors

The dominant riparian vegetation in the Central Billabong is Red Gum Woodland. Frequently inundated or waterlogged areas support a sedgy understorey which includes Cumbungi, Common Reed, sedges and rushes. Less frequently flooded areas support Black Box Woodland which typically supports a grassy or shrubby understorey with Old Man Saltbush, Lignum and Nitre Goosefoot (Cooling & Gippel, 2018). Previous assessments found no strong trends in habitat quality, but a distinct decline in tree health (Kaye, 2013).

ASPIRATIONAL GOAL

Improve condition and extent of riparian vegetation across the Central Billabong system.

OBJECTIVES FOR THESE ASSETS

By end of 2024:

- Establish baseline data for existing riparian vegetation (including Threatened Ecological Communities) in priority areas (with focus on key species such as Superb Parrot feed sources).

By end of 2026:

- Establish demonstration sites which include planting out of key plant species that are commonly missing in riparian habitats.

By mid-2031:

- Improve species diversity at a minimum of 50% of priority demonstration sites.
- Develop 20 natural capital asset plans with landholders.
- Revegetate 750 hectares of riparian land along and adjacent to waterways.
- Regenerate (through weed control/ fencing/ pest control/ in-stream works) 750 hectares of land along and adjacent to waterways.

Above: Connected corridors. Credit: Darren Grigg.

4.1.3 Turtles and frogs

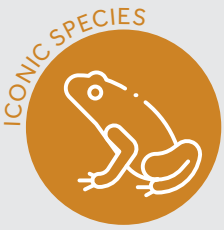
Several turtle species have been recorded across the Central Billabong system including Eastern long-necked turtles, Broad-shelled turtles and Murray short-necked turtles (Turner et al. 2022).

Intensive frog surveys were undertaken in 2019 – 20 seasons across the Mid Yanco, Colombo and Lower Billabong creek systems (Turner, Wassens & McNeil, 2020). Seven species of frog were found across the system in constructed and natural waterbodies: Spotted Marsh frog, Barking Marsh frog and Eastern Sign-bearing froglet, Eastern Banjo frog, Giant Banjo frog, Peron's tree frog and the Southern Bell frog.

Southern Bell Frog

Southern Bell Frog (*Litoria raniformis*) is listed Endangered in NSW and Vulnerable under the EPBC Act. The Southern Bell Frog is one of the largest frog species in Australia and was first found in the Mid Yanco Creek in October 2017. Southern Bell Frog is generally associated with River Red Gum swamps, billabongs along floodplains and also irrigated rice crops when no natural habitat is available. They prefer wetlands with long wet cycles which suits their long larval development requirements. The species is threatened by changes in natural flooding regimes, decline in habitat quality from ground cover removal, pesticide run off and removal of aquatic vegetation.

Above: Southern Bell Frog. Credit: Damian Michael.



ASPIRATIONAL GOAL

Self-sustaining and diverse population of native frogs and turtles throughout the entire Central Billabong Creek system.

OBJECTIVES FOR THESE ASSETS

By end of 2024:

- Understand the extent and abundance of Southern Bell Frogs and identify priority sites.
- Investigate potential drought refuges for Southern Bell Frog including farm dams.
- Establish baseline of turtle nest counts extent and abundance and identify priority sites.

By end of 2026:

- Understand and mitigate threats posed by foxes on the three species of turtles at priority sites.
- Undertake wetland rehabilitation at priority sites on private and public land for Southern Bell Frog habitat.
- Raise awareness in the community about local turtles and frogs.

By mid-2031:

- An increase in frog diversity and abundance at priority sites.
- Successful turtle recruitment detected at priority sites in at least one turtle species.
- Increase in fencing of targeted waterbodies to manage grazing.

Above: Murray Short-necked turtle. Credit: Rob Lacey.

4.1.4 Birds

The floodplain ecosystem of Central Billabong includes long continuous stretches of riparian woodland which is critical habitat for waterbirds and terrestrial bird species. With an increase in the frequency and severity of drought due to climate change, these floodplains will become even more important for the for the bird communities they support.

Superb Parrot

Superb Parrot (*Polytelis swanisonii*) is a medium sized green parrot with a long narrow tail and are listed as Vulnerable (both NSW and Commonwealth status). Superb Parrots nest in deep hollows in large trees, usually River Red Gums along watercourses. Though common in their habitat, Superb Parrots largely due to the alteration of habitat resulting in a lack of nesting sites and changing habitats in their feeding grounds.

Above: Superb Parrot. Credit: Linda Unwin.

ASPIRATIONAL GOAL

Increase in distribution of Superb Parrots throughout highly connected remnant patches for foraging.

OBJECTIVES FOR THIS ASSET

By end of 2024:

- Establish baseline data for Superb Parrot populations.
- Raise awareness in the community about Superb Parrot in the catchment.

By end of 2026:

- Investigate supplementation of the number of natural hollows with artificial hollows.
- Establish a citizen science program to record Superb Parrot.

By mid-2031:

- Restore Superb Parrot habitat in strategic locations close to known habitat and movement corridors.
- Increase the distribution of Superb Parrot recorded in the catchment since 2021, through riparian works and actively engaging the community in recording observations of Superb Parrot.

Waterbirds

The system features extensive floodplain wetland systems including Dry Lake and Wanganella Swamp. These sites support large populations of breeding waterbirds and extensive and diverse aquatic plant communities. A high diversity of waterbird species including Pink-eared ducks, Hoary-headed Grebes, Grey Teal, Pacific Black Ducks, Eurasian Coot and White-faced Heron have been sighted. Additionally, Australian Pelicans and Yellow-billed Spoonbills, and Black-shouldered Kite have all been sighted at Wanganella Swamp.

Above: White-faced Heron. Credit: Michael Hamel-Green.

ASPIRATIONAL GOAL

Healthy, sustaining, returning populations of both migratory and resident waterbirds.

OBJECTIVES FOR THESE ASSETS

By end of 2024:

- Establish baseline data for migratory and resident waterbirds and identify priority sites.
- Raise awareness in the community about the importance of wetlands for waterbirds.

By end of 2026:

- Commence a citizen science program to record observations of waterbirds.
- Undertake baseline surveys of fox and cats at priority sites.

By mid-2031:

- 10% increase in observations of local and migratory waterbird species through community actively recording observations.
- Re-establish a diversity of aquatic vegetation to attract migratory and resident waterbirds.
- Implement of fox and cat control programs at priority sites.

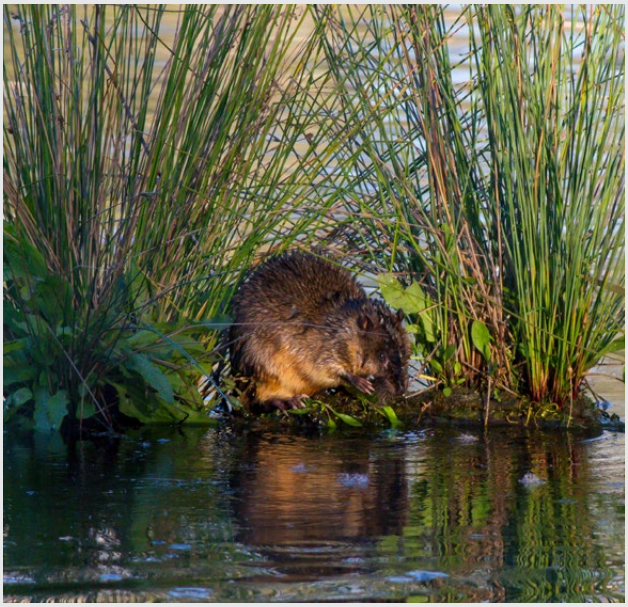
4.1.5 Mammals

Several iconic Australian mammal species have also been found in the Central Billabong including Platypus and Rakali.

Platypus

Platypus (*Ornithorhynchus anatinus*) is a unique Australian mammal that has been found historically in the Yanco and Billabong Creek systems. The conservation status was changed from Least Concern to Near Threatened by the International Union for the Conservation of Nature (IUCN) in 2016. Threats to platypus include loss of habitat, especially land clearing and dams that disrupt the natural water flow, and predation. Entanglement in litter, such as yabby traps, cause many drowning deaths of platypus. Analysis of eDNA data in 2017 verified that Platypus was present in low densities in the upper reaches of the Yanco and Colombo creeks between the townships of Morundah and Narrandera, extending up to 100km downstream in the Yanco Creek and also in the Colombo Creek. Positive Platypus detection and sightings were associated with high creek velocities in floodplain habitats and close to sandhills (McNeil and Griffiths, 2021).

Above: Platypus. Credit: Local Land Services.



Above: Rakali. Credit: David Smith ANU.

Rakali

Rakali (*Hydromys chrysogaster*) is regularly sighted in the Billabong Creek and some tributary streams. Rakali forage for prey primarily underwater and their diet includes fish, aquatic insects, crayfish, crabs, mussels, freshwater molluscs, aquatic plants and even frogs, turtles, birds and bird eggs. Rakali are semi-aquatic and live in burrows on the edges of rivers, lakes and estuaries and consume their prey on flat feeding sites such as logs, rocks or sheltered areas on the riverbank, returning to these sites for each meal - the key requirement is a permanent body of water. Rakali can be threatened by the effects of land use changes for agriculture, river regulation and dams, as well as predation by feral animals (cats and foxes).

ASPIRATIONAL GOAL

Self-sustaining populations of both Platypus and Rakali throughout system.

OBJECTIVES FOR THESE ASSETS

By end of 2024:

- Complete annual monitoring at priority sites where Rakali and Platypus are known to occur.
- Develop a citizen science program for monitoring of Rakali and Platypus.

By end of 2026:

- Undertake detailed habitat analysis for Platypus.

By mid-2031:

- 10% increase in observations of Rakali and Platypus as part of a citizen science program.
- Improvement of habitat for Rakali and Platypus at a minimum of 50% of priority sites.

4.1.6 Water quality

Improving water quality was a community concern throughout consultation. The community are interested in investigating turbidity levels, major point and re-entrainment (e.g. Carp) sources understanding acceptable turbidity levels.

ASPIRATIONAL GOAL

Improve and maintain water quality at key locations since baseline was established in 2024.

THE OBJECTIVES FOR THIS ASSET

By end of 2024:

- Establish water quality monitoring at key locations throughout the catchment.
- Initiate a community campaign about water quality in the catchment.

By end of 2026:

- Support and initiate extension and practice change programs that address on-farm water use planning and efficiency.

By mid-2031:

- Improve water quality by 5% at key locations in the catchment.
- Increase landholder participation in existing programs which help to improve water quality.

Above: Water turbidity testing. Credit: Rob Lacey.

4.2 A PEOPLE'S SYSTEM (SOCIOCULTURAL VALUES)

CULTURAL HERITAGE	Create a shared history and future promoting and protecting both Indigenous and Non-Indigenous values.
EDUCATION	Create a lifelong living lab for local and visiting students from schools and university to conduct research that contributes to the understanding and future management of the creek system.
RECREATION	Provide opportunities for camping, birdwatching, fishing, boating, walking and other activities.
WELL-BEING	Maintain places for quietness, openness, aesthetics, and connecting with nature.
OPPORTUNITIES	Create partnerships, youth employment (retain/return to area), build-utilise local capacity, and create projects for diverse groups to work together.
GOVERNMENT	Establish long-term, partnership-based approaches to working with government.
INFRASTRUCTURE & ACCESS	Improve roads, campsites, toilets, interpretive information, walkways, bridges, TSRs, Crown and Council managed lands.
FIRE RISK	Manage fuel loads and improve access and support for local RFS.

4.3 A PRODUCTIVE/WORKING SYSTEM (ECONOMIC VALUES)

PRODUCTION	Maintain, enhance and promote innovative, sustainable farming practices.
EMPLOYMENT	Generate employment opportunities via infrastructural, ecological enhancement, carbon offset, environmental management and monitoring, tourism and other projects.
TOURISM	Attract visitors to the Yanco/Billabong, establishing 'something to see', developing infrastructure to support this.
WATER	Establish a watering regime that meets the social and economic needs of the system users whilst not compromising ecological health.
RESEARCH/ DEVELOPMENT	Generate employment for locals (e.g. returning university students) centred around government and private based projects. Build capacity locally.

Above: Rice paddock with irrigation canals. Credit: Rob Lacey.

5 Threats

Threats to values were identified by the community and articulated within the three main categories. A summary of threats is provided in the table below:

ENVIRONMENTAL	SOCIOCULTURAL	ECONOMIC
Farm runoff – pollution	Reduction of public access to creeks	Loss of local businesses
Bank erosion/subsistence	Loss of young people from the district	Loss of owner/occupier to corporate owned land
Lack of environmental protection	Declining and ageing population	Reduction to water allocation
Aquatic pests	Loss of local knowledge and experience	Loss of traditional resources
Feral animals	Lack and loss of local capacity or capacity development in NRM	
Weeds	Loss and lack of local education opportunities in NRM	
Domestic animals	Loss of Aboriginal cultural heritage	
Rubbish/litter	Deterioration of cultural and spiritual locations	
Insufficient funding for local activities		
Flows – inappropriate flows and water levels		
Reduction in annual flows and water quality		

Above: Willows choking waterways have been a priority for control. Credit: Andrea Mitchell.

Above: Boxthorn biocontrol at Pretty Pine. Credit: Andrea Mitchell.

6 Management actions

The following management strategies and actions have been developed for the four main categories according to each key system value.

A HEALTHY SYSTEM (ENVIRONMENTAL)

Action	Key values protected	Key threats addressed	Key stakeholders
Develop an integrated fish recovery plan for all zones	• **Threatened and rare fish**	• Aquatic pests • Reduction in annual flows and water quality	• Refreshing Rivers • YACTAC • Research institutions • Water managers • NSW Department of Primary Industries - Fisheries
Establish water quality monitoring in key locations around the catchment	• **Threatened and rare fish** • **Frogs and turtles** • **Water quality**	• Aquatic pests • Farm runoff – pollution • Reduction in annual flows and water quality • Bank erosion / subsidence	• Refreshing Rivers • YACTAC • NSW Department of Primary Industries - Fisheries • NSW Department of Planning and Environment • Landholders • Local schools • Local community • Research institutions
Identify, map, control and monitor priority weeds	• **Vegetation and connected corridors** • **Mammals**	• Weeds	• Refreshing Rivers • Local Land Services • Local Government • CSIRO
Support existing pest animal control programs • Support existing partnerships between public and private land managers to control pest animals (e.g. aerial baiting and culling programs where pest animals impact on waterways).	• **Threatened and rare fish** • **Frogs and turtles**	• Aquatic pests • Feral animals	• Refreshing Rivers • Local Land Services • NSW Department of Primary Industries - Fisheries • Landholders • Local Government
Support existing pest fish monitoring and control programs	• **Threatened and rare fish** • **Water quality**	• Aquatic pests	• NSW Department of Primary Industries – Fisheries • Research institutions • YACTAC

Establish demonstration sites for best practice to improve waterway health on public and private lands across all three zones	• **Threatened species** • **Vegetation and connected corridors** • **Birds** • **Frogs and turtles** • **Platypus and Rakali**	• Weeds • Farm runoff – pollution • Bank erosion/subsistence • Reduction of public access to creeks	• Refreshing Rivers • YACTAC • Landholders • Local Government • Local Aboriginal groups
Develop property based riparian land management plans	• **Vegetation and connected corridors** • **Water quality**	• Lack of environmental protection • Farm runoff – pollution • Weeds • Loss of local knowledge and experience	• Refreshing Rivers • YACTAC • Landholders
Implement riparian management / erosion mitigation works on private land to protect waterway and wetland values	• **Threatened and rare fish** • **Platypus and Rakali** • **Superb Parrot** • **Vegetation and connected corridors** • **Birds** • **Frogs and turtles**	• Weeds • Farm runoff – pollution • Bank erosion/subsistence • Lack of environmental protection	• Refreshing Rivers • YACTAC • Landholders • Local Aboriginal groups • Expert consultants

Above: Researchers monitoring fish abundance and diversity in Yanco Creek Credit: Rob Lacey.

A PEOPLE'S SYSTEM (SOCIOCULTURAL)

Action	Key values protected	Key threats addressed	Key stakeholders
Improve community knowledge and understanding through topic specific education, training and activities	• **Environmental** • **Education** • **Opportunities** • **Threatened species**	• Lack and loss of local capacity or capacity development in NRM • Loss of Aboriginal cultural heritage	• Refreshing Rivers • YACTAC • Local Government • Community groups • Local schools • Local Aboriginal groups
Establish a citizen science and education program as part of the monitoring program. • For example, Community groups could monitor public sites for Superb Parrot sightings and timings.	• **Threatened species** • **Platypus and rakali** • **Birds**	• Loss and lack of local education opportunities in NRM	• Refreshing Rivers • YACTAC • Local Government • Local schools
Create and promote opportunities for local Aboriginal communities to connect and manage Country	• **Cultural heritage** • **Well-being** • **Threatened species**	• Loss of Aboriginal cultural heritage • Deterioration of cultural and spiritual locations	• Refreshing Rivers • YACTAC • Community groups • Local Aboriginal groups
Maintain places for quietness, openness, aesthetics, and connecting with nature	• **Well-being** • **Recreation** • **Education**	• Reduction of public access to creeks	• Community groups • Local Government

Above: Birdwatching. Credit: Rob Lacey.

A PRODUCTIVE/WORKING SYSTEM (ECONOMIC VALUES)

Action	Key values protected	Key threats addressed	Key stakeholders
Maintain, enhance, and promote innovative, sustainable farming practises	• **Viable business opportunity** • **Fertile landscape** • **Biodiversity**	• Loss of local businesses • Farm runoff – pollution	• Refreshing Rivers • YACTAC • Community groups • Industry
Create employment opportunities via infrastructural, ecological enhancement, carbon offset, environmental management and monitoring, tourism, and other projects	• **Viable business opportunity**	• Loss of local businesses	• Local Government • Industry • Landholders • Local Aboriginal groups • Local business
Attract visitors to the Yanco/Billabong, and establishing 'something to see', developing infrastructure to support this	• **Viable business opportunity** • **Source of traditional resources**	• Loss of local businesses	• Local Government • Community groups • Industry • Local Aboriginal groups • Local business
Establish a watering regime that meets the social/ cultural and economic needs of the system users whilst contributing to ecological outcomes	• **Viable business opportunity** • **Fertile landscape** • **Biodiversity** • **Threatened species**	• Loss of local businesses • Reduction to water allocation	• Water Managers • YACTAC • Research institutions
Create employment for locals (i.e. returning university students) centred around government and private based projects	• **Education** • **Viable business opportunity**	• Loss of local businesses	• Local Government • Industry • Local business • Research institutions • Local schools

Above: Jerilderie in the centre of Central Billabong. Credit: Rob Lacey.

7 Implementation and governance

The Refreshing Rivers Program is managed by Murray Local Land Services who has partnered with YACTAC to implement the Program for Central Billabong. A Target Area Advisory group (TAAG) has been appointed to provide guidance about local activities and is made up of community members (farmers, business owners, indigenous, youth etc) representative of the project area. The general community will also be able to give input and aid with direction during the program.

Implementation of the plan will be broken down into specific phases so not all projects start at the same time. It is not technically or financially possible to start all activities in year one, so projects will have to be prioritised and implemented in a staggered approach. Prioritisation of activities will be through YACTAC and the TAAG, with additional local community input. Implementation of activities will also be adaptive and responsive to other programs in the area (e.g. NSW Reconnecting River Country), and look to either have other programs fund certain actions within a project or value add to other programs through funding different activities that are mutually beneficial.

Above: Dooby grub collected on cultural tour. Credit: Andrea Mitchell.

8 Funding the management actions

Natural resource management has historically delivered incentive funding from various sources (e.g., State and Federal Governments, other NGOs, Industry research bodies and philanthropic sources) to assist landholders to do environmental works on a cost-share basis. There is now a trend towards less investment through grants, and a move to market-based instruments such as credit markets and accreditation schemes to drive more private investment in these activities. These markets have developed around **carbon** and **biodiversity**, with waterway-specific methodologies being developed. There are also industry sustainability frameworks (e.g. beef and sheep) that have measures and targets for producers participating in these programs.

For landholders, a key part of these markets and accreditations systems is the identification of assets and benchmarking their condition using a recognised methodology. For investors it is having a mechanism to value and trade the 'credits' generated by improving those values that are measured with a recognized methodology.

These things are happening currently both in the government and private sectors. A focus of the Waterway Management Plan is to identify actions that fit with this model and recognise that it may not be the traditional types of investment that drive change.

Above: CSU researchers fish monitoring. Credit: Rob Lacey.

9 Monitoring and evaluation

It is recommended that a mid-term review of the Waterway Management Plan be undertaken in 2026. This will enable an assessment of progress towards objectives, and the implementation of management strategies and actions. It will be an opportunity to modify actions or objectives, or add new actions or objectives, as issues are addressed, or new issues emerge. This adaptive management will help to ensure that the Waterway Management Plan remains a current, and relevant guide to actions that are required in the catchment to address threats to important values.

A final review of the Waterway Management Plan should also be conducted in 2031, to assess its effectiveness and inform future planning processes in the catchment, and more broadly in NSW.

Above: Waterways and productive landscapes. Credit: Darren Grigg.

10 References

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Find out more at www.refreshingrivers.org.au