REFRESHING
RIVERINA HIGHLANDS
Waterway Management Plan
April 2023

NSW GOVERNMENT
refreshing rivers
Riverina Highlands Landcare Network
Holbrook Landcare Network
YACTAC
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Acknowledgement of Country

We would like to acknowledge the Traditional Custodians of the land on which they work and live, and recognise their continuing connection to land, water and community.

We pay respect to Elders past, present and emerging. We also recognise the unique, diverse and enduring cultures of Traditional Custodians in NSW.

The Riverina Highlands region broadly aligns with the Wiradjuri nation, and many members of our community are Wiradjuri people. Our community also includes people who are descended from other nations living in Wiradjuri land.

Traditional Custodians and Aboriginal people are one of the key community groups with whom partnerships will be fostered through this plan. This is in recognition of their land management practices which ensured sustainable, viable communities over tens of thousands of years. Traditional Custodians Peoples have managed their land for over 40,000 years. A key goal for this plan is to connect people and landscapes and this will be achieved through *Ngangaanha* – the Wiradjuri word meaning to look after, regard and care for Country.

The project team gratefully acknowledges Traditional Custodians, the Riverina Highlands community, the Target Area Advisory Group (TAAG) and workshop attendees for their valuable contributions to the development of this draft report.

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Riverina Highlands

Contents

1 Introduction

The Refreshing Riverina Highlands Waterway Management Plan will build on and expand activities already occurring in the region. Refreshing Rivers Program will support delivering a range of initiatives over 10 years to improve waterway health outcomes.

The program 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.
- High and very high risks to values.
- Specific, Measurable, Achievable, Relevant, Timely (SMART) objectives for key values.
- Management strategies and actions.
- Asset and indicator selection, and targets for monitoring.

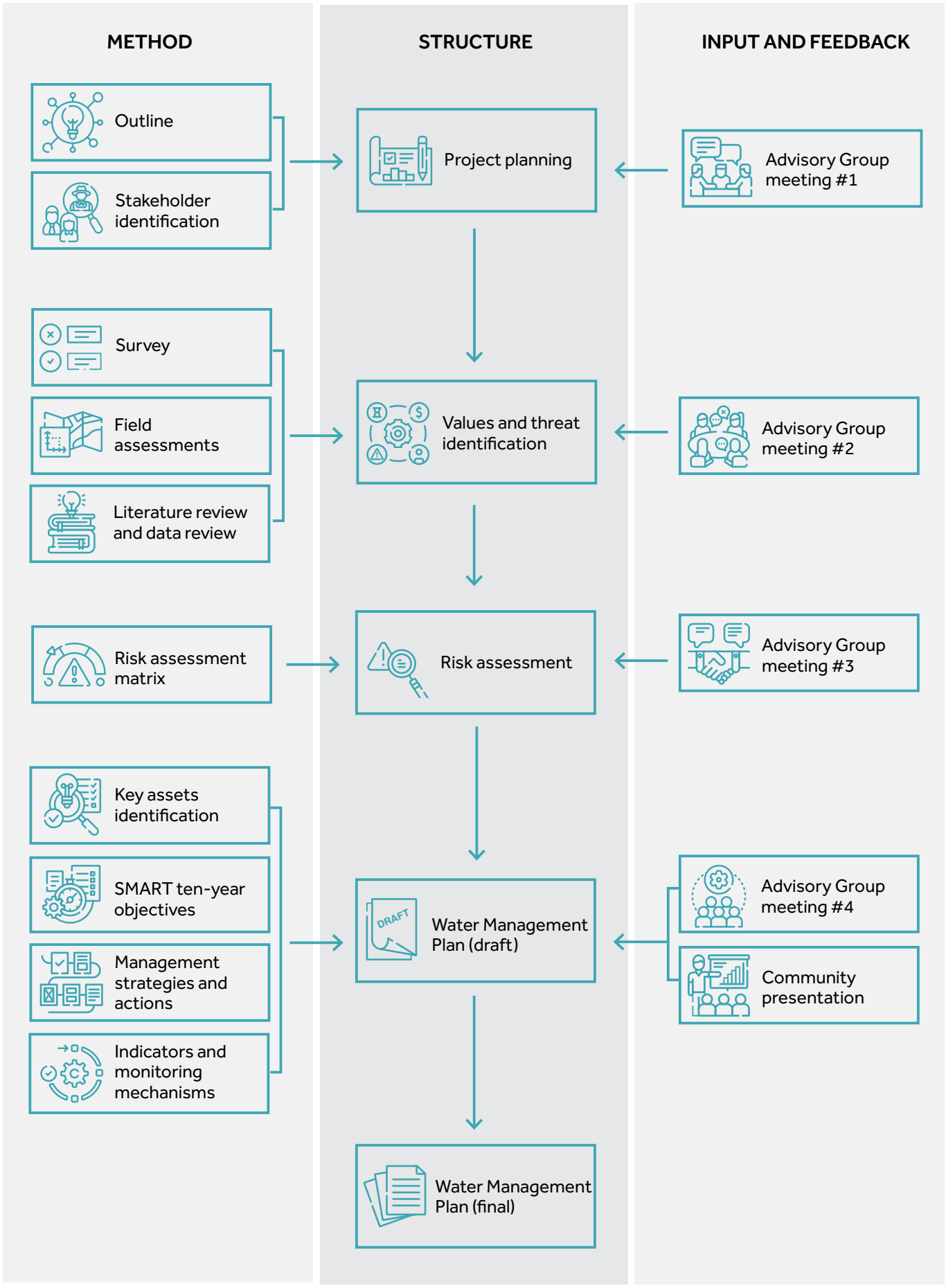
The outcomes of the Waterway Management Plan over the next ten years, will be:

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

Consultation for the Waterway Management Plan was conducted throughout 2022 in collaboration with the Target Area Advisory Group (TAAG) for the Riverina Highlands region, surveys and in-person meetings with the wider community. See the figure for the stepwise approach to the development of the Plan.

Above: Riverina Highlands display at Winter Bites Festival, 2022. Credit: Local Land Services.

CONSULTATION PROCESS



2 Project Area

The Riverina Highlands lies on the western edge of Kosciuszko National Park. It is largely situated in the Snowy Valleys Council area, with a small portion of the catchment to the north (which includes Gundagai and Jugiong) located in the Cootamundra - Gundagai Regional Council area. The total land area of the catchment is approximately 263,500 hectares.

The Riverina Highlands broadly aligns with the Wiradjuri nation, and many members of the community are Wiradjuri people. The community also includes people who are descended from other nations living in Wiradjuri land. The Riverina Highlands region has a rich history and was a meeting place for different Indigenous Nations for thousands of years.

SUB-CATCHMENTS AND WATERWAYS

The Riverina Highlands catchment is made up of seven sub-catchments (See map). Each sub-catchment has been assigned an iconic species which will be align with management actions and communicating progress against the Waterway Management Plan.

Each sub-catchment has been assigned an iconic species:

Goobarragandra River
Endangered Tumut Grevillea

Yaven Yaven, Nacki Nacki, Hillas Creeks
Platypus

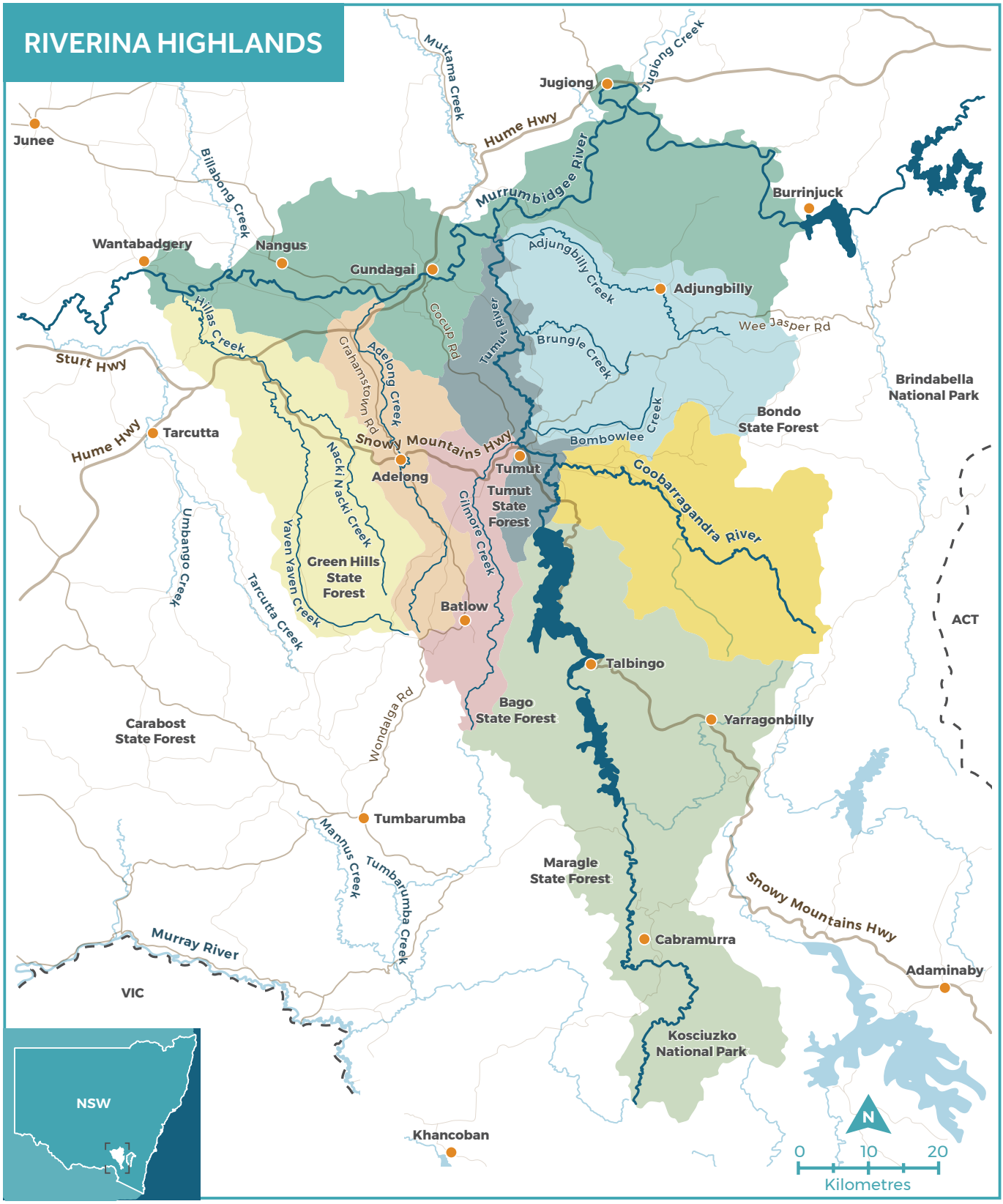
Tumut River
Murray Crayfish

Murrumbidgee River
Trout Cod

Gilmore Creek
Endangered Booroolong Frog

Adjungbilly/Brungle/ Bombowlee Creeks
Endangered Macquarie Perch

Adelong Creek
Murray Cod



KEY

Sub-catchments

- Murrumbidgee River
- Hillas/Yaven/Nacki Creeks
- Adelong Creek
- Gilmore Creek
- Lower Tumut River
- Adjungbilly/Brungle/ Bombowlee Creeks
- Goobarragandra River
- Upper Tumut River

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

Above: Community consultation, November 2022. Credit Kathie Le Busque.

3 Vision

Throughout 2022, the local community was surveyed to understand their vision for their local waterways in the Riverina Highlands and how they envisioned it in 30 years' time. See Figure 1 below for the outcome.

The results indicate that revegetation, native aquatic species and water quality were highly valued in the catchment, along with bank stability and the management and prevention of erosion and weeds. Environmental features were reflected strongly in the vision. Other values include agriculture, soil health and recreation.

Figure 1: Thirty-year community vision for Riverina Highlands.

4 Values

In the survey, 13 values were listed, and respondents were asked to rank these values in terms of their importance . The survey results are summarised in Figure 2 below.

The plan has taken the values identifed by the community and set out objectives to ensure the assets are protected and enhanced for the future.

KEY VALUES OF OUR WATERWAYS

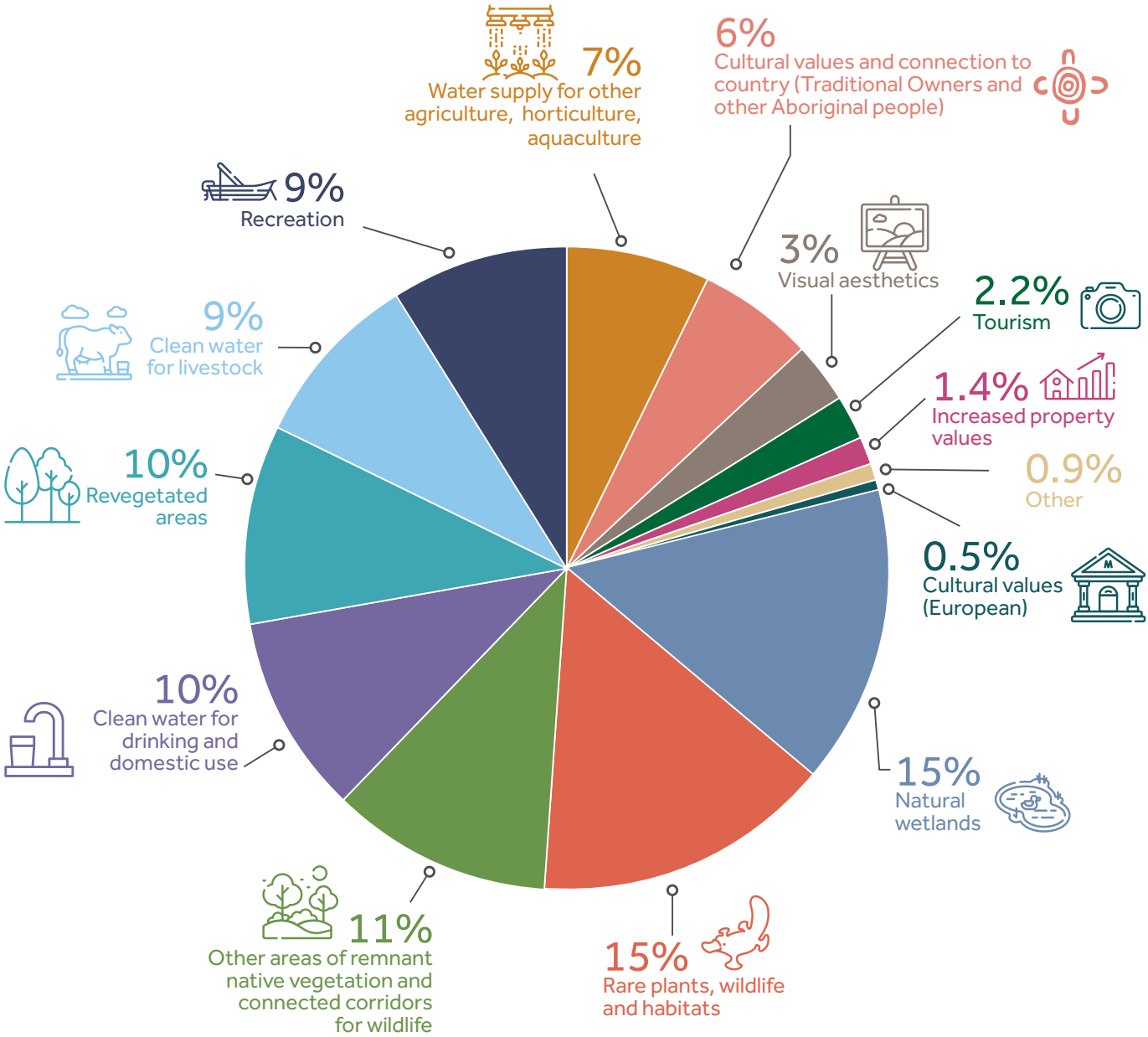


Figure 2: Values of the Riverina Highlands waterways as voted by the local community.

4.1 NATURAL WETLANDS

Natural wetlands, such as billabongs, soaks, swamps and seasonally wet areas, was the highest rated value according to the survey results. Wetlands are an important habitat for native plants and animals and breeding grounds and nurseries for invertebrates, fish, frogs and waterbirds.

Wetlands are valued for the ecosystem services (the benefits to humankind provided by natural ecosystems) that they provide. These include direct economic benefits like food and fresh water; or their capacity to filter pollutants and sediments in water, and retain or slow floodwaters.

Key wetland assets include:

- **Tomneys Plain**
  Tomneys Plain is found in the headwaters of the Tumut River near Tumbarumba. It is part of a complex of montane Sphagnum bogs in the Bago State Forest to the west of Kosciuszko National Park. Tomney's Plain is a nationally listed wetland and an example of an endangered ecological community.

- **Tumut Wetlands**
  The Tumut wetlands (approximately 20 hectares), is a crown land reserve managed by Snowy Valleys Council. It comprises a series of lagoons fringed by native reeds, stands of the giant River Red Gum forests adjacent to the Tumut River. These wetlands provide a variety of habitats for over 70 different bird species including Spotless Crake, the Darter, the Royal Spoonbill, the Cattle Egret, the Curlew Sandpiper, the Rufous Night Heron, the Australian Shoveler and the little Grassbird may be seen at the site.

- **Floodplain wetlands on private land**
  These are important assets in the catchment due to the natural values they support such as habitat for native species, waterbirds, fish, frogs, invertebrates and plants; and ecosystem services such as their capacity to filter pollutants and sediments in water, and retain or slow floodwaters.

Right: Tumut wetlands. Credit: Local Land Services.

OVERARCHING GOAL

To have improved the condition of very high and high priority wetlands in the catchment and maintained their extent.

OBJECTIVES

By 2024:

- Prioritised wetlands in the catchment for monitoring and management actions (such as stock exclusion fencing, weed control, erosion control and revegetation).

By 2026:

- Determined a wetland condition monitoring method and program, and established baseline condition at priority wetlands in the catchment.
- Created and promoted opportunities for Traditional Custodians to be involved in wetland use and management.
- Developed (or enhanced existing) partnerships with stakeholder agencies, private landholders and the broader community to work together on wetland management and monitoring in the catchment.

By 2031:

- Improved the condition of very high priority wetlands in the catchment from baseline condition and maintained their extent.
- For Traditional Custodians to be actively involved in wetland restoration and management, as demonstrated through the provision of advice and events on wetland Country.
- Actively worked in partnership with stakeholder agencies, private landholders and the broader community to manage and monitor wetlands in the catchment. This should be demonstrated by an increased number of partnerships, wetland management projects and stakeholder/ community participation in wetland monitoring since 2021.

4.2 RARE PLANTS, WILDLIFE AND HABITATS

Rare plants, wildlife and habitats was the second highest rated value according to the Riverina Highlands community. The key pieces of legislation that identify and protect threatened species, populations and ecological communities in NSW is the Biodiversity Conservation Act 2016 (BC Act) and its regulations. The Department of Planning and Environment administers the BC Act, and the Department of Primary Industries is responsible for protecting threatened fish.

Key rare and threatened species include:

- Tumut Grevillea
- Booroolong Frog and habitat
- Macquarie Perch
- Platypus
- Lowland Murray River Aquatic Endangered Ecological Community
- Coolac-Tumut Serpentinite Shrubby Woodland
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

Above: Booroolong Frog habitat, Gilmore Valley. Credit: Rob Lacey.

Tumut Grevillea

Tumut Grevillea (*Grevillea wilkinsonii*) is a spreading shrub with a highly restricted distribution, with its main occurrence along a 6 km stretch of the Goobarragandra River where about 1,000 plants are known. The other occurrence is a small population north of Gundagai. It is listed as Critically Endangered in NSW and Endangered under the *Commonwealth Environment Protection and Biodiversity Act 1994* (EPBC Act).

Above: Tumut Grevillea. Credit: Kathie Le Busque.

ASPIRATIONAL GOAL

To have expanded and protected Tumut Grevillea populations in the catchment to support the longer term Saving Our Species Strategy objective to 'secure the species in the wild for 100 years and maintain its conservation status under the BC Act'.

OBJECTIVES FOR THIS ASSET

By 2024:

- Prioritised areas in the catchment where Tumut Grevillea populations could be protected, enhanced or established.
- Continued to engage with Traditional Custodians and Landcare to collect seed and propagate Tumut Grevillea.
- Promoted the Tumut Grevillea and its importance in the catchment through a community awareness campaign.

By 2026:

- Expanded the extent of Tumut Grevillea by protecting existing populations and including it in revegetation plantings where appropriate.

By 2031:

- Protected Tumut Grevillea populations through agreements with landholders, fencing and revegetation plans (land management plans), and pest animal control.
- Ensured that Traditional Custodians People and the community are actively involved in projects to protect and expand Tumut Grevillea populations.

ICONIC SPECIES

Coolac-Tumut Serpentinite Shrubby Woodland

Coolac-Tumut Serpentinite Shrubby Woodland is a restricted ecological community which occurs on serpentinite geology and associated substrates between Coolac, Gundagai and Tumut in NSW. Riparian areas where this woodland intersects the Adjungbilly Creek, Brungle Creek and Goobarragandra River are ecologically significant in terms of quality of the vegetation and the habitat it provides for threatened species. It is listed as Endangered in NSW, and is not listed under the Commonwealth EPBC Act.

Above: Serpentinite Woodland. Credit: Local Land Services.

ASPIRATIONAL GOAL

To have expanded and protected Serpentinite Shrubby Woodland in the catchment to support the longer term Saving Our Species Strategy objective to 'maximise the viability of the ecological community and maintain its conservation status under the BC Act'.

OBJECTIVES FOR THIS ASSET

By 2024:

- Continued to promote the Serpentinite Shrubby Woodland campaign led by landholders and Riverina LLS.
- Worked with Traditional Custodians to understand the cultural significance of Serpentinite Shrubby Woodland and the rare species its supports.

By 2026:

- Worked with stakeholders to expand the Serpentinite Shrubby Woodland campaign led by landholders and Riverina LLS.
- Investigated options for biodiversity stewardship payments for protection of these woodlands.
- Ensured that Traditional Custodians are involved in projects to protect Serpentinite Shrubby Woodland, such as seed collection and restoration activities.

By 2031:

- Protected and improved quality of Serpentinite Shrubby Woodland through agreements with landholders, fencing and revegetation plans (land management plans), and pest animal control.
- Ensured that Traditional Custodians and the community are actively involved in projects to protect Serpentinite Shrubby Woodland, including restoration activities, research and monitoring.

Box Gum Grassy Woodlands

White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland - (Box Gum Grassy Woodlands) occur on mid-slopes in all sub-catchments in the Riverina Highlands. It is listed as critically endangered in NSW and under the Commonwealth EPBC Act. It supports a number of rare woodland bird species such as the critically endangered Regent Honeyeater and the endangered Swift Parrot, as well as wattlebirds, tree creepers, thornbills and wrens. Key threats to this community are habitat loss, degradation and fragmentation from agricultural, forestry, mining, infrastructure and residential development; altered fire regimes; weed invasion and a lack of community knowledge and appreciation of the community and component threatened species.

Above: Box Gum Woodland.
Credit: Local Land Services.

ASPIRATIONAL GOAL

To have improved the quality of Box Gum Grassy Woodland in the catchment to support the longer term Saving Our Species Strategy objective to 'maximise the viability of the ecological community and maintain its conservation status under the BC Act'.

OBJECTIVES FOR THIS ASSET

By 2024:

- Promoted the importance of Box Gum Grassy Woodlands to the community.
- Worked with Traditional Custodians to understand the cultural significance of Box Gum Grassy Woodlands and traditional methods for managing this woodland.
- Identified high quality stands of Box Gum Grassy Woodlands for rehabilitation actions, including setting realistic expectations and objectives for restoration such as focusing on top up plantings of canopy and understorey species.

By 2026:

- Investigated options for biodiversity stewardship payments for protecting and improving Box Gum Grassy Woodlands.
- Worked with landholders to improve the quality of priority Box Gum Grassy Woodlands adjacent to riparian zones.
- Ensured that Traditional Custodians are involved in projects to protect Box Gum Grassy Woodland, such as seed collection and restoration activities.

By 2031:

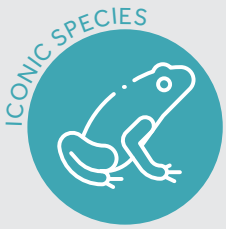
- Improved the quality (both overstorey and understorey species) of Box Gum Grassy Woodlands along waterways since 2021, via fencing, weed control and revegetation where appropriate.
- Ensured that Traditional Custodians People and the community are actively involved in projects to protect Box Gum Grassy Woodland, including restoration activities, research and monitoring.

Booroolong Frog and habitat

The Booroolong Frog *(Litoria booroolongensis*) is listed as Endangered in NSW, and also under the Commonwealth EPBC Act. They are found on a number of streams in the Riverina Highlands including the Adjungbilly, Brungle Goobarragandra, Gilmore and Adelong Creeks. Chytrid fungus is a key threat to this species. However, it is a threat that is difficult to mitigate. The preferred management strategy is to mitigate other threats, which make populations more vulnerable to Chytrid, such as loss of habitat through damage to stream margins by stock; weed invasion of streamside habitats, particularly by willows; and erosion /sedimentation of waterways.

Above: Booroolong Frog. Credit: Dave Hunter.

ASPIRATIONAL GOAL



Ensure that all Booroolong Frog habitat is protected and key threats are managed in the catchment.

OBJECTIVES FOR THIS ASSET

By 2024:

- Continued to promote the rarity of Booroolong Frog in the catchment to the community, including increasing knowledge of the importance of its habitat and threats to the species, through educational opportunities.
- Worked with Traditional Custodians to understand the cultural significance of Booroolong Frog and Country where this species occurs in the Riverina Highlands.
- Prioritised sites for restoration focusing on extending the current areas protected for Booroolong Frog.

By 2026:

- Continued to work with stakeholders to monitor the presence and abundance of Booroolong Frog in waterways across the catchment.
- Ensured that Traditional Custodians and the community are actively involved in aspects of Booroolong Frog recovery including for example, habitat restoration activities and monitoring.
- Worked with landholders and other stakeholders to improve and expand Booroolong Frog habitat, through riparian fencing, revegetation, weed control, off-stream watering and erosion management works.

By 2031:

- Increased the length of Booroolong Frog habitat protected (through riparian fencing, revegetation and erosion management) in the catchment since 2021.
- Improved understanding of the presence, abundance and population dynamics of Booroolong Frog in waterways in the catchment through monitoring.
- Ensured that Traditional Custodians and the community are actively involved in projects to protect Booroolong Frog and its habitat, including riparian restoration activities, research and monitoring.

Macquarie Perch

The Macquarie Perch (*Macquaria australasica*) is only found on four streams within the Murray Darling Basin in NSW, including the Adjungbilly Creek. This restricted population, persisting along a 12km section of the Creek, has unique genetics and is important for the long-term viability of this species. It is listed as endangered in NSW, and also under the Commonwealth EPBC Act.

Above: Macquarie Perch. Credit: NSW DPI.

ASPIRATIONAL GOAL

To have increased knowledge of Macquarie Perch distribution and abundance in the catchment and protected its habitat to secure the species in the wild for 100 years.

OBJECTIVES FOR THIS ASSET

By 2024:

- Prioritised reaches (gaps between existing protection works) along the Adjungbilly Creek for management of Macquarie Perch habitat (such as through stock exclusion fencing, weed control, erosion control and revegetation) and monitoring.
- Raised awareness of the importance of Macquarie Perch in the catchment.
- Worked with NSW DPI Fisheries to investigate and prioritise sites for the establishment of translocated Macquarie Perch populations in the catchment.
- Collaborate with Traditional Custodians to understand the cultural significance of Macquarie Perch and its locality in the Adjungbilly Creek.
- Worked with stakeholders to investigate and communicate the impacts of introduced species such as trout on native fish, and consider the cessation of trout-restocking in key Macquarie Perch reaches (including translocation sites).

By 2026:

- Implemented works (such as stock exclusion fencing, weed control, erosion control and revegetation) at priority sites (gaps) for Macquarie Perch habitat.
- Supported existing pest fish monitoring and control programs (e.g. carp and redfin).
- Raised awareness with the community to reduce pest fish (e.g. carp and redfin).
- Work with stakeholders to monitor the presence and abundance of Macquarie Perch in waterways across the catchment.
- Supported NSW DPI Fisheries to understand and manage the genetics of existing Macquarie Perch populations.
- Worked with stakeholders to mitigate the threats posed by forestry in the upper catchment to threatened species such as Macquarie Perch.

By 2031:

- Initiated a reintroduction program for Macquarie Perch at a translocation site in the catchment (the upper Goobarragandra River being the likely receival waterway), using mixed genetics including those from Adjungbilly Creek.
- Improved understanding of the presence, abundance, population dynamics and genetics of Macquarie Perch in the catchment.
- Ensured that Traditional Custodians and the community are involved in aspects of Macquarie perch recovery including habitat restoration activities, research and monitoring programs.
- Managed (such as through stock exclusion fencing, weed control, erosion control and revegetation) and monitored Macquarie Perch habitat in priority gaps along the Adjungbilly Creek.

Above: Adjungbilly Creek.

Platypus

Platypus (*Ornithorhynchus anatinus*) is a unique Australian mammal that is dependent on fresh water streams. Platypus are found on all major streams in the Riverina Highlands. 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. They are an iconic Australian species that are protected in NSW under the *Biodiversity Conservation Act 2016*.

Above: Platypus. Credit: Local Land Services.

ASPIRATIONAL GOAL

To have increased knowledge of Platypus distribution and abundance in the catchment and protected its habitat to secure the species in the wild for 100 years.

OBJECTIVES FOR THIS ASSET

By 2024:

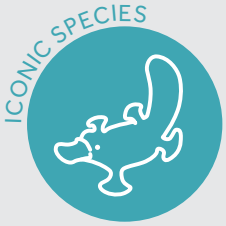
- Worked with stakeholders and the community to promote the presence of Platypus in the catchment and start actively recording Platypus sightings to establish baseline presence/absence information.
- Worked with Traditional Custodians to understand the cultural significance of Platypus and Country where this species occurs in the Riverina Highlands.

By 2026:

- Worked with landholders and other stakeholders to improve and protect Platypus habitat, through expanding the existing restoration project, using riparian fencing, revegetation and erosion management works.
- Ensure that Traditional Custodians are involved in projects to promote and protect Platypus and habitat in the catchment, such as through communication events; and fencing and revegetation activities.

By 2031:

- Increased the distribution of Platypus recorded in the catchment since 2021, through riparian works and actively engaging the community in recording observations of Platypus through a Platypus app.
- Maintained Platypus populations in key locations around the catchment since 2024.
- Ensured that Traditional Custodians and the community are actively involved in projects to record sightings and protect Platypus habitat in the catchment, including riparian restoration activities, research and monitoring.



Lowland Murray River Aquatic Endangered Ecological Community

Lowland Murray River Aquatic Endangered Ecological Community is listed as Endangered in NSW includes all native fish and aquatic invertebrates within all natural creeks, rivers, and associated lagoons, billabongs and lakes of the Murrumbidgee River downstream of Burrinjuck Dam and the Tumut River downstream of Blowering Dam. The community has been greatly modified since European settlement, through river regulation, cold water pollution, agricultural practices, degradation of riparian zones, removal of instream large woody debris, and the introduction of non-native species including pest fish.

Above: Lowland Murray River Aquatic Endangered Ecological Community. Credit: Local Land Services.

ASPIRATIONAL GOAL

Sustained the Lowland Murray River Aquatic Endangered Ecological Community in the catchment.

OBJECTIVES FOR THIS ASSET

By 2024:

- Worked with stakeholders and the community to promote the presence and importance of the Ecological Community in the catchment, including threats to the ecological community.
- Worked with Fisheries and other stakeholders to prioritise riparian and instream aquatic habitat rehabilitation works, along key river reaches where populations of threatened species are known to occur.
- Worked with Traditional Custodians to understand the cultural significance of the community in Riverina Highlands.

By 2026:

- Worked with landholders and other stakeholders to improve and protect riparian areas, instream habitats and water quality in the Ecological Community, through fencing, revegetation and erosion management works.
- Supported existing pest fish monitoring and control programs (e.g. carp and redfin).
- Raised awareness with the community to reduce pest fish (e.g. carp and redfin).
- Continued to work with stakeholders to monitor the presence and abundance of species and habitats in the Ecological Community in waterways across the catchment.
- Ensured that Traditional Custodians are involved in projects to promote and protect Lowland Murray River Aquatic Endangered Ecological Community in the catchment, such as through communication events; and fencing and revegetation activities.

By 2031:

- Implemented works and conducted monitoring at priority sites for the Ecological Community.
- Actively encouraged community involvement in aspects of the recovery of the Ecological Community including for example, research, reporting, monitoring and management activities.
- Worked with stakeholders to mitigate the threats posed by forestry in the upper catchment to Lowland Murray River Aquatic Endangered Ecological Community.
- Ensured that Traditional Custodians and the community are involved in aspects of Ecological Community recovery including habitat restoration activities, research and monitoring programs.

Above: Tumut River riparian vegetation. Credit: Rob Lacey.

4.3 REMNANT NATIVE VEGETATION AND CONNECTIVITY

Remnant native vegetation and connectivity was ranked as the third highest value in the catchment in the survey. Respondents valued 'well vegetated waterways', 'good habitat and ecosystems for wildlife to increase biodiversity' and the 'natural beauty' of the catchment.

Remnant native vegetation and connected corridors for wildlife across the landscape can link areas of habitat.

- Ellerslie Nature Reserve which supports critically endangered Box Gum Grassy Woodland remnant vegetation.
- Mudjarn Nature Reserve, locally known as "Pine Mountain", due the locally abundant Black Cypress Pine (*Callitris endlicherii*), which gives the reserve a very dark appearance and makes it stand out from other high points in the area. It also protects other areas of remnant native forest, such as small pockets of Box Gum Grassy Woodland, and six threatened bird species. The reserve protects Aboriginal cultural heritage sites, landscapes and other features that have high significance to the local Aboriginal community.
- The area of Coolac-Tumut Serpentinite Shrubby Woodland, between Coolac - Gundagai and Tumut which transects the Adjungbilly and Goobarragandra sub-catchments.
- Existing linear patches of vegetation along waterways and around wetlands which provide habitat, shade and help to reduce erosion; as well as trapping/filtering nutrients and sediment before they enter waterways.
- Riparian Sheoak Forests on waterways at lower elevations. These high-quality sites provide habitat for threatened species.
- The large expanse of public land in the southern section of the catchment, upstream of the Blowering Dam wall which supports native vegetation.

Above: Goobarragandra River. Credit: Rob Lacey.

ASPIRATIONAL GOAL

To have improved the condition of patches of remnant vegetation and improve linkages along and adjacent to waterways and wetlands in the catchment.

OBJECTIVES

By 2024:

- Prioritised areas of remnant vegetation in the catchment for protection and improvement (such as through stock exclusion fencing, weed control, erosion control).

By 2026:

- Investigated options for biodiversity stewardship payments for protecting and improving remnant vegetation.
- Developed (or enhanced existing) partnerships with stakeholders, landholders and the broader community to work together on managing remnant vegetation in the catchment.
- Created and promoted opportunities for Traditional Custodians to be involved in the management of remnant vegetation and connected corridors for wildlife.
- Developed a riparian intervention monitoring method to assess the success of riparian management works in areas of remnant vegetation.
- Better understand the decline of River Sheoak along waterways in the catchment, and develop options for mitigating risks to this important riparian species.

By 2031:

- Recorded all new or maintenance vegetation works to allow evaluation and reporting on progress; as well as future planning for the protection of key vegetation assets in the catchment.
- Protected remnant vegetation and created linkages along and adjacent to waterways and wetlands, through 12 voluntary and non-binding conservation agreements.
- Actively working in partnership with stakeholder agencies, private landholders and the broader community to monitor the impact at the site scale, of riparian management (intervention) works.
- For Traditional Custodians to be actively involved in the management and monitoring of vegetation associated with waterways and wetlands, as demonstrated by contracts to complete on-ground environmental projects, the provision of advice and events on Country.

4.4 CLEAN WATER FOR DRINKING, DOMESTIC USE AND LIVESTOCK

Survey respondents ranked clean water for drinking and domestic use as the fourth highest value in the catchment. The word such as 'clean, clear water', 'cleaner water', 'improved water quality free of sediment and other contaminates' and 'pristine water' featured heavily in the free text responses in the survey.

Many people in the catchment extract water from their local waterways for domestic use. In addition, local government authorities extract, treat and distribute water for town water supply.

Above: Cattle in creek, Gilmore Valley. Credit: Rob Lacey.

ASPIRATIONAL GOAL

To have improved water quality at key locations in the catchments since baseline was established in 2024.

OBJECTIVES

By 2024:

- Worked with stakeholders to establish water quality monitoring at key locations throughout the catchment to allow evaluation and reporting on progress; as well as future planning.

By 2026:

- Created and promoted opportunities for Traditional Custodians People to be involved in water quality monitoring.
- Created and promoted opportunities for the broader community, including school children, to be involved in citizen science water quality monitoring.
- Promoted information on the benefits of clean water to livestock health and productivity to landholders by restricting stock access to waterways.

By 2031:

- Maintained or improved water quality at key locations in the catchment since baseline was established in 2024.
- For Traditional Custodians to be actively involved water quality monitoring in the catchment, as demonstrated by participation in monitoring and sharing of Traditional Ecological Knowledge with the broader community.

4.5 REVEGETATED AREAS

Survey respondents also valued the revegetation efforts that had been undertaken in the catchment over previous decades. Revegetation was the most commonly used word in the '30 year vision', indicating that respondents also see it as a key component of the future management of the catchment.

Riverina LLS data indicates that approximately 54 km of waterways in the catchment have been revegetated over the past 14 years. The majority of this work was co-funded through government programs. In the future, as less government funding is available, stewardship programs and natural capital markets may drive private landholders to undertake revegetation works.

Under future climate change scenarios, it will be important to build climate resilience into rehabilitation and restoration works to assist the long-term survival of vegetation species and communities in the catchment.

Above: Tumut River revegetation. Credit: Rob Lacey.

ASPIRATIONAL GOAL

To have improved the condition of sites adjacent to waterways and wetlands in the catchment, as demonstrated by the riparian intervention monitoring method.

OBJECTIVES

By 2024:

- Prioritised riparian areas in the catchment for management (such as stock exclusion fencing, weed control, erosion control and revegetation).
- Adapted, as required, revegetation techniques based on previous experience in the catchment (i.e. what has worked and what hasn't).
- Continued to support Murrumbidgee Landcare Inc and Holbrook Landcare Network in the development of climate ready revegetation guides (including for riparian areas).
- Investigated and promoted opportunities for funding revegetation via carbon projects or eco-certification schemes.

By 2026:

- Continued to work with stakeholders, landholders and the broader community to promote the benefits of revegetation, and options to maintain or establish revegetation (including through natural capital projects).
- Worked with landholders, stakeholders and the broader community to maintain existing revegetation, or establish new revegetation, through the initiation of land management plans.
- Created and promoted opportunities for Traditional Custodians People to be involved in the management and monitoring of revegetation.
- Developed a riparian intervention monitoring method to assess the success of riparian management works such as revegetation.

By 2031:

- Recorded all new or maintenance revegetation works (and riparian condition assessment results) to allow evaluation and reporting on progress; as well as adaptive management and future planning for the protection of key vegetation assets in the catchment.
- Increased the extent of riparian native vegetation through the development of 20 land management plans with landholders.
- Regenerated (through weed control/ fencing/ pest control/ in-stream works) 750 hectares of riparian land.
- Revegetated 750 hectares of riparian land.
- Actively working in partnership with stakeholder agencies, private landholders and the broader community to monitor the impact at the site scale, of riparian management (intervention) works, including revegetation.
- Traditional Custodians to be actively involved in the management and monitoring of revegetation associated with waterways and wetlands, as demonstrated by contracts to complete on-ground environmental projects, participation in monitoring, the provision of advice and events on Country.
- Climate ready revegetation guidance included into all land management plans.

4.6 RECREATION

Recreation was voted the seventh highest value in the catchment by survey respondents, and it is a key value in the majority of sub-catchments.

Key activities include:

- **Murrumbidgee River**
  Camping, fishing, swimming and kayaking/canoeing.
- **Adjungbilly, Brungle and Bombowlee Creeks**
  Camping, fishing, swimming and kayaking/canoeing.
- **Goobarragandra River**
  Recreation and tourism, such as fishing, swimming and kayaking/canoeing; Hume and Hovell Walking Track, Kosciuszko National Park.
- **Tumut River and Blowering Dam**
  Recreation and tourism, such as camping, fishing, swimming, bush walking, boating and kayaking/canoeing.
- **Gilmore and Sandy Creeks**
  Recreation such as fishing and swimming.
- **Adelong Creek**
  Tourism - gold was first discovered at Adelong in 1857 and the nearby heritage listed industrial site of Adelong Falls Gold Mill Ruins contains historic remnants of the gold mining. Recreation such as fishing, swimming and kayaking/canoeing.

Above: Fishing on the Tumut River. Credit: Rob Lacey.

ASPIRATIONAL GOAL

- Raised the profile of five key recreational activities (including eco-tourism) in the catchment, by increasing participation in these activities.
- Reduced the impact on waterway health by recreational users, as demonstrated by the number of reports of incidences of pollution / littering etc, and responses required by agency stakeholders.

OBJECTIVES

By 2024:

- Prioritised five key recreational activities in the catchment that enable the community to enjoy and protect key values.
- Investigated opportunities for linking citizen science (i.e. Platypus counts) and recreation.

By 2026:

- Worked with stakeholder agencies and the broader recreational community to promote five key recreational activities in the catchment; as well as the benefits of waterway health, the impacts that recreation may have on these values, how to mitigate threats to waterway and recreational values.
- Worked with stakeholders, through a local working group, to investigate and promote eco-tourism opportunities.
- Created and promoted opportunities for Traditional Custodians People to be involved in the management of recreation along waterways.

By 2031:

- Completed five campaigns to promote recreation (including eco-tourism, as appropriate) in the catchment, which also focus on the benefits of good waterway health to recreationalists, the environment and the broader community
- Actively working with stakeholder agencies, private landholders and the broader community to monitor and respond to the impact of recreation along waterways.
- For Traditional Custodians to be actively involved in the management and monitoring of recreation along waterways, as demonstrated through the provision of advice and events on Country.

4.7 CULTURAL VALUES AND CONNECTION TO COUNTRY (TRADITIONAL CUSTODIAN VALUES)

The Riverina Highlands broadly aligns with the Wiradjuri nation and has a rich cultural history. The area was a meeting place for different Indigenous Nations including Ngunawal (north east), Walgalu (south-east) and Wiradjuri (west). Traditional Custodians have managed their land here for over 40 000 years. Evidence of past practices can be found in the landscape through scar trees, ring trees, stone artefacts, boora rings and rock paintings.

Partnerships with Traditional Custodians including the Brungle-Tumut Local Aboriginal Land Council are being fostered to improve our Aboriginal ecological knowledge and enable the Aboriginal community to care for Country.

This has included:

- Cultural burning on public lands
- Seed collecting training and mentoring
- Contract weed spraying on significant sites
- Cultural heritage assessments.

Above: Brungle-Tumut LALC collecting Tumut Grevillea seed on the Goobaragandra River Credit: Local Land Services.

ASPIRATIONAL GOAL

Enriched, enhanced and fostered opportunities for Traditional Custodians to connect with, to be on, and to continue to manage Country.

OBJECTIVES

By 2024:

- Actively engaged with Traditional Custodians in the development of the Waterway Management Plan, and its Implementation and Monitoring Plans to ensure that First Nations perspectives and needs are included in the Refreshing Rivers project.

By 2026:

- Increased employment opportunities for Traditional Custodians in the catchment through activities such as seed collection, revegetation, fencing, weed control and other waterway management works.
- Encouraged and created opportunities for Traditional Custodians (including different groups of Traditional Custodians e.g. men, women and family) to engage with waterways in the catchment. This includes for the protection of physical and spiritual cultural values, the management of environmental values, connection to Country and celebration and ceremony.
- Continued cultural burning in the catchment.
- Recorded and protected cultural sites found along waterways in the catchment.

By 2031:

- Ensure that different groups of Traditional Custodians (e.g. men, women and family) are able to access riparian land to share stories and knowledge, and for celebration and ceremony.
- Developed a cultural burning program for the catchment.
- Investigated opportunities for cultural flows in the catchment.
- Actively involved and employed Traditional Custodians in the management and monitoring of values in the catchment, and participation in ongoing waterway health monitoring.
- Promoted Aboriginal Ecological Knowledge, and the importance of cultural values in the catchment to the broader community.

5 Threats

In the survey, 13 threats were listed, and respondents were asked to rank these threats in terms of their importance The survey results are summarised in Figure 3 below.

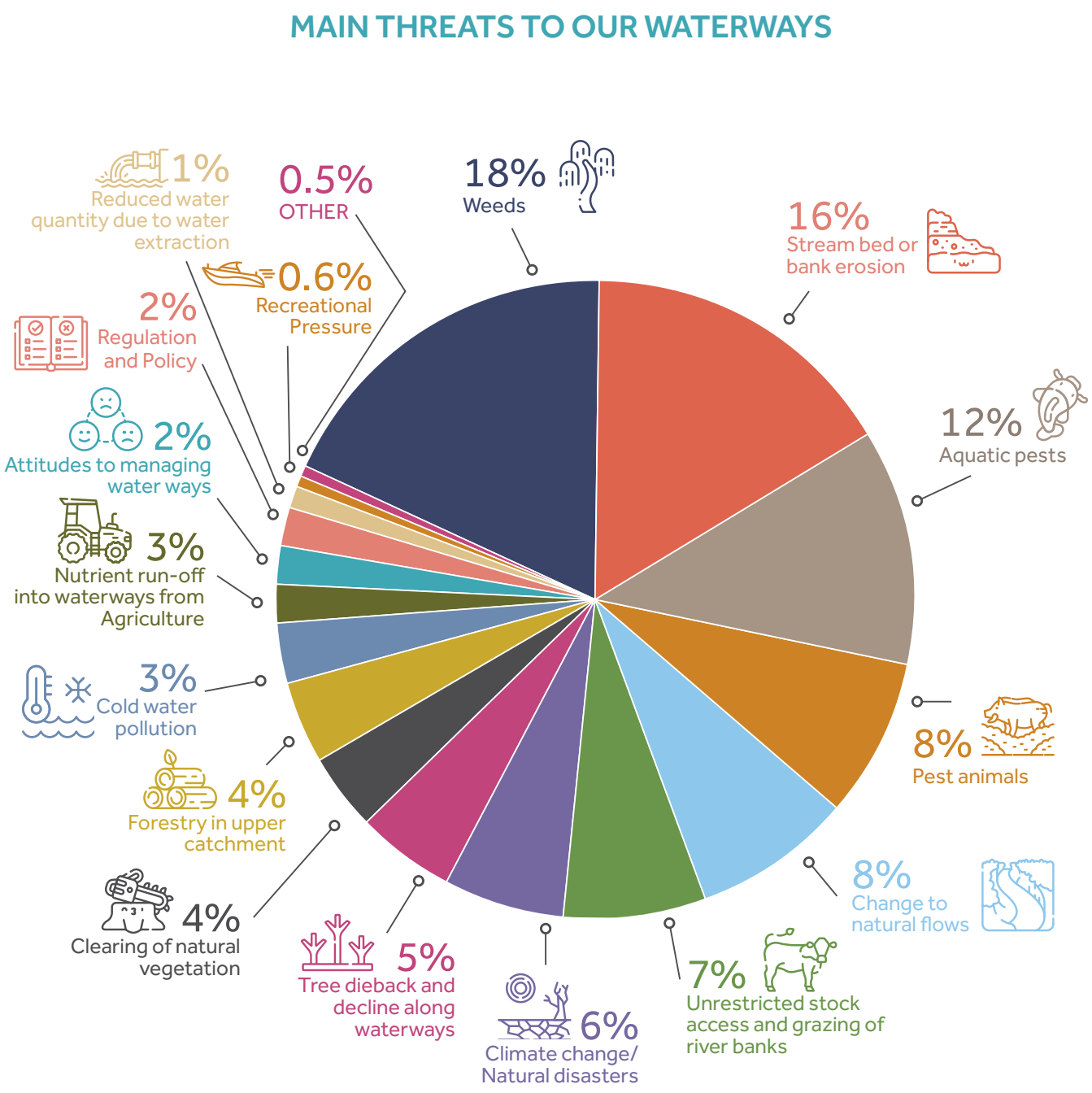


Figure 3: Main threats to waterways as ranked by the community in the Riverina Highlands.

5.1 WEEDS

Weeds were identified by the community as the highest threat to the waterways that they value. Key species in all sub-catchments are Willows (Black, Crack and to a lesser extent, Tortured Willow) and Blackberry. Other common weeds include Poplar, Plane trees, Hawthorn, wild Plum, Privet and a range of herbaceous weeds (e.g. St Johns Wort, Paterson's Curse, Thistles, Hemlock and Fennel), sprawling weeds (e.g. Blue Periwinkle, Tradescantia) and pasture weeds (Serrated Tussock and Chilean Needle grass).

Above: Dense growth of Willows along Adelong Creek Credit: Rob Lacey.

5.2 STREAM BED OR BANK EROSION

Stream bed or bank erosion was the second highest threat in the catchment nominated by survey respondents. Abnormally wet seasons experienced in 2021 and 2022, with associated flooding, have exacerbated erosion throughout the project area.

Gully erosion in headwater streams, such as in the headwater tributaries of the Gilmore Creek, following bushfires (Dunns Road Fire, 2019-20) that started in the Yaven catchment (lightning strike in pine plantations near Ellerslie Nature Reserve).

Lower Gilmore Creek – has been influenced by sedimentation and sediment extraction, both leading to erosion of unconsolidated alluvial floodplains.

Lower Goobarragandra River – This section of river has been impacted by bushfires within the upper catchment. Anecdotally there has been sediment inputs that have exacerbated instabilities in this lower reach. Overbank flooding is not uncommon.

Sedimentation of cobble bed streams is threatening the Booroolong Frog in a number of streams including the Adjungbilly and Brungle Creeks; and Macquarie Perch in the Adjungbilly Creek.

Above: Gilmore Valley bank erosion. Credit: Rob Lacey.

5.3 AQUATIC PESTS

Aquatic pests were identified as a significant issue in the catchment through the stakeholder consultation. The main aquatic pests are noxious fish such as Carp and Redfin and introduced species such as Rainbow and Brown Trout.

The removal of European Carp and Redfin has been undertaken by NSW DPI Fisheries while undertaking fish monitoring surveys. However, monitoring and control needs to be undertaken at a catchment scale on an on-going basis to make an impact on population sizes.

The region is promoted widely for its trout fishing, and it is a social and economic value. However, greatest concern is where these species impact on threatened species such as Macquarie Perch.

5.4 PEST ANIMALS

Pest animals were nominated as the fourth highest threat to values in the catchment. Pest animals in Riverina Highlands which impact on waterway health include goats, deer, pigs, rabbits and feral horses. Impacts include grazing of native riparian vegetation, bank erosion, weed invasion through animals transporting propagules and impacts to water quality through manure inputs and increased turbidity.

5.5 CHANGE TO NATURAL FLOWS

The Tumut and Murrumbidgee Rivers and their floodplains have highly regulated flows. The regulated flows from these rivers can threaten a number of physical and biological processes such as:

- Natural flow regimes are generally reversed when high flows are captured in storages over winter-spring and delivered for irrigation in the summer months. The change in seasonal high flows can interrupt native fish spawning triggers.
- The water delivery from dams (i.e. Burrinjuck and Bowering Dams) is cold and not conducive for native large bodied fish, rather, favouring exotic species including Trout. This is known as 'cold water pollution'.
- Water is occasionally delivered overbank.
- Sudden changes in water releases cause riverbank slumping leading to increased stream bank erosion and loss of riparian vegetation, especially large River Red Gums.
- Riverbank saturation can also impact the natural wetting and drying out of wetlands.

The challenges faced in addressing changes to natural flows include balancing the needs of irrigators and economic values (including using waterways as conveyance channels to move water quickly downstream), with environmental values in the catchment.

5.6 UNRESTRICTED STOCK ACCESS AND GRAZING OF RIVERBANKS

Unrestricted stock access and grazing of river banks was also an issue of concern for survey respondents. Impacts of stock access to waterways include localised bank erosion from livestock trampling, reduced water quality due to increased turbidity, increased nutrient loads from manure, and loss of riparian native vegetation, (especially aquatic reeds) from overgrazing.

Over the past 14 years, over 32 hectares of riparian land has been fenced from stock access to address bank erosion.

The survey results suggest that many people in the community understand the threat of stock access to waterways and believe that there is still more work to be done around the catchment.

5.7 CLIMATE CHANGE AND NATURAL DISASTERS

Survey respondents identified climate change, and associated natural disasters such as bushfire, flood and drought as important threats in the catchment. In the last decade alone, the Riverina Highlands catchment has experienced significant drought, flood and fire conditions such as bushfires in 2019-20, and floods in 2012 and 2022. Impacts on waterways include increased streambank erosion, loss of riparian vegetation, loss of habitat for aquatic species, increased water temperatures, and reduced water quality.

It is important to build resilience into floodplains though revegetating wide buffers along streams and managing erosion through restricting stock access. This will create roughness to slow flow in flood events, reducing erosion. After fires, increased run-off can also cause erosion and sedimentation. Inputs to waterways could potentially be reduced through riparian buffers and increased ground cover, trapping sediment and nutrients on the floodplain before they enter the stream.

Above: Gilmore Valley bushfire. Credit Rob Lacey.

5.8 CLEARING OF NATIVE VEGETATION

Clearing of native vegetation was also listed as a threat to important values by the survey respondents. Historically vegetation would have been cleared in the catchment for agriculture, forestry and horticulture, and the establishment of townships. Today, the loss of paddock trees and riparian vegetation in some areas continues.

5.9 FORESTRY IN THE UPPER CATCHMENTS

Forestry in the upper catchments was also of concern to survey respondents. Forestry operations are generally plantation forestry where native vegetation has been cleared and pine plantations established. Key impacts of forestry include the fragmentation of native vegetation, harbouring of pest animals and plants and sedimentation of waterways during or after harvesting. Forestry roading is also likely to be a major source of sediment input to waterways. Sedimentation, particularly in the Adjungbilly Creek, threatens cobble bed habitat for Booroolong Frog and Macquarie Perch.

OTHER THREATS

Several other threats that were listed as options for respondents to rank in the survey, did not score highly in the survey results. These were:

- Tree dieback and decline along river banks.
- Reduced water quantity due to water extraction.
- Cold water pollution.
- Nutrient run-off into waterways from agriculture.
- Regulation and policy (e.g. either over or under regulation).
- Attitudes to managing waterways (e.g. old fashioned, out of date).
- Recreational pressure (e.g. power boats, camping, rubbish).

Several of the actions developed to address the key threats in the catchment will also help to address some of these issues, particularly actions related to establishing and retaining native vegetation.

6 Risk Assessment

A risk assessment was applied to survey results based on the values and threats listed. Below is the high and very high threats to highest ranked values. Key management actions in Section 7 are be based on mitigating these threats.

VALUES		THREATS: Weeds	Stream bed or bank erosion	Aquatic pest plants and animals	Pest animals	Change to natural flow	Unrestricted stock access and grazing of river banks	Climate change/ Natural disasters	Clearing of native vegetation	Forestry in the upper catchments
ENVIRONMENTAL	Rare plants, wildlife and habitats	Very high	High	High	Very high		Very high	Very high	High	High
	Natural wetlands	Very high		Very high	Very high	Very high	Very high	Very high	High	
	Remnant native vegetation and connectivity	Very high			High		High	High		
	Revegetated areas	Very high			High		High	High		
SOCIAL	Clean water for drinking and domestic use		Very high				High			
	Recreation					High				
ECONOMIC	Clean water for livestock						High	Very high		
CULTURAL	Cultural values and connection to Country (traditional owner values)	High	High		Very high	Very high	Very high	Very high	High	High

Table 1: Risk levels based on values and threats.

Very high High

7 Management actions

The following management strategies and actions have been developed for the very high and high risks identified in the risk assessment.

WEED MANAGEMENT

Action	Key values protected	Key stakeholders
Awareness raising #1 - 'What's wrong with Woody Weeds?' • Document and communicate issues associated with woody weeds (e.g. Willows, Poplar, Hawthorn, Blackberry, Scotch Broom) to the community.	• **Remnant native vegetation and connectivity** • **Revegetation**	• Refreshing Rivers • LLS • Local Government • NSW National Parks and Wildlife Service • Forestry Corporation of NSW • Crown Lands (NSW Government)
Identify, map and monitor priority weeds • Map infestations/occurrences within the catchment and create a baseline from which to monitor change.	• **Remnant native vegetation and connectivity** • **Revegetation**	• Refreshing Rivers • LLS • Local Government
Support landholders to continue weed management in revegetation areas • Provide support to landholders to continue weed control in areas already fenced and revegetated.	• **Revegetation**	• Refreshing Rivers • LLS

STREAM BED OR BANK EROSION

Action	Key values protected	Key stakeholders
Identify and prioritise bed and bank erosion, and sedimentation in the catchment • Undertake a strategic plan to review and extend previous Earth Tech study (e.g. what has been done since, what actions remain, have conditions changed, priority locations) at reaches/sites across the catchment. • The plan should be driven by the values to be protected, e.g. Booroolong Frog and Macquarie Perch; or other waterway values.	• **Booroolong Frog** • **Macquarie Perch** • **Clean water for drinking, domestic use and livestock**	• Refreshing Rivers • LLS • Soil Conservation Service • Erosion specialist/ consultant
Establish a range of demonstration sites for waterway health works in the catchment • Set up sites, or use previous restoration sites, to demonstrate best practice, or trial waterway management techniques. • Demonstrate erosion management, riparian revegetation, off-stream stock watering, weed control or habitat enhancement and restoration for threatened species.	• **Booroolong Frog** • **Macquarie Perch**	• Refreshing Rivers • Landholders • LLS
Implement erosion management works • Approach landholders where priority reaches are identified and engage them in the purpose of the project, benefits of works and support available. • Landholders may choose to implement works as part of a stewardship scheme.	• **Clean water for drinking, domestic use and livestock** • **Revegetation** • **Booroolong Frog**	• Refreshing Rivers • LLS • Erosion specialist/ consultant
Awareness raising #2 - Fluvial Geomorphology 101 • Develop material to improve understanding within the community of fluvial geomorphology processes in-channel and across floodplains, with a particular focus on alluvial rivers and floods.	• **Revegetation** • **Remnant native vegetation and connectivity**	• Refreshing Rivers • LLS • Erosion specialist/ consultant
Awareness raising #3 - Information on permits for work on waterways Provide easily accessible information for landholders on the types of works that require a Controlled Activity Permit for works on or adjacent to waterways, how to apply and tips for completing the form.	• **Revegetation** • **Remnant native vegetation and connectivity**	• Refreshing Rivers • LLS • NSW Department of Planning and Environment - Licensing and Approvals

Above: Streambank stabilisation at Gilmore Creek.

AQUATIC PESTS

Action	Key values protected	Key stakeholders
Support existing pest fish monitoring and control programs • Fisheries NSW has undertaken baseline (~2013) and ongoing monitoring of Macquarie Perch and exotic pest fish species (carp and redfin) in the Adjungbilly catchment.	• **Macquarie Perch**	• Refreshing Rivers • LLS • Local Government • NSW National Parks and Wildlife Service • Forestry Corporation of NSW • Crown Lands (NSW Government)
Awareness raising #4 - Engage the community to reduce pest fish • Work with local schools and community to participate in annual / seasonal carp competitions e.g. Humula Public School Carp-a-thon.	• **Macquarie Perch** By 2026, to have raised awareness with the community to reduce pest fish (e.g. carp and redfin).	• Refreshing Rivers • LLS • Fisheries NSW • Local schools • Local communities

PEST ANIMALS

Action	Key values protected	Key stakeholders
Support existing collaborative pest animal 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).	• **Serpentinite Shrubby Woodland** • **Tumut Grevillea**	• Refreshing Rivers • LLS • NSW Parks and Wildlife Service • Forestry Corporation NSW
Support monitoring of the extent and impacts of pest animals following bushfires • Species include deer, pigs and goats which are known to expand in extent and distribution after fires.	• **Serpentinite Shrubby Woodland** • **Tumut Grevillea**	• Refreshing Rivers • LLS • NSW Parks and Wildlife Service • Forestry Corporation NSW

CHANGES TO NATURAL FLOWS

Action	Key values protected	Key stakeholders
Consider the impacts of flow regulation when designing and managing assets on floodplains • Support, where possible, land managers who have land along these streams that are influenced by the regulated streams and may not be eligible for works through the Refreshing Rivers project.	• **Revegetation** • **Remnant native vegetation and connectivity**	• Refreshing Rivers • LLS • Local Government
Investigate opportunities for Cultural Flows in the catchment • Work with Traditional Custodians People, water managers and other stakeholders to investigate the potential for Cultural Flows in the catchment.	• **Cultural values and connection to Country**	• Traditional Custodians • Refreshing Rivers • LLS • Water Managers

UNRESTRICTED STOCK ACCESS AND GRAZING OF RIVER BANKS

Action	Key values protected	Key stakeholders
Prioritise wetlands and waterways for riparian management works and monitoring • Riparian management works may include revegetation, fencing, off-stream watering or weed control. • Priorities to be driven by values in the catchment such as threatened species or communities (e.g. Tumut Grevillea, Box Gum Grassy Woodland, Booroolong Frog, Macquarie Perch and Platypus).	• **Natural wetlands** • **Remnant native vegetation and connectivity** • **Revegetation** • **Tumut Grevillea** • **Box Gum Grassy Woodland** • **Booroolong Frog** • **Macquarie Perch** • **Platypus**	• Refreshing Rivers • LLS • NSW Department of Planning and Environment
Implement riparian management works to protect waterway and wetland values • Works to include fencing, revegetation, weed control and off-stream watering. • Work with stakeholders to support works in priority areas.	• **Natural wetlands** • **Remnant native vegetation and connectivity** • **Clean water for drinking, domestic use and livestock** • **Revegetation** • **Tumut Grevillea** • **Serpentinite Shrubby Woodland - Box Gum Grassy Woodland** • **Macquarie Perch** • **Booroolong Frog** • **Platypus**	• Refreshing Rivers • LLS • Landholders • Biodiversity Conservation Trust (BCT) • Water Managers
Develop / apply a riparian intervention monitoring method • Intervention monitoring methods are designed to detect change in riparian condition at the site scale following interventions such as fencing, revegetation, weed control or erosion control works.	• **Remnant vegetation and connectivity** • **Revegetation**	• Refreshing Rivers
Develop / apply a wetland condition monitoring method for priority wetlands • Work with stakeholders such as public land managers to access or augment existing wetland monitoring data and procedures, where possible.	• **Natural wetlands**	• LLS
Identify barriers to fencing and revegetation • Improve understanding of the key reasons why there is reluctance to fence and revegetate. • Use demonstration sites to showcase benefits and options for fencing and revegetation (Action 5).	• **Remnant native vegetation and connectivity** • **Revegetation**	• Refreshing Rivers • LLS • Griffith University • Landholders
Awareness raising #5 –Benefits to landholders of fencing and revegetating riparian zones • Evidence based campaign, including lamb and shelter belt research, ANU sustainable farms, productivity benefits of revegetation and clean water through off-stream watering.	• **Remnant native vegetation and connectivity** • **Clean water for drinking, domestic use and livestock** • **Revegetation**	• Refreshing Rivers • LLS • Landholders, including "champion" spokesperson/s • Landcare groups

Awareness raising #6 - Waterways as natural capital assets • Gather information and promote existing stewardship and accreditation schemes to the community. • Investigate options for biodiversity stewardship payments for threatened species and communities (e.g. Serpentinite Shrubby Woodland, Box Gum Grassy Woodland and other remnant vegetation).	• **Remnant native vegetation and connectivity** • **Revegetation** • **Serpentinite Shrubby Woodland** • **Box Gum Grassy Woodland**	• Refreshing Rivers • LLS • Biodiversity Conservation

CLIMATE CHANGE AND NATURAL DISASTERS

Action	Key values protected	Key stakeholders
Summarise and promote climate change modelling for the catchment • Focus on the impacts to riverine ecosystems and riparian land and inform the community. • Emphasise the importance of protecting waterways as potential refugia for flora and fauna species in reference to climate change; impacts on threatened species; benefits of well vegetated corridors for regulating instream temperatures.	• **Revegetation** • **Remnant native vegetation and connectivity**	• Refreshing Rivers • LLS • Adapt NSW • Local Government
Identify and confirm values significantly impacted by drought, flood or fire • Also use process to identify fish barriers and drought refugia/refuge pools, review previous reports and identify / fill gaps where possible, and use information to feed into future work to protect refugia (such as fencing and revegetation actions).	• **Natural wetlands** • **Tumut Grevillea** • **Booroolong Frog** • **Macquarie Perch**	• Refreshing Rivers • LLS • Adapt NSW • Fisheries NSW • NSW Department of Planning and Environment
Awareness raising #7 - Promote threatened and iconic species and communities • Continue promotion of species such as Tumut Grevillea Booroolong Frog and Macquarie Perch. • Promote platypus (icon species) and Box Gum Grassy Woodland (EPBC Act 1999). • Build on previous reintroduction of Murray Cod along Adelong Creek, and continue to promote and monitor.	• **Tumut Grevillea** • **Serpentinite Shrubby Woodland** • **Box Gum Grassy Woodland** • **Booroolong Frog** • **Macquarie Perch** • **Platypus**	• LLS • NSW Department of Planning and Environment
Protect refuge pools for Booroolong Frog, Macquarie Perch and Platypus • Continue to protect refugia for these species using stock exclusion, revegetation, off-stream watering and weed control. • The community identified Adelong Creek, Nimbo Creek and Brungle Creek as areas of concern.	• **Macquarie Perch** • **Platypus** • **Platypus** • **Booroolong Frog**	• Fisheries NSW • Refreshing Rivers • LLS • NSW Department of Planning and Environment
Macquarie Perch Genetic Rescue and Translocation • NSW Fisheries have a long-term objective to increase populations of Macquarie Perch by establishing mixed genetics in more stable habitats to improve fish vigour and resilience. • Support Fisheries NSW to help to understand and manage the genetics of existing Macquarie Perch populations. • Work with Fisheries NSW to translocate Macquarie Perch populations in the catchment.	• **Macquarie Perch**	• Fisheries NSW • Refreshing Rivers • LLS • NSW Department of Planning and Environment

Investigate impacts of introduced species such as Trout on Macquarie Perch • Work with stakeholders to research and communicate the impacts of introduced species such as Trout on native fish. • Consider the cessation of trout-restocking in key Macquarie Perch reaches (including translocation sites).	• **Macquarie Perch**	• Fisheries NSW • Refreshing Rivers • LLS • NSW Department of Planning and Environment • Local Community
Support the development and implementation of the climate ready revegetation guide • Guides are currently under development by Murrumbidgee Landcare and Holbrook Landcare Network. • Work with Landcare, nursery staff and landholders to implement the guide.	• **Revegetation** Climate ready revegetation guidance into all land management plans.	• Refreshing Rivers • LLS • Holbrook Landcare Network • Murrumbidgee Landcare Network • Adapt NSW • Landcare Nursery
Awareness raising #8 - Flood behaviour and building resilience on farms • Provide information about flood behaviour and floodplain features such as wetlands to landholders and the broader community.	• **Revegetation** • **Remnant native vegetation and connectivity**	• Refreshing Rivers • LLS • Adapt NSW
Actively record platypus occurrence • Work with stakeholders to increase the recording of platypus sightings. • Encourage the use of the Australian Platypus Monitoring Network app (or similar) to record and promote sightings www.platypusnetwork.org.au/australian-platypus-conservancy	• **Platypus**	• Refreshing Rivers • LLS • Adapt NSW • Local community
Continue cultural burning with Traditional Custodians People and develop a Cultural Burning Strategy for the catchment • This would continue Traditional Custodians People's cultural burning within the contemporary landscape. • The development of a strategy in future could enable the use of Cultural burning to inform contemporary fire management by other agencies. It would potentially reduce fuel loads in the catchment.	• **Cultural values and connection to Country**	• Traditional Custodians • Refreshing Rivers • LLS • NSW Rural Fire Service

Above: Platypus monitoring, Gilmore Creek. Credit: Local Land Services.

CLEARING OF NATIVE VEGETATION

Action	Key values protected	Key stakeholders
Current conditions map and data management tool • Use existing / create new geodatabase to map and store existing works data and record future on-ground works for the Refreshing Rivers project. • Include patches of remnant vegetation and their status in the map, threatened species records, threatened ecological communities, plus revegetation / fencing works over the past 20 years (where possible) in the catchment.	• **Natural wetlands** • **Remnant vegetation and connectivity** • **Clean water for drinking, domestic use and livestock** • **Revegetation** • **Booroolong Frog**	• Refreshing Rivers • LLS • Local Government
Continue Riverina LLS paddock tree project • Continue working with landholders to establish paddock trees across the landscape to build habitat, create linkages between riparian areas and other habitat zones and increase biodiversity.	• **Remnant native vegetation and connectivity** • **Revegetation** • **Box Gum Grassy Woodland**	• Refreshing Rivers • LLS
Develop property based riparian land management plans • Project officer/s to work with landholders to develop property-based riparian revegetation / restoration plans to map and document revegetation areas, weed control, and if required fencing and off-stream watering. • Plans may be for funded or self-funded works, eco-certification or stewardship payments.	• **Remnant native vegetation and connectivity** • **Clean water for drinking, domestic use and livestock** • **Revegetation** • **Tumut Grevillea** • **Serpentinite Shrubby Woodland** • **Box Gum Grassy Woodland** • **Booroolong Frog** • **Natural wetlands**	• Refreshing Rivers • LLS • Landholders
Expand the extent of Tumut Grevillea • Continue to expand the extent of Tumut Grevillea by including it in revegetation plantings and translocation as appropriate.	• **Revegetation** • **Tumut Grevillea**	• Landcare Nursery • Refreshing Rivers • LLS • Traditional Custodians
Investigate the decline of River Sheoak along waterways in the catchment • Work with researchers to map and investigate the distribution of this species along waterways in the catchment over time. • Determine the drivers of decline and options for mitigation to preserve this species (and its important stability and habitat functions) along waterways.	• **Remnant vegetation and connectivity**	• Refreshing Rivers • LLS • Research institutions
Create and promote opportunities for Traditional Custodians People to connect and manage Country • Create employment opportunities for Traditional Custodians People on Country to undertake riparian restoration activities. • Create opportunities for Traditional Custodians People to manage and monitor key values such as at wetlands, other riparian intervention sites; threatened species and communities, water quality, or recreational impacts to waterways. • Also enable opportunities for access to different groups of Traditional Custodians People (e.g. Men, Women, family) to riparian land to share stories and knowledge about Country and cultural values. • Look for opportunities to promote Aboriginal Ecological Knowledge to the broader community. • Record and protect cultural sites found on waterways.	• **Natural wetlands** • **Remnant vegetation and connectivity** • **Clean water for drinking, domestic use and livestock** • **Revegetation** • **Recreation** • **Tumut Grevillea** • **Serpentinite Shrubby Woodland** • **Box Gum Grassy Woodland** • **Booroolong Frog** • **Macquarie Perch** • **Platypus** • **Cultural values and connection to Country**	• Traditional Custodians • Refreshing Rivers • LLS • Local community

Awareness raising #9 – The benefits of good waterway health to recreationalists • Engage recreationalists in caring for local waterways and the species they support. • Promote the synergies between waterway health and recreation e.g. water quality for swimming and paddling, riparian vegetation for fish etc.	• **Recreation**	• Fishing groups • Boating groups • Local schools • Local community • Tumut Chamber of Commerce

Above: Tumut Grevillea seedlings being grown at the local Landcare nursery. Credit: Rob Lacey.

FORESTRY IN UPPER CATCHMENTS

Action	Key values protected	Key stakeholders
Continue working with stakeholders to mitigate impacts of forestry to threatened species downstream • Particularly focus on sedimentation, water quality and the spread of pest plants and animals. • Consider reviewing buffer widths in priority catchments for threatened species such as Booroolong Frog.	• **Booroolong Frog** • **Macquarie Perch**	• Refreshing Rivers • LLS • Forestry Corporation NSW • Private forestry operators • Fisheries NSW • NSW Department of Planning and Environment
Continue support for existing threatened species networks at the local scale • Networks to work on planning and mitigating threats to threatened species and communities together. • Networks to develop stream-scale Local Area Management Plans (LAMPs) for threatened species populations, as required.	• **Booroolong Frog** • **Macquarie Perch**	• Refreshing Rivers • LLS • NSW Department of Planning and Environment • NSW Parks and Wildlife Service • Forestry Corporation NSW • Fisheries NSW • Local Government
Establish water quality monitoring in key locations around the catchment • Work with stakeholders to access data, augment existing water quality monitoring network, or establish new sites as required.	• **Clean water for drinking, domestic use and livestock** • **Macquarie Perch**	• Refreshing Rivers • LLS • Forestry Corporation NSW • Private Forestry Operators • Fisheries NSW • NSW Department of Planning and Environment • Landholders • Local schools • Local community

8 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: Tumut Grevillea habitat on Goobaragandra River. Credit: Local Land Services.

Refreshing Riverina Highlands Waterway Management Plan was produced as part of the the Refreshing Rivers Program which is a collaboration between government, industry, research, and community organisations, led by Local Land Services.

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Find out more at www.refreshingrivers.org.au