COFFS HARBOUR CITY COUNCIL

Orara River Rehabilitation Strategy 2013–2023

February 2013

THIS IS A LOOKING AFTER OUR ENVIRONMENT PROJECT

Helping to achieve the 2030 Community Vision

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Bush regeneration

Contents

Part 1 | Background to the Strategy

1.1 Introduction

The Orara Valley is located within the land of the Gumbaynggirr people, north-west of Coffs Harbour on the mid north coast of New South Wales. The valley is a subcatchment of the greater Clarence River system — the largest coastal river system in New South Wales. The Orara subcatchment within Coffs Harbour Local Government Area (LGA) covers 41,200 hectares. The Orara River flows through Karangi, Coramba and Nana Glen, then eventually joins the Clarence River east of Copmanhurst.

This 'Orara River Rehabilitation Strategy 2012–2022' ('the/this Strategy') relates to the *riparian zone* within the Orara River, Urumbilum River, Bucca Bucca Creek and their tributaries within Coffs Harbour LGA — this is referred to as the 'Project area'. The riparian zone includes areas adjacent to riverbanks, creeklines and wetlands. See Figure 1.

The Orara Valley supports a range of threatened and significant species and vegetation communities, including Lowland Rainforest on Floodplain Endangered Ecological Community which is also recognised as critically endangered at the national level. The Coffs Harbour hinterland, is a stronghold for the endangered Giant Barred Frog (*Mixophyes iteratus*), particularly the tall wet forests associated with permanent rivers and creeks.

Vegetation in the valley has been impacted by land clearing, grazing and logging; and the rivers and streams have been impacted by gravel and water extraction. However, there are still regionally and locally important vegetation remnants throughout the catchment as well as river reaches in good condition. Headwater streams are in good condition in well-vegetated state forests and national parks. This Strategy forms part of the broader 'Coffs Harbour Biodiversity Action Strategy' (CHCC 2012a) which reflects community values relating to biodiversity conservation as documented in the 'Coffs Harbour 2030 Plan' (CHCC 2009). The outcomes in the 2030 Plan that relate to protection of the natural environment are:

LE1 We understand and value our unique natural environment and its cultural connections.
LE2 We protect and restore our environment to conserve its unique biodiversity for future generations.
LE3 We manage our resources and development sustainably.

Strategies to achieve these outcomes include implementing on-ground programs to restore and improve our environment; and building ecosystem resilience through a system of local and regional habitat corridors. This Strategy also aligns with a number of other local, regional, state, national and international natural resource management plans (see Part 6).

The Orara River Rehabilitation Project

In 1996 a number of landholders from several communities across the district independently formed Landcare groups to address river degradation at the local level. The groups were:

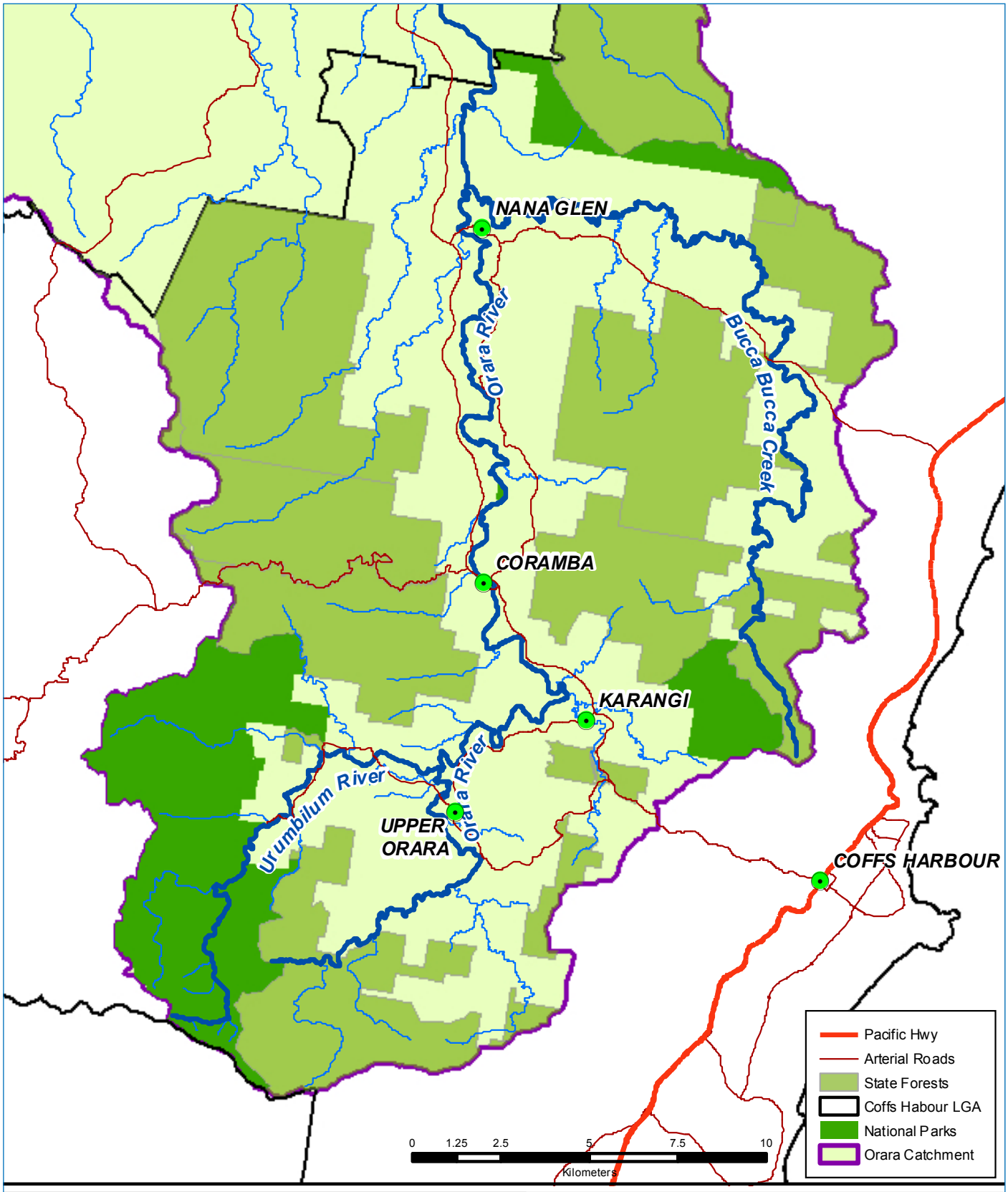
- Cochrans Pool Urumbilum Rivercare Group
- Karangi Landcare Group
- Nana Glen Landcare Group

Two years later the Orara Valley Rivercare Groups Management Committee (the 'Orara Rivercare Committee') was formed as an umbrella group for these local groups. The Orara Rivercare Committee oversees the distribution of grant funding from the Northern Rivers Catchment Management Authority* (CMA) and is delegated to distribute funding from Coffs Harbour City Council's Environmental Levy on Council's behalf.

Each year the Project involves around 50 landholders working on project sites that encompass, on average, 45 hectares of riparian land along 35 kilometres of stream. To date the Project has:

- achieved significant reductions in the density and distribution of major target weed species, including Cat's Claw Creeper (*Dolichandra unguis-cati*), Camphor Laurel (*Cinnamomum camphora*) and Privet (*Ligustrum* spp.)
- regenerated riparian habitat along more than 60 kilometres of stream length
- achieved significant improvement in channel structure and stock management
- re-established bed and bank stability and structural diversity within the channel along 20 kilometres of the Orara River
- built significant community capacity and knowledge particularly through Landcare groups.

* At the time of writing, the Northern Rivers Catchment Management Authority is being amalgamated into Local Land Services, the final structure and boundaries of which are yet to be finalised.



Orara River Subcatchment within the Coffs Harbour LGA

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These river rehabilitation activities have assisted the conservation and preservation of several vulnerable and endangered species, including the Wompoo Fruit-dove, Rose-crowned Fruit-dove, Giant Barred Frog, Pale-vented Bush Hen and Eastern Freshwater Cod. Due to the long-term nature of the Project, many project sites now adjoin each other and form contiguous corridors of good condition riparian vegetation. These corridors make a significant contribution to landscape biodiversity conservation. This contribution is enhanced by the strict use of local provenance plant stock in all revegetation activities, and by the extent of natural regeneration that occurs after weed control. Although the catchment has been severely degraded, project sites often show very good natural regeneration due to the healthy soil seedbank and effective seed dispersal throughout the catchment.

The Project was awarded bronze and silver Rivercare awards in 1999 and 2000 respectively, and in 2001 won the NSW Landcare gold award in the Natural Heritage Trust Rivercare section.

This Strategy sets the direction for the Orara River Rehabilitation Project for the next 10 years, to 2023.

Project goals

The Orara River Rehabilitation Project has four overarching goals:

1. Healthy river systems and resilient ecosystems
2. Community educated and effectively engaged
3. Success meaningfully measured
4. Project sustainability ensured.

Project objectives

The objectives of the Orara River Rehabilitation Project are to:

- Support landholders to improve the condition of the riparian zone in the Orara River, Urumbilum River and Bucca Bucca Creek subcatchments within Coffs Harbour LGA.
- Deliver funding for on-ground works including structural erosion control works, stock management, weed control, and revegetation planting using local provenance semi advanced plant stock.
- Conserve biodiversity at the landscape scale by reinforcing resilient riparian zone vegetation corridors which connect to well-forested hill slopes in state forests and national parks.
- Build community capacity to engage in river rehabilitation through the delivery of landholder workshops and field days.
- Publicise the Project through the quarterly project update, media items, displays at community events, and the project email list which includes landholders and interested parties.

Target condition of rehabilitation sites

Target condition is the state we are striving to attain at each project site.

Target condition must be realistic and achievable within the timeframe of each project site and within the physical constraints of the landscape. For example, it would be unrealistic to say that total eradication of Camphor Laurel or privet is our target due to these constraints. Target condition, therefore, accommodates some presence of weed infestation, while at the same time ensuring that weed control on project sites can be maintained by the landholder. A project site will be considered to be in target condition — as per management targets relating to river structure, riparian vegetation and fish passage — when the following are achieved:

- The immediate seed sources of major infesting weeds are removed and there are no seed-producing mid/upper canopy weed species within the management zone. (This equates to the 'gold' canopy weed class — see Appendix A).
- Stock impacts on the site are reduced or minimised to the point where understorey native plants (such as *Lomandra* spp.) can establish without being continually grazed.
- There is sufficient existing native canopy cover (50–100%) to shade out and suppress weed infestations. If the native canopy is thick enough, juvenile privet will stay suppressed as an understorey ground cover and will not produce seed.
- In addition, for areas that have been replanted with semi advanced native seedlings or areas that have native regeneration after total clearing of the canopy:
- A survival rate of at least 1 plant per 5 m^2 after two seasons, and control of competing weed species regeneration. Plantings must survive at least two winters to be considered suitably established and must be able to provide enough canopy cover to reduce weed regeneration (i.e. plants at least 2 metres high with a canopy cover of 50–100%).

Orara Boronia *Boronia umbellata*

1.2 About the Orara Valley

Climate, geology, landform and soils

The climate of the Orara Valley is subtropical with warm to very warm and wet summers, and cool to mild and dry winters. The area experiences a high annual rainfall of 1600 to 1900 millimetres.
The underlying geology is predominantly the Coffs Harbour Late Carboniferous metasediments, comprised of partially metamorphosed sedimentary rock (Milford 1999).

The landform of subcoastal wet forested environments which are typical of the Project area is undulating to hilly terrain situated 180–400 metres above sea level. Project work is mainly carried out on alluvial floodplains and terraces which support a number of threatened ecological communities restricted to the floodplain.

The highly erodible soils are Quaternary clayey, silty, sandy and gravelly alluvials, with layered gravels, cobbles and stones in some locations.

Vegetation types

The majority of vegetation communities in the New South Wales North Coast Bioregion that occur on coastal floodplains are listed as endangered ecological communities (EEC) under the Threatened Species Conservation Act 1995. As such, the majority of vegetation within the Project area is an EEC.

Lowland Rainforest on Floodplain EEC
The main riparian vegetation type in the Orara Valley is Lowland Rainforest on Floodplain EEC. This forest community is also listed as critically endangered under Commonwealth legislation.

Lowland Rainforest is generally a moderately tall to tall (20 to ≥30 metres) closed forest (canopy cover ≥70%) community with a typically high species richness (≥40 woody species).

The riparian zone vegetation is dominated by Water Gum (*Tristainiopsis laurina*), River Oak (*Casuarina cunninghamiana*), Lilli Pilli (*Acmena smithii*), Brush Cherry (*Syzigium australe*) and Creek Sandpaper Fig (*Ficus coronata*).

There is often an upper, discontinuous layer that includes canopy emergents with large spreading crowns, which may be up to 40–50 metres tall, composed of species such as figs (*Ficus sp.*), Pepperberry (*Cryptocarya obovata*), and Yellow Carrabeen (*Sloanea woolsii*).

Other threatened ecological communities
Other threatened floodplain ecological communities occurring less extensively in the Orara Valley include:

- Swamp Oak Floodplain Forest
- Swamp Sclerophyll Forests on Coastal Floodplains
- Freshwater Wetlands on Coastal Floodplains.

Threatened flora and fauna species
Threatened flora and fauna species known to occur in the riparian zone of the Orara Valley include those listed in Table 1.

Bush Regeneration

Table 1. Threatened flora and fauna species in the Project area

Fauna species	Scientific name	NSW conservation status	National conservation status
PLANTS			
Rusty Plum	*Niemeyera whitei*	Vuln *Boronia* erable	–
Orara Boronia	*Boronia umbellata*	Vulnerable	Vulnerable
FISH AND FROGS			
Eastern Freshwater Cod	*Maccullochella ikei*	Endangered	Endangered
Giant Barred Frog	*Mixophyes iteratus*	Endangered	Endangered
Green-thighed Frog	*Litoria brevipalmata*	Vulnerable	–
REPTILES			
Bellinger River Emydura	*Emydura macquariisignata*	–	Vulnerable
Stephens' Banded Snake	*Hoplocephalus stephensii*	Vulnerable	–
BIRDS			
Black-necked Stork	*Ephippiorhynchus asiaticus*	Endangered	–
Pale-vented Bush Hen	*Amaurornis moluccana*	Vulnerable	–
Powerful Owl	*Ninox strenua*	Vulnerable	–
Rose-crowned Fruit-dove	*Ptilinopus regina*	Vulnerable	–
Sooty Owl	*Tyto tenebricosa*	Vulnerable	–
Wompoo Fruit-dove	*Ptilinopus magnificus*	Vulnerable	–
MAMMALS			
Eastern Pygmy-possum	*Cercartetus nanus*	Vulnerable	–
Koala	*Phascolarctos cinereus*	Vulnerable	Vulnerable
Long-nosed Potoroo	*Potorous tridactylus*	Vulnerable	Vulnerable*
Red-legged Pademelon	*Thylogale stigmatica*	Vulnerable	–
Spotted-tailed Quoll	*Dasyurus maculatus*	Vulnerable	Endangered
Yellow-bellied Glider	*Petaurus australis*	Vulnerable	–
FLYING MAMMALS			
Common Blossom-bat	*Syconycteris australis*	Vulnerable	–
Eastern tube-nosed Bat	*Nyctimene robinsoni*	Vulnerable	–
Golden-tipped Bat	*Kerivoula papuensis*	Vulnerable	–
Grey-headed Flying-fox	*Pteropus poliocephalus*	Vulnerable	Vulnerable
Little Bentwing-bat	*Miniopterus australis*	Vulnerable	–

* *Potorus tridactylus tridactylus south-east mainland subspecies.*

Key threatening processes

The following key threatening processes, listed under the *Threatened Species Conservation Act 1995*, are relevant to the Project area:

- invasion, establishment and spread of various weeds (e.g. vines and scramblers, Lantana)
- alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands
- anthropogenic climate change
- clearing of native vegetation
- predation and hybridisation by feral Dogs (*Canis lupis familiaris*)
- predation by the European Red Fox (*Vulpes vulpes*)
- predation by the feral Cat (*Felis catus*)
- predation by Plague Minnow or Mosquito Fish (*Gambusia holbrooki*).

Major weed species

The major weed species occurring within the Project area that pose a serious threat to native vegetation communities are: Camphor Laurel, Small-leaved Privet (*Ligustrum sinense*), Broad-leaved Privet (*Ligustrum lucidum*) and Broad-leaved Paspalum (*Paspalum mandiocanum*).

Other significant weeds impacting the Project area include the following Weeds of National Significance: Cat's Claw Creeper, Madeira Vine (*Anredera cordifolia*) and Lantana (*Lantana camara*). Other significant weed species include Blue Billy Goat Weed (*Ageratum houstonianumon*), Japanese Honey Suckle (*Lonicera japonica*) and Cape Ivy (*Delairea odorata*).

Wildlife corridors

Clearing of vegetation has resulted in loss of biodiversity and fragmentation of habitat. Long-term conservation of biodiversity, both within the region and more locally, depends on protecting, enhancing and connecting remaining habitats across the landscape. This type of regional landscape conservation planning involves core habitat areas (the largest, most intact habitats), buffers and overall landscape connectivity.

Landscape connectivity is provided through habitat corridors at regional, subregional and local scales (Scotts 2003). As such, overall landscape connectivity involves vegetation remnants on both public and private lands, and of various shapes and sizes across the landscape.

There are a number of *regional corridors* in the Orara Valley including:

- two Orara Valley corridors which link public lands east and west of the Orara River
- the Bucca corridor which links lands north and south of lower Bucca Bucca Creek

The 'Coffs Harbour Biodiversity Action Strategy' (CHCC 2012a) also identifies a number of *landscape connections* in the Orara Valley:

- Nana Creek – Coramba – Lower Bucca (similar to the Orara Valley corridor)
- Lower Bucca – Bucca Bucca – Sherwood (similar to the Bucca corridor)
- Orara East– Karangi – Orara West.

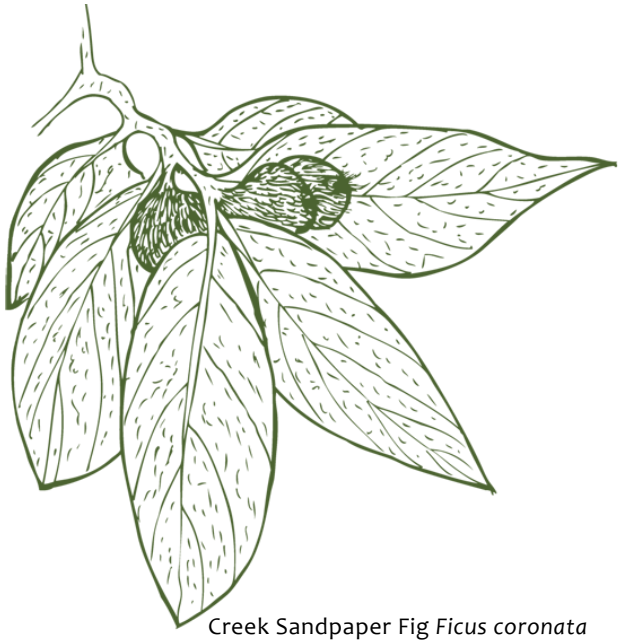
These landscape connections are known to support important biodiversity values and they also provide overall habitat connectivity. As such, these areas will be a focus of Coffs Harbour City Council's biodiversity conservation efforts.

Local corridors, which form an important component of landscape connectivity, include roadside vegetation and linear riparian vegetation corridors like those found in the Project area.

Landholder demographics

Most landholders in the region are no longer bona fide farmers due largely to shifting demographics and farm viability. Many landholders now rely on off-farm incomes to complement their farming enterprises.

Other people that have moved into the area for the rural lifestyle tend to maintain jobs in town and view farming as a non-commercial pursuit.



Creek Sandpaper Fig *Ficus coronata*

Part 2 | Project goals and actions

Timeframes

The Strategy will be implemented over the next 10 years; from 2012 to 2022. The Strategy's goals relate to this 10-year timeframe and the short-term actions are to be undertaken within the next five years.

Adaptive management

To ensure the Strategy remains relevant and its actions achievable, an adaptive management approach will be taken. The Strategy will be implemented in an adaptive and flexible manner, so it can be adjusted in response to new information or changing priorities. An annual review of this Strategy will be undertaken to track progress. Changes will be implemented when it is evident that current approaches are ineffective.

2.1 Long-Term Goals

The Strategy's long-term goals reflect and build on the past and present work of partners on the Orara River Rehabilitation Project. These partnerships can be built upon to ensure effective long-term river rehabilitation through the Strategy's long-term goals and priority short-term actions. Each goal has a number of short-term goals as identified in the following table.

Goal	What the goal means
1: Healthy river systems and resilient ecosystems	River rehabilitation ensures that river health and ecosystem resilience are sustained against current and future impacts
2: Educated and effectively engaged community	Landholder and community knowledge gaps are identified and addressed; the sharing of knowledge is facilitated; our knowledge base is improved; and landholders, schools and the community are engaged in on-ground river rehabilitation
3: Success meaningfully measured	Use set targets to measure and report the Strategy's implementation and effectiveness
4: Project sustainability ensured	Actively seek funding from all levels of government, philanthropic sources and private sponsorship; and maintain effective government and community partnerships

Poisoned Camphor laurel

2.3 Priority Short-Term Actions

The following tables identify priority short-term actions under each goal, the associated leadership and collaboration which is required to achieve these actions, and the measures which will be used to assess our success.

1: HEALTHY RIVER SYSTEMS and RESILIENT ECOSYSTEMS			
Action	Outcome	Partners	Measures
Action 1.1 Regularly review threats to river health and ecosystem resilience, linking into the Northern Rivers CMA Ecohealth Program.	Impacts from invasive species, stock, farm runoff, flood and drought are recorded and any new threats are identified as they arise.	Landholders Bush regeneration contractors Darrunda Wajaarr Local Landcare groups Orara Rivercare Committee Project officer Coffs Harbour Regional Landcare Coffs Harbour Water Northern Rivers CMA	– location of stock impacts identified – location of weed impacts identified – location of erosion sites identified – location of farm runoff impacts identified – number of new weed species identified – number of new feral animal species identified
Action 1.2 Continue to complete adaptive management plans at the site, reach and subcatchment levels.	Site action plans are formulated. Reach plans are updated. Subcatchment plans are updated.	Landholders Bush regeneration contractors Darrunda Wajaarr Local Landcare groups Orara Rivercare Committee Project officer Northern Rivers CMA	– number of site action plans – area of riparian zone included in site action plans – length of riparian zone included in site action plans
Action 1.3 Implement best practice stock management.	Best practice stock management encourages natural vegetation regeneration wherever possible.	Landholders Bush regeneration contractors Local Landcare groups Orara Rivercare Committee Project officer	– area of riparian zone protected from stock impacts – length of riparian zone protected from stock impacts
Action 1.4 Implement best practice weed control.	Best practice weed control encourages natural vegetation regeneration wherever possible.	Landholders Bush regeneration contractors Darrunda Wajaarr Local Landcare groups Orara Rivercare Committee Project officer	– area of best practice weed control – area of natural vegetation regeneration – best practice weed control techniques included in the project bush regeneration contract
Action 1.5 Implement best practice revegetation.	Best practice revegetation enhances the resilience of riparian vegetation.	Landholders Bush regeneration contractors Darrunda Wajaarr Local Landcare groups Orara Rivercare Committee Project officer	– area of best practice revegetation – number of local provenance species planted – best practice revegetation techniques and local provenance seed collection included in the project bush regeneration contract
Action 1.6 Implement best practice structural erosion control works.	Best practice structural erosion control works constructed.	Northern Rivers CMA Orara Rivercare Committee Project officer	– number of structural erosion control works – length of stream bed protected – length of stream bank protected
Action 1.7 Reinforce connectivity between riparian vegetation, wetlands, vegetation remnants and forested hill slopes.	Riparian vegetation, vegetation remnants and vegetation corridors are reinforced and linked to support the ability of species and ecosystems to adapt to changing environments and to provide buffers against threatening processes.	Landholders Bush regeneration contractors Darrunda Wajaarr Local Landcare groups Orara Rivercare Committee Project officer Coffs Harbour Regional Landcare Coffs Harbour City Council Northern Rivers CMA Office of Environment and Heritage (OEH) Forests NSW Crown Lands	– area of remnant vegetation enhanced – length of vegetation corridors enhanced – plant species diversity on project sites
Action 1.8 Assist landholders access funding and in-kind support for biodiversity conservation.	Landholders conserve native vegetation with support from all available sources.	Landholders Local Landcare groups Orara Rivercare Committee Project officer Coffs Harbour Regional Landcare Coffs Harbour City Council Northern Rivers CMA OEH	– number of Landholder Management Agreements – number of conservation covenants – number of formalised Wildlife Refuges – number of Conservation Trust agreements

2: EDUCATED and EFFECTIVELY ENGAGED COMMUNITY			
Action	Outcome	Partners	Measures
Action 2.1 Promote participation in and provide opportunities for everyone to be involved in on-ground river rehabilitation.	Landholders, community groups and schools are involved in on-ground fence construction, installation of off-stream watering points, weed control, bush regeneration and site maintenance.	Landholders Bush regeneration contractors Darrunda Wajaarr Local Landcare groups Orara Rivercare Committee Project officer Orara Valley schools	– number of landholders, community groups and schools engaged in planning – number of landholders, community groups and schools engaged in implementation – number of landholders, community groups and schools engaged in monitoring

Action 2.2:
Ensure that professional bush regeneration contractors with local knowledge are engaged to develop relationships with landholders and pass relevant skills on to landholders to achieve landholder ownership of the Project and effective site management and ongoing site maintenance.
	Landholders work together with bush regenerators on-site to develop their knowledge and skills in planning of works, stock management, weed control, natural regeneration, revegetation and site maintenance requirements.	Landholders
		Bush regeneration contractors
		Darrunda Wajaarr
		Project officer
			– local knowledge and effective landholder liaison included as an essential criteria in the bush regeneration contract documents
			– number of hours spent by landholders with bush regenerators during:
			  – planning
			  – stock management
			  – weed control
			  – revegetation
			– site maintenance

Action 2.3 Identify knowledge gaps and assess knowledge needs to set education priorities.	Project staff, landholders and community groups constantly assess their own knowledge needs and readily communicate these needs so that meaningful education priorities are set.	Landholders Bush regeneration contractors Darrunda Wajaarr Local Landcare groups Orara Rivercare Committee Project officer Coffs Harbour City Council Coffs Harbour Water Northern Rivers CMA OEH	– number of new education opportunities identified
Action 2.4 Implement a community and school education program encompassing all aspects of river rehabilitation.	Community and school education program implemented.	Local Landcare groups Orara Rivercare Committee Project officer Orara Valley Primary Schools Cascade Environmental Education Centre Darrunda Wajaarr Coffs Harbour City Council Northern Rivers CMA Coffs Harbour Water OEH	– number of partners participating in plan formulation – number of partners delivering workshops – number of landholder workshops – number of landholder workshop participants – number of school workshops – number of school workshop participants
Action 2.5 Ensure sufficient scientific expertise to support river rehabilitation.	Ongoing scientific research of the Orara Valley by academics and students occurs, with results communicated to landholders and the community, and incorporated into on-ground activities.	Orara Rivercare Committee Project officer Coffs Harbour City Council Northern Rivers CMA Coffs Harbour Water OEH Tertiary education institutions	– number of scientific studies
Action 2.6 Disseminate information about the Project to landholders and the community, and improve communication between landholders, community members, bush regeneration contractors, scientists, policy makers, government agencies and non-government organisations to facilitate the sharing of local knowledge and scientific expertise.	Project staff, landholders and community groups are involved in proactive communication with academic institutions, policy makers, and non-government/government agencies.	Landholders Bush regeneration contractors Darrunda Wajaarr Local Landcare groups Orara Rivercare Committee Project officer Coffs Harbour City Council Northern Rivers CMA OEH	– number and type of project information disseminated

3: SUCCESS MEANINGFULLY MEASURED			
Action	Outcome	Partners	Measures
Action 3.1 Build baseline datasets for: – vegetation condition – river bed and bank condition	Northern Rivers CMA condition report proforma and GPS photo points.	Landholders Bush regeneration contractors Darrunda Wajaarr Project officer Northern Rivers CMA Coffs Harbour Water	– stream length of vegetation condition assessed – stream length of river bed and bank condition assessed – aquatic ecosystem health assessed
Action 3.2 Complete monitoring of on-ground works at each project site to measure progress towards target condition (as described in the body of this Strategy).	Monitoring and evaluation of on-ground works at each project site completed, measuring progress towards target condition.	Landholders Bush regeneration contractors Darrunda Wajaarr Project officer	– area of vegetation condition monitored – stream length of vegetation condition monitored – stream length of river bed and bank condition monitored – aquatic ecosystem health monitored
Action 3.3 Ensure that every community engagement activity is evaluated against accepted community engagement key indicators.	Community engagement activities regularly evaluated and improvements implemented.	Project officer	– community engagement indicators researched – community engagement evaluated annually
Action 3.4 Ensure that every community and school education program activity is evaluated against accepted environmental education key indicators.	Community and school education program activities evaluated regularly and improvements implemented.	Project officer	– environmental education indicators researched – environmental education evaluated annually
Action 3.5 Ensure that community communication activities are evaluated against accepted communication key indicators.	Communication activities evaluated regularly and improvements implemented.	Project officer	– communication indicators researched – communication activities evaluated annually
Action 3.6 Undertake annual performance reviews of professional project staff, including bush regeneration contractors and project officer.	Performance reviews completed and recommendations implemented.	Coffs Harbour City Council	– results of performance review documented and recommendations implemented
Action 3.7 Ongoing overall project assessment, replicating 2002 baseline study (see Appendix B), to be completed on a 10-yearly basis.	Project assessment, replicating 2002 baseline assessment, completed every 10 years.	Project officer Northern Rivers CMA	– project assessment completed every 10 years

4: PROJECT SUSTAINABILITY ENSURED			
Action	Outcome	Partners	Measures
Action 4.1 Build river rehabilitation and biodiversity conservation into land-use planning instruments at local and state government levels.	Land-use planning instruments include controls which mitigate impacts on river health and threats to biodiversity and ecosystem resilience.	Orara Rivercare Committee Coffs Harbour City Council Coffs Harbour Water	– land-use planning instruments include river rehabilitation objectives
Action 4.2 Ensue that the 'Orara Valley Rehabilitation Strategy 2013–23' is included in Council's Management Plan.	The Strategy is included in Council's Management Plan and implementation of the Project is a key objective in the Plan.	Orara Rivercare Committee Coffs Harbour City Council Coffs Harbour Water	– 'Orara River Rehabilitation Project Strategy' included in the Coffs Harbour City Council Management Plan
Action 4.3 Link this Strategy into local, state and federal government natural resource management (NRM) frameworks.	State and federal government NRM frameworks are reviewed to ensure alignment of project activities within these frameworks, where possible. Input actively sought from project stakeholders and submitted into any review of state and federal government NRM frameworks as reviews occur.	Orara Rivercare Committee Coffs Harbour City Council Coffs Harbour Water Northern Rivers CMA	– 'Orara River Rehabilitation Project Strategy' aligns to the objectives, aims, and actions in local, state and federal government NRM frameworks
Action 4.4 Maintain in-kind investment from landholders and the community.	Landholders and community groups receive regular communications about project activities; are consulted at every opportunity; and supported by financial investment in on-ground works and education activities.	Landholders Local Landcare groups Orara Rivercare Committee Coffs Harbour City Council Coffs Harbour Water Northern Rivers CMA	– level of in-kind contributions from landholders and community – community consultation activities recorded – number of grants received – total grant income for on-ground work – total grant income for education activities
Action 4.5 Maintain financial and in-kind investment from all levels of government and private industry.	Local, state and federal government funding programs and private sponsorship opportunities are regularly reviewed to assess project eligibility and track deadlines. Applications submitted for local, state and federal government funding on a regular basis. Sponsorship and private funding prospectus developed and opportunities pursued.	Local Landcare groups Orara Rivercare Committee Coffs Harbour City Council Coffs Harbour Water Northern Rivers CMA	– level and type of in-kind contributions received – number of grants received – total grant income (including for on-ground and educational activities)
Action 4.6 Investigate research opportunities and partnerships with tertiary education institutions to continually improve and develop best practice for all on-ground work, community engagement, and monitoring and evaluation activities.	List of research priorities developed in consultation with all project stakeholders. Tertiary institution websites reviewed and contact made with relevant academics.	Local Landcare groups Orara Rivercare Committee Coffs Harbour City Council Coffs Harbour Water Northern Rivers CMA OEH Tertiary education institutions	– number of communications with research institutions – number of research activities
Action 4.7 Continually improve project management processes in order to prepare and implement effective adaptive plans for river rehabilitation.	This Strategy is reviewed annually and updated and revised as necessary.	Orara Rivercare Committee Bush regeneration contractors Darrunda Wajaarr Coffs Harbour City Council Coffs Harbour Water Northern Rivers CMA	– feedback from annual review of the Strategy is incorporated into the revised Strategy

Part 3 | Project implementation

Much has been learnt in the 16 years since the Project commenced and this knowledge has been used to develop this Strategy. Apart from the specific actions detailed in Part 2, a range of planning and operational techniques will be used to implement the Project over the next 10 years. These are outlined in this section.

The success of the Orara River Rehabilitation Project is based on the strong partnerships that have been formed since the Project's inception. Project partners are:

- Australian Government through Caring for our Country.
- Coffs Harbour City Council
- Coffs Harbour Regional Landcare
- Coffs Harbour Water
- Darrunda Wajaarr Indigenous Bush Regeneration Team
- Department of Primary Industries NSW (including Crown Lands)
- EnviTE (Environment Training Employment)
- GreenGrid (TransGrid & Greening Australia)
- Jaliigirr Biodiversity Alliance Inc.
- Landcare Australia
- local bush regenerators
- North Coast Weeds Advisory Committee
- Northern Rivers CMA
- NSW Environmental Trust
- Office of Environment and Heritage NSW
- Orara Valley landholders
- Orara Valley Progress Association
- Orara Valley Rivercare Groups Management Committee
- public schools in the Orara Valley
- WetlandCare Australia

Project partners and their contributions are summarised in Part 5.

Giant Barred Frog *Mixophyes iteratus*

3.1 Assess, plan and prioritise project sites

Site assessment and site action planning

To become involved in the Project, landholders need to first join one of the local Landcare/Rivercare groups. Once they have joined, a bush regenerator visits their site to carry out one day of weed control and/or revegetation work, as appropriate. New group members may be eligible to receive free plants via their local group.

To gain additional external funding for rehabilitation of their properties (e.g. CMA funding), landholders are invited to participate in developing *site action plans* for their properties. These invitations are made through the quarterly 'Orara Valley Rehabilitation Project Update' and/or through referral of a landholder by their local Landcare group.

A key component of this Strategy is involving the landholder in the *site assessment process* which informs the site action plan. The landholder works with the project officer and bush regenerator to identify and map the condition of the riparian zone on their property. This assessment results in the delineation of management zones which are linked to specific rehabilitation actions (see Appendix A).

During the site assessment, the management zones are marked on an A3 satellite image. A site action plan is then prepared on behalf of the landholder and records management zone details on a geographic information system (GIS).

A demonstrated level of landholder commitment is required for project sites to attract external funding.

Site prioritisation by the Orara Rivercare Committee

The merits of each potential project site are discussed at monthly Orara Rivercare Committee meetings according to the criteria listed in the following table.

Width of riparian zone available for rehabilitation	Approximately 20 metres average width is preferred, depending on site management considerations, for example, incline of bank and level of site management required
Condition of bank and stream structure	The condition of the bank and stream structure must be sufficiently stable to minimise potential erosion impacts on weed control, natural regeneration and revegetation works
Condition of stream bank vegetation	Stream bank vegetation in better condition is preferred
Potential for natural regeneration	This is indicated by the presence of seed-bearing, mature parent trees and emerging seedlings
Links to other project sites	Properties adjacent to existing project sites or adjacent to good condition riparian vegetation are preferred
Links to other vegetation remnants and corridors	Links promote vegetation and habitat connectivity over the entire catchment and include links to national parks and state forests
Potential for stock management, where required	Landholder must be willing to exclude stock from a riparian zone approximately 10 meters wide for effective rehabilitation
Potential for revegetation	Adequate riparian zone width and incline, and weed control potential for effective planting
Potential for erosion control works, where required	Erosion sites need to be manageable to ensure long-term effectiveness of erosion control works
Demonstrated landholder commitment	Landholder must be a member of a local group and demonstrate sufficient involvement in the site project and commitment to site maintenance over a five-year period
Potential as demonstration site	Site is accessible to the public, landholder is willing to have visitors on their property, and site has aesthetic attributes, e.g. remnant vegetation and mature rainforest trees.

Landholder management agreements

Formal landholder management agreements may be required by external funding providers, including Northern Rivers CMA. These agreements document the project activities to be funded, including the supply of fencing materials, water troughs, weed control, revegetation and erosion control works. Some funding bodies have upper limits on the funding they provide for particular items.

Agreements also document specific landholder in-kind contributions, expressed in dollar amounts according to an hourly rate. Landholders are expected to undertake fence construction and water trough installation works. They are required to commit to five years of site maintenance, particularly regarding stock management, weed control, and any follow-up planting which may be required.

A final map is prepared for the agreement and recorded on GIS. All project participants are fully informed of any improved stock management, weed control or planting options, and associated incentive schemes. Landholders are made aware of the need to ensure adequate stock management and weed control in rehabilitation areas.

Funding under a land management agreement is delivered by:

- payments to bush regeneration contractors who provide a service to landholders
- payments to suppliers of materials (either delivered to a project site or picked up by landholders)

and/or

- reimbursement to landholders for the purchase of materials.

3.2 Rehabilitate Project Sites

Manage stock

Trampling and grazing of native seedlings and understorey vegetation by cattle is an impediment to natural regeneration and effective riparian rehabilitation. The Project undertakes improved stock management through fencing of the riparian zone to exclude cattle, and provides off-stream watering troughs for cattle where necessary. As stock are also responsible for widespread grazing of understorey woody weeds, improved stock management must be integrated into an appropriate weed control strategy in rehabilitation areas.

Control weeds

Weed control measures target Camphor Laurel, Broad-leaved Privet, Small-leaved Privet, Broad-leaved Paspalum and Cat's Claw Creeper. Weed control is staged to avoid excessive disturbance to the riparian zone and to maximise the natural regeneration of native seedlings. Best practice chemical weed control is undertaken at project sites, including cut and paint, foliar spraying and stem injection.

Revegetate with local provenance plants

Revegetation is carried out using native tube stock and semi-advanced plants. The use of semi-advanced plants has been found to be a more efficient and cost-effective solution due to the impact of frost and flooding on plantings of smaller tube stock.

Local seeds are collected by the EnviTE Seed Bank program, landholders and bush regenerators employed on the Project. The project officer liaises with seed collectors to ensure appropriate supply.

The seeds are propagated by the Coffs Coast Tree Nursery (a business unit of the Council) and local Orara Valley nurseries for distribution to project sites. This seed collection and propagation system ensures that only local provenance plant stock is used in all project activities.

Landholder involvement in seed collecting is an important aspect of project implementation. A map of parent/seed tree locations and a calendar of fruiting times to help landholders gather seeds is collated.

Progress of propagation and plant stock provenances is tracked at regular intervals.

Rehabilitate channel structure

A geomorphic rehabilitation plan, developed by the then NSW Department of Land and Water Conservation and the Orara Rivercare Committee, was formally adopted by Council in 1999.
Appropriate techniques include the use of log jams, pin groynes, log and brush groynes, log and root ball groynes, tree groynes, log sills, pin ramps, log realignment, rock ramps with fishways, rock revetment, flood chute retardants, and reintroducing large woody debris. The reintroduction of pool and riffle sequences has improved the stream stability of the river and increased the available aquatic habitat.

3.3 Community Education and Communiation

Quarterly project update newsletter

Landholders who have expressed an interest in the project receive a two-page, quarterly 'Orara Valley Rehabilitation Project Update'. Currently, this includes 350 landholders along the main river channel and others whose land encompasses tributaries. The update includes information on:

- current project activities
- the types of materials and assistance the Project can provide, including an outline of on-ground works which can be funded
- what landholders are expected to contribute if they become involved in the Project
- current funding opportunities, workshops and training days.

Orara Valley landholders and friends email list

This email list includes Orara Valley landholders, project stakeholders and other interested parties, including natural resource management practitioners in local government and community organisations across the North Coast region. Information about the Project and other relevant material is sent out to promote best practice management of the riparian zone and sustainable agriculture in general.

Landholder Booklet

The 'Orara River Rehabilitation Project Landholder Booklet' (CHCC 2012b) is to be widely disseminated throughout the Project area. The booklet includes sections on the Orara Valley environment, the role of Landcare, stock management, weed identification, weed control measures, planting guidelines, and where landholders can access further assistance.

School and community education program

A community education program forms an integral part of the Strategy. Landholder knowledge gaps are identified, particularly with new residents to the area and new members of the local Landcare groups who have not previously been involved in the Project.

Stakeholders work in partnership to develop and deliver appropriate extension and education activities — including field days, training sessions, meetings and workshops — in locations and at times which are easily accessible to landholders. Given many landholders in the Project area are not actively involved in primary production, these extension activities are scheduled on nights and weekends. The education program takes a community development approach to facilitate effective involvement in project planning and on-ground works.

Plant nurseries have been established in local primary schools with Waterwatch activities scheduled at schools in order to educate future generations. Indigenous knowledge workshops are held in conjunction with on-ground works carried out by Darrunda Wajaarr Indigenous Bush Regeneration Team.

Media communication

Media releases are prepared at key points throughout the year, to promote:

- landholder workshops and field days
- project's successes and milestones
- community events, such as the local show and festivals

3.4 Research Opportunities

The scope and success of the Project combined with its high profile creates opportunities for research into rehabilitation ecology. This will contribute significantly to the refinement of the Strategy and contribute to improved conservation management actions on the North Coast.

3.5 Project Sustainability

Local, state and federal government funding opportunities are pursued to obtain private sponsorship for all aspects of Strategy implementation.

The success of the Project and the involvement of local landholders mean that a reach-based approach (see Landholder Booklet [CHCC 2012b]) could be taken for future planning and funding applications. For example, reinforcement of these river reaches can be undertaken by extending rehabilitation works onto neighbouring properties or by carrying out necessary follow-up work on sites within the reaches.

Bangalow palm forest

Part 4 | Monitoring and reporting

The project works towards achieving target and site condition (see Part 1). Measuring progress towards target condition contributes to reporting requirements and assists the Orara RiverCare Committee, project officer, and project site landholders understand site parameters.

Triennial site monitoring

Triennial monitoring of project sites, in conjuction with the landholder are completed using the Site Report form (adapted from the Northern Rivers CMA Baseline Assessment of Riparian Condition form). This records progress towards target condition over time. Site reporting also involves follow-up mapping to record work completed and site condition.

Once monitoring and evaluation have been undertaken for each site, a GIS map of site work is prepared and GPS photo points are established for a triennial photo record of progress.

Weed control and revegetation works carried out by bush regeneration contractors are recorded at each site. A spreadsheet is used to record hours of on-ground work completed and/or number of plants planted per site, and a dollar amount for work undertaken at each site each month.

Wompoo Fruit Dove *Ptilinopus magnificus*

Annual project reporting

Progress reports and final reports as required by funding bodies, including project site details (as above) and details of community engagement activities.

Ten-yearly assessments

A project assessment report prepared in 2002 (see Appendix B) provides a benchmark for the Project area's condition at that point in time. This assessment is to be repeated at 10-yearly intervals.

Community engagement

Part 5 | Partnerships, programs, roles and relationships

Landholders

Extensive in-kind support from landholders ensures the success of fencing riparian zones, installing off-stream watering points, weed control, and revegetation with local provenance indigenous plants. Many landholders are consistently engaged in river rehabilitation over a number of years.

Orara Valley Rivercare Groups Management Committee

The Orara Rivercare Committee, an incorporated body, was formed as an umbrella organisation to coordinate the activities of the Cochrans Pool Urumbilum Rivercare Group, and Karangi and Nana Glen Landcare local groups. The Committee meets monthly and oversees all project works and funding allocations. The umbrella group allows the local groups to spend less time on administration and more time building community capacity and undertaking on ground works.

Coffs Harbour City Council

Historically, Council has provided funding for the Orara Valley Rehabilitation Project through an annual contribution from the Environmental Levy — a levy on ratepayers in the LGA that has been in place since 1999. Council part funds a project officer to facilitate the Orara Valley Rehabilitation Project. This funding is applied for annually but not guaranteed.

To date, the Coffs Coast Tree Nursery (the Council's nursery) has supplied the Project with local provenance species produced from locally collected seed stock. Weeds officers within Council liaise with stakeholders to ensure an integrated approach to weed control in the Orara Valley and the LGA.

Coffs Harbour's landscape corridors

Coffs Harbour Water

Coffs Harbour Water (a business unit of Council) oversees the water supply for the LGA. There are three sources of water used to feed the off-stream Karangi Dam: Cochrans Pool on the Orara River, the Nymboida River and Shannon Creek Dam. Once treated, water from Karangi Dam is then pumped to coastal households from Sawtell to Corindi. In addition to this, approximately 145 households in Nana Glen are supplied with treated water pumped from the Orara River at Nana Glen.

Coffs Harbour Water is committed to implementing an Ecosystem Health Monitoring Program (Ecohealth) to comprehensively monitor marine, estuarine and freshwater sites — including sites in the Project area. Freshwater Ecohealth monitoring provides an assessment of water quality (physical and chemical), riparian vegetation condition, fish assemblage, and macroinvertebrate distribution to assess ecosystem health in individual waterways and catchments.

Northern Rivers CMA

The funding provided to date by the Northern Rivers CMA has been to meet targets in the Northern Rivers Catchment Action Plan (NRCMA 2006), as follows:

- Water target 1 – River structure, riparian vegetation and fish passage: By 2016, rehabilitate and protect the stream health (in terms of structure, riparian vegetation and fish passage) of 60% of stream length in all identified streams in priority subcatchments (15% to be completed by 2009).
- Community capacity building target 1 – Awareness, knowledge and skills: By 2016, there is an increase in community awareness, knowledge and skills in relation to NRM.
- Community capacity building target 2 – Community engagement: By 2016, there is an adequate level of community engagement and collaborative partnerships in NRM and adequate trust in NRM institutions and processes.

The *Draft Northern Rivers Catchment Action Plan 2013–2023* (NRCMA 2012) also includes strategies and targets relating to maintaining and improving landscape health and function, as well as community engagement and capacity building targets. For example, action 2.2.8 of the draft Plan is:

- Enhance the condition of catchments and the riparian zone through revegetation, strategic weed control, stock management and establishment of effective buffer zones.

Catchment officers provide advice on the management of the Project as a whole as well as the management of individual sites, particularly relating to structural erosion control works.

Coffs Jaliigirr Project

A new project is being developed in the Coffs Harbour LGA under the Federal government's Clean Energy Future initiative called the Jaliigirr Project. This project has similar goals and objectives to the Orara River Rehabilitation project, but will be implemented over a larger geographic area.

Coffs Harbour Regional Landcare

The partnership between Council and Coffs Harbour Regional Landcare has resulted in 'Rainforest Plant Identification' and 'Seed Collecting' workshops. Coffs Harbour Regional Landcare has also run workshops of benefit to agricultural producers in the Orara Valley, for example, workshops on paddock plants and biological farming.

Local bush regenerators

Local bush regenerators have a long association with river restoration and rehabilitation in the Orara Valley. Valuable ongoing relationships with landholders and vast knowledge of individual sites and the Orara River catchment have enabled these bush regenerators to provide a very high level of local, on-ground knowledge. These regenerators have a long-term, dedicated commitment to the health of the river, which in turn results in excellent service for the Project.

Darrunda Wajaarr Indigenous Bush Regeneration Team

Darrunda Wajaarr is auspiced by the Coffs Harbour Region Local Aboriginal Land Council. The team has been engaged on specific project sites, mainly on public land, as well as under a federal government grant to construct bush tucker gardens at Orara Valley primary schools. The Bush Tucker project, and a project at The Jungle in Coramba also include the running of 'Indigenous Knowledge' workshops by Gumbaynggirr Elders.

Public schools in the Orara Valley

Public primary schools in the Orara Valley have established plant nurseries which involve the students in propagating local provenance plants for use on public project sites, including Bridge Park at Nana Glen and Karangi Cemetery. The schools have also been involved in Waterwatch workshops utilising water quality testing and macroinvertebrate sampling as indicators of stream health.

WetlandCare Australia

WetlandCare Australia works on wetland classification, assessment, mapping, monitoring, protection and conservation; and education activities and building partnerships to improve wetlands. The Orara River Rehabilitation project officer liaises with WetlandCare when landholders express an interest in rehabilitating wetlands and incorporates wetland rehabilitation into site action plans when appropriate.

EnviTE (Environment Training Employment)

The EnviTE Seed Bank provides local provenance seed to the Coffs Coast Tree Nursery and stores seed to ensure ongoing supply to maintain the genetic integrity of plant stock. The project officer assists EnviTE in sourcing seed when possible.

Orara Valley Progress Association

The Association maintains an ongoing interest in improving the Orara Valley environment and is involved in tree planting activities at Coramba village.

North Coast Weeds Advisory Committee

Weed information from the North Coast Weeds Advisory Committee is distributed through all project communication channels. Project bush regenerators and landholders are well placed to provide the Advisory Committee with valuable information about emerging new weeds in the Project area and successful weed control methods.

NSW Office of Environment and Heritage

The Project contributes to actions articulated in NSW National Parks and Wildlife Service reserve plans of management as well as threatened species recovery strategies, for example:

- Liaise with landowners and promote community programs that assist with the conservation of the ecological community.
- Fence ecological community to allow natural regeneration. Fencing must be linked to monitoring and weed control.
- Undertake weed control where required.
- Restore and rehabilitate remnants and linkages to the ecological community in the landscape. Link this to other revegetation programs as well as recovery plans for threatened species and ecological communities.
- Develop sustainable management guidelines and technical material to assist landowners. This will include measures to address threatening processes and management options.

The NSW Office of Environment and Heritage administers a Conservation Partners Program, including conservation agreements and wildlife refuges in areas of high conservation value on private land.

Land for Wildlife is another voluntary scheme for landholders interested in conserving wildlife habitat on their property. Landholders are provided with knowledge and skills to maintain habitat and their participation in the scheme has no legal implications. Landholders are provided with signage to indicate their participation in the scheme.

NSW Department of Primary Industries

The Fisheries section of NSW Department of Primary Industries funded the construction of a fishway at Casuarina Lane, Karangi, in 2007–08 to address a causeway barrier to native fish movement. Fisheries NSW also runs the Fish Friendly Farms scheme which aims to raise farmers' and other landholders' awareness about ways they can improve fish populations in their creeks and wetlands and at the same time improve on-farm productivity.

Crown Lands NSW

There are a number of Crown lands within the Project area, including a large area of The Jungle just north of Coramba Village which is in relatively close proximity to Coramba Nature Reserve, the largest remnant of intact Lowland Subtropical Rainforest in the Orara Valley. Ongoing partnership opportunities are sought with Crown Lands NSW.

Landcare Australia

Landcare Australia has recently provided funding, during 2012, for bush regeneration works and an 'Indigenous Knowledge Workshop' at The Jungle. This work is complemented by work on private land in the same river reach which includes Coramba Nature Reserve.

From 2003 to 2008 the Project attracted funding from Qantas through Landcare Australia for propagation nurseries at each of the four Orara Valley primary schools. With this funding the Orara Rivercare

Bush regeneration

Committee supplied the schools with shade houses, potting benches, automatic irrigation systems, seed trays, pots, fertiliser, potting mix, wheel barrows, garbage bins and brooms. The committee provided education on river rehabilitation to the students and staff. Tube stock and advanced plant stock were provided to public parks in the valley through the Project.

GreenGrid

GreenGrid (partnership between TransGrid and Greening Australia) has provided funding for structural erosion control works in close proximity to the TransGrid electricity substation at Karangi. It is hoped that further funding becomes available from this program.

NSW Environmental Trust

The NSW Environmental Trust provides funding under its environment restoration and rehabilitation; and community bush regeneration programs.

Caring for our Country

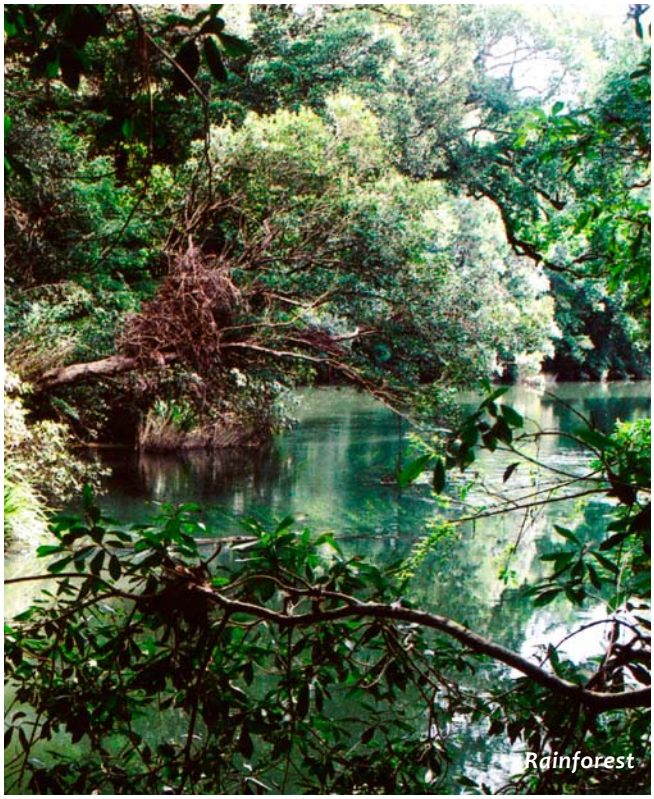
The Australian Government's Caring for our Country initiative provides funding for national natural resource management targets as well as community action grants.

Skewes Fishway

Part 6 | Alignment with other strategies and plans

This Strategy aligns with the following natural resource plans and strategies:

- Northern Rivers Catchment Action Plan
- Coffs Harbour 2030 Plan
- Coffs Harbour Biodiversity Action Strategy 2012-2030
- Coffs Harbour Koala Plan of Management
- Northern Rivers Regional Biodiversity Management Plan
- NSW Biodiversity Strategy 2010–2015
- Australian Biodiversity Conservation Strategy 2010–2020
- International Convention on Biodiversity
- Recovery Plan for the Eastern Freshwater Cod (Maccullochella ikei)
- Recovery Plan for the Spotted-tailed Quoll (Dasyurus maculatus)
- Recovery Plan for the Bellinger River Emydura (Emydura macquarii)
- Recovery Plan for the Grey-headed Flying-fox (Pteropus poliocephalus)
- Bindarri National Park Plan of Management
- Coramba Nature Reserve Plan of Management
- Sherwood Nature Reserve Plan of Management
- Ulidarra National Park Plan of Management
- Northern Rivers Invasive Plants Action Strategy 2009–2013
- NSW Invasive Species Plan 2008–2015
- Australian Weeds Strategy


Rainforest


Rose-crowned fruit dove *Ptilinopus regina*


Coastal carpet python *Morelia spilota mcdowelli*

Part 7 | Risk management plan

Risk description	Risk rating (severity / likelihood)	Risk response	Post response (severity / likelihood)	Residual risk rating
Flooding and long periods of site saturation by rainfall may impede implementation of on-ground works	Nuisance / Likely	On-ground works planned for drier months, as reflected in bush regeneration contract	Nuisance / Likely	Low priority
Periods of dry weather may impede growth of revegetation plantings	Nuisance / Likely	Add water crystals when planting and schedule watering when necessary, as reflected in bush regeneration contract	Nuisance / Likely	Low priority
Change in land ownership	Nuisance / Unlikely	Landholder liaison to ensure that potential property purchasers are made aware of funding arrangements	Nuisance / Likely	Low priority
Inadequate site maintenance	Nuisance / Unlikely	Selection of sites in relatively good condition with sufficient landholder capacity to carry out follow-up site maintenance	Nuisance / Likely	Low priority
Project manager resigns	Nuisance / Unlikely	Existing project officer keeps comprehensive records of all project processes and activities and will ensure a thorough hand-over of project	Nuisance / Likely	Low priority
Bush regeneration contractor disbands	Nuisance / Unlikely	Bush regeneration contract is non-exclusive so more than one contractor can be engaged. If necessary the contract can be readvertised.	Nuisance / Likely	Low priority
Orara Rivercare Committee disbands	Nuisance / Unlikely	Coffs Harbour Regional Landcare could take on role of project oversight	Nuisance / Unlikely	Low priority

NB: With regard to the first three risks, the Orara Rivercare Committee has extensive experience managing bush regeneration works in the Orara Valley, including all the practicalities relating to seasonal constraints and landholder relationships.

Risk Rating Key

SEVERITY		LIKELIHOOD			
Description	Outcomes	Imminent	Very likely	Likely	Unlikely
Catastrophic	Death or disabling injury or illness, huge financial loss or irreparable damage to organisation	Very high	Very high	High	Substantial
Critical	Lost-time injuries, major financial loss, major disruption to business activities	Very high	High	Substantial	Moderate
Marginal	Medical treatment or first-aid treatment required, moderate financial loss, disruption to a job	High	Substantial	Moderate	Low priority
Nuisance	No injury, illness or property damage, nuisance interruption, low financial loss, minor breakdown that can be fixed immediately	Substantial	Moderate	Low priority	Low

Acronyms

CHCC	Coffs Harbour City Council
CMA	catchment management authority
EEC	endangered ecological community
GIS	geographic information system
LGA	local government area
NRCMA	Northern Rivers Catchment Management Authority
NRM	natural resource management

Hard quandong *Elaeocarpus obovatus*

Subtropical lowland rainforest

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Appendix A

Northern Rivers CMA River Reach Program

Appendix B

Orara Valley Riparian Rehabilitation Project

PROJECT ASSESSMENT REPORT 2002 SUMMARY

Orara Valley Riparian Rehabilitation Project Project Assessment Report 2002 Summary

Background

The Orara River Riparian Rehabilitation Plan was developed in 1999, with the objective of removing infestations of exotic weeds degrading riparian communities and replacing them with suitable local native species. With ongoing support, the project has achieved significant reductions in density and distribution of major target weed species of cats claw creeper, camphor laurel and privet.

A walking survey was undertaken between August and October 2002 to evaluate and monitor success or otherwise of the project since its inception. The total length of riparian frontage monitored in this report was 53km. The following table displays the number of management zones mapped across each rivercare / landcare group.

Group	Number of Mgt zones (50m)	Km of Riparian Frontage
Cochran's Pool - Urumbilum	118	5.9
Karangi	221	11
Coramba	71	3.5
Nana Glen	651	32.5

Riparian zone widths

Width of the riparian zone is an important factor when considering riparian vegetation as filters and buffers for the stream. Across the project, 52.4% of management zones were less than 10m wide and 75% less than 20m wide. Of note is that 14% of management zones were greater than 30m wide, with the majority of these having moderate to high conservation value.

Canopy weed control

Results indicated that since late 2000, control of dominant upper and mid canopy weeds has been initiated across 66% of all 50m management zones and completed across 18% of these.

Positive changes to a lower density class for canopy weeds were recorded in 35% of the management zones where weed control was undertaken. The number of Green management zones doubled from 20% to 40% and red zones decreased by a third from 25% to 17%.

Major issues are associated with the management and control of ground layer weeds, predominantly juvenile species of target canopy weeds.

Fencing and stock management

25% of riparian management zones across the project are fenced, while 65% of management zones have evidence of stock grazing on understorey natives. It was determined that stock access to riparian areas is responsible for the majority of sites recommended for additional tubestock planting. Trampling and grazing of recruiting native seedlings and understorey vegetation evident across the project is an impediment to effective riparian rehabilitation.

Improved stock management will be necessary if the project's rehabilitation objectives are to be achieved in those areas. Conversely, stock are also responsible for widespread grazing of understorey woody weeds, therefore improved stock management must be linked to an appropriate weed control strategy in rehabilitation areas.

Native understorey plants

Assessment of Native Understorey Plants (NUP) found that 34% of all 10m belt transects across the project recorded a NUP density greater than 1 plant per 5 square metres. For a 50m management zone to be considered as having suitable NUP and not requiring revegetation, at least four out of five 10m belt transects must have a NUP density of >1/5m2. Of the management zones where these criteria are satisfied, 71% occur in current green canopy weed class zones.

This indicates preference to treat low weed canopy class zones first, as much greater intervention is needed in higher canopy weed class zones to achieve the regeneration objectives. Further more, these results suggest an increasing commitment of resources will be required for management zones with high classes of canopy weeds and problematic natural regeneration.

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