

KARUAH RIVER Catchment Management Plan

SNAPSHOT



To maintain and improve the health of the Karuah River Catchment

What is the Karuah River Catchment Management Plan?

The Karuah River Catchment is located on the lower north coast of New South Wales.

The Karuah River Catchment Management Plan has been developed in conjunction with the local community to maintain and improve the health of the Karuah River Catchment's natural environment so that it can support the sustained wellbeing of the catchment's community and industries.

This snapshot provides a brief introduction to the catchment, its values and threats, and provides an outline of the Plan's desired outcomes and recommended management actions required to improve the catchment's health.

THE PEOPLE

It is the actions of people that has had and will continue to have the greatest impact on the catchment.

Throughout history, many changes in land use and land management have contributed to the Catchment's present landscape.

"Planning must account, as far as possible, for past, present and future conditions. An understanding of the history of the catchment, as well as the drivers of current condition is required if the planned rehabilitation measures are to match the nature and scale of the drivers of river condition"

(Cottingham, Bond, Lake, & Outhet, 2005)

Prior to European settlement, the Aboriginal family groupings of the Worimi inhabited much of the catchment. European settlement commenced in the early 1800's with the arrival of cedar cutters, and shortly after, agriculture was introduced by the Australian Agriculture Company.

Since this time the Karuah River Catchment has changed. Industries and landuses that have played a key role in shaping the Catchment have been agriculture, the timber industry in combination with the conservation movement, mining (minerals and coal), oyster farming and more recently tourism and rural lifestyle development.

Land use change is a continuous process, driven in most instances by economic and social factors; however, the economic and social viability of the Catchment's community is inherently linked to the condition and function of the natural environment.

"The challenge is to identify these trends and harness them where opportunities exist to achieve improvements in natural resource management and catchment condition"

(Land & Water Australia 2005)

The Karuah Catchment Forum

A broad range of both formal and informal activities were undertaken within the Catchment as a means of capturing community input into the Plan. The Karuah Catchment Forum was a central component of this.

On the 19th & 21st of June 2014, approximately 135 community, government and industry representatives attended the two day Forum in Stroud. The Forum was designed to formally identify and capture catchment values, threats and strengths to catchment health and ideas for management actions.

Outcomes from the Forum and broader community engagement guided the development of the Plan and have been integrated throughout the document.



THE SCIENCE

Water quality

A scientific assessment of the health of the Karuah River was completed in 2011. The assessment provides an indication of the river's current health, and a benchmark to observe trends in river and estuarine health over time.

The assessment found that overall, the Karuah River and its estuary were in moderate ecological condition. However, the assessment also revealed concerning indicators of poor and degrading ecological condition. These indicators included:

- elevated turbidity and suspended sediment
- elevated water column nutrient concentrations, in particular nitrogen and phosphorous
- excessive algal growth
- degraded riparian habitats
- seriously diminished seagrass habitats in the estuary
- diminished saltmarsh habitats in the estuary
- mangrove encroachment on other habitat types in the estuary.

"Clean rivers mean a well-managed catchment regardless of diversity of activity"



The influence of storm events

Algal blooms flourish in clear, nutrient rich water. In dry periods, when streams have low turbidity (clear water) the existing nutrient base load combined with clear water can create the ideal conditions for algal growth. Conversely, during intense periods of rainfall (e.g. during storms) the turbidity and suspended solid levels rise, reducing the level of light required to support the growth of harmful algal blooms.

A 'typical' algal bloom may not always be visually evident, however if unhealthy growth of small algae in the waterway continues, algae growth has the risk of reaching levels which are harmful to people, fish and aquatic life.

Building the catchment's capacity to reduce loads of sediment and nutrients into the river is a key component of the Plan.

The health of the catchment's biodiversity

The Karuah River Catchment contains significant biological diversity, and compared to other catchments, has a relatively high proportion of native vegetation. Many threatened flora and fauna species and ecological communities are known to occur within the catchment.

The landscape is influenced by tropical and temperate climatic conditions, and, as a consequence, a number of plant and animal species are at the limit of their natural range.

Approximately 34% of the catchment is tree and shrub cover located on private land. The largest areas of intact native vegetation cover are mostly located in the less developed and more inaccessible steep slopes of the catchment. It is probable that these slopes also contain significant biodiversity and ecosystem values, that are not actively managed.

With a few exceptions, the lower to mid-slopes and floodplains are cleared, particularly along the Karuah River valley floor, the lower Monkerai district and The Branch sub-catchment.

THE SCIENCE

Fragmentation of habitat is a well-recognised pressure on ecosystem resilience, and despite the existence of large areas of native vegetation, the catchment's biodiversity is under pressure due to habitat fragmentation.

The catchment's rivers banks (riparian zones) often, but not always, only have narrow strips of vegetation and / or are infested with weeds such as lantana.

The biodiversity in the catchment's estuary is also under pressure. Seagrass extent in the estuary decreased by almost 80% between 1985 and 2009. Low light availability, due to high turbidity and/or nutrient enrichment, is the most probable cause of seagrass decline.

Over time, the loss of seagrass results in declining habitat and food availability for many species, such as fish. The extent of salt marsh between 1985-2009 has also reduced, while the area of mangroves has increased.

What are the threats the Catchment faces?

- Surface water quality (nutrients, sediments, effluent and other pollutants) and quantity
- Impact of high intensity rainfall and extended wet periods. Impacts from erosion
- Condition and extent of riparian zones
- Weeds and feral animals
- Degradation of wetlands
- Risks and impacts of acid sulphate soil
- Soil erosion, nutrient loss and water use efficiency associated with agriculture
- Groundwater quality and quantity
- Best management practices for rural lifestyle properties and absentee landholders
- Soil health, including organic carbon
- Landscape and habitat connectivity
- Quality / condition of native vegetation
- Altered fire regime
- Climate change
- Knowledge gaps, e.g. nutrient hotspots
- Poor co-ordination and collaboration between stakeholders

What are the Catchments' strengths?

- Residual high biodiversity
- The people in the catchment. Community values and structures
- Relatively high amount of native vegetation
- Still able to use water in the river
- When in drought the springs open up
- Farming is still viable in the catchment
- Appreciation of the importance of water in the catchment
- Relatively good rainfall
- Have reserves and national parks e.g. World Heritage Area in headwaters
- Overall landscape

The identified threats and strengths draw on local community knowledge in combination with scientific understanding

"The continuous vegetation along the Karuah River looks amazing compared to so many other rivers"

THE FUTURE

The importance of the Plan for the future health of the catchment

The historical use and management of the Karuah River Catchment's natural resources has yielded significant social and economic benefits to the people of the catchment and beyond. However, these benefits have resulted in the decline of some aspects of catchment health. It will be the actions of people today and in the future that will influence the catchment's health in the years to come.

The long term health of the Karuah River Catchment's natural resources will, in some measure, be influenced through the successful implementation of this Plan. The Plan is modest in its objectives and does not aim to return the catchment to its 'natural' or pre-European condition. It does, however, aim to restore and protect the catchment's health to a level that is possible within the limits of the prevailing environmental and socio-economic conditions.

The Plan's desired outcomes and recommended management actions

The Plan has established three sets of outcomes that will be delivered through the implementation of a comprehensive set of recommended management actions. The outcomes and recommended management actions align with the following three themes:

- ▶ **Water**
- ▶ **Landscape, Production and Community**
- ▶ **Resilient Ecosystems**

The Plan is guided by four key principles developed from the Karuah Catchment Forum.

- 1** The **communities** of the Karuah River Catchment are **active partners** of the Catchment Management Plan.
- 2** **Healthy, clean rivers and riparian zones** are important to the long-term sustainability of the Karuah River Catchment.
- 3** **Catchment health** is fundamental to the economy and way of life of the Karuah River Catchment.
- 4** **Resilient ecosystems** are essential for catchment health.

DESIRED OUTCOMES

WATER OUTCOMES

- Water quality and the ecological values of waterways, wetlands and groundwater are protected, maintained and restored
- The export of pollutants, including nutrients, sediments and effluent to the waterways of the Karuah River is reduced
- The landscape has an increased ability to slow the flow of water and protect water quality during high inflow periods
- Developments on greenfield sites achieve a neutral or beneficial effect on water quality and ecological values of waterways
- The health and functioning of water systems, including groundwater, are better understood within the Karuah River Catchment



LANDSCAPE, PRODUCTION AND COMMUNITY OUTCOMES

- Improved capacity of the agriculture, forestry and aquaculture sectors to manage the landscape for productive returns, whilst also improving the ecological health of the catchment
- The export of pollutants, including nutrients, sediments and effluent from production based landscapes to the waterways of the Karuah River Catchment is reduced
- Mining and industry is responsive to the needs of the environment, community and health
- Potential impacts and opportunities associated with the economic development of land, landuse and demographic change are understood, planned for and managed to ensure catchment health, maintenance of productive landuse and community wellbeing
- Management of catchment health is underpinned by community awareness, understanding and shared responsibility



RESILIENT ECOSYSTEMS' OUTCOMES

- Natural ecosystems and biodiversity are strategically conserved, restored, linked and managed within a productive landscape to maintain and improve resilience
- Forestry areas are managed in order to maintain and improve a range of ecosystem services, biodiversity, water quality and cultural heritage values
- Pressures on biodiversity, natural ecosystems and habitat are reduced



MANAGEMENT ACTIONS - WATER

Management Actions	Participating Partners
Wetland and Acid Sulfate Soil Management	
1 Map the occurrence and condition of wetlands. Identify priorities for management and action	GLC, LLS
2 In collaboration with private landholders, utilise incentives and engagement mechanisms to protect and rehabilitate wetlands within the Karuah River Catchment	GLC, PSC, LLS, DPI (Fisheries) Local Landholders
3 Investigate and pursue the strategic purchases of priority wetlands to improve water quality and biodiversity values	GLC
4 Continue to engage and inform the community about the value of local wetlands and associated issues	GLC, OEH, LLS, DPI (Fisheries)
5 Investigate the potential for the establishment, re-establishment or enhancement of wetlands in sub-catchments with high nutrient and sediment inputs	LLS, GLC
6 Manage wetlands in the Karuah River Catchment in accordance with the principles and actions of the Wallis Lake Wetland Strategy	GLC
7 Adopt and implement a model NRM clause for wetlands in the Great Lakes Local Environmental Plan (LEP)	GLC
8 Improve community knowledge and management of acid sulfate soils in the estuary zone of the catchment	LLS, DPI (Fisheries), GLC
Water Pollution Management	
9 Conduct works to protect and rehabilitate riparian zones, incorporating the establishment of native vegetation. Works to be carried out opportunistically and in line with priorities. Where possible, develop synergies between works on both public and private land. Priorities to include: <ul style="list-style-type: none"> • areas with medium hydraulic soils • areas where current land use results in high rates of nutrient or sediment export to the river • high quality native vegetation • areas where links can be created to nearby patches of native vegetation • priorities identified by the Riverstyles mapping and framework. 	LLS, GLC, PSC, DPI (Fisheries), Local Landholders
10 Phase out grazing of stock in riparian zones in identified foreshore Crown Reserves and manage Crown Foreshores for conservation purposes. Zone identified Crown Foreshores for Environmental Protection within the relevant Local Environmental Plan	DPI (Crown Lands), GLC
11 Map and identify areas at high risk of erosion. Implement an incentive program to prevent and remediate soil erosion within priority areas, including the management of steep slopes	LLS, DPI (SCS), DPI (Fisheries), GLC, DPI (NoW), Local Landholders
12 Improve community knowledge of the methods available to both prevent and mitigate soil erosion, including the value of riparian vegetation	LLS, DPI (SCS), DPI (Fisheries), GLC
13 Identify and prioritise areas of sediment export to the Karuah River from unsealed roads, tracks and creek crossings and undertake mitigation activities according to priorities	NPWS, Forestry Corporation, GLC, PSC, Local Landholders

MANAGEMENT ACTIONS - WATER

Management Actions	Participating Partners
Water Pollution Management continued	
14 Expand GLC Sediment and Erosion Control Environmental Management System (SECEMS) to address management of sediment and erosion control of Council managed unsealed roads	GLC
15 Assess road network needs for operational and fire management purposes. Close and rehabilitate roads surplus to requirements and install locked gates as appropriate to minimise erosion from recreational vehicles	Forestry Corporation, NPWS
16 Ensure future developments comply with GLC's Water Quality Objectives to: (a) ensure re-development and infield developments achieve a load reduction, and (b) all greenfield developments achieve a neutral or beneficial effect on water quality	GLC
17 Review and update the Karuah section of the Port Stephens Urban Stormwater and Rural Water Quality Management Plan.	PSC
18 Ensure all future developments in the Karuah area address the objectives of the Port Stephens Urban Stormwater and Rural Water Quality Management Plan	PSC
19 Develop a stormwater management plan for Stroud	GLC
20 Continue to implement the Great Lakes Council Onsite Sewerage Management Strategy, including the following recommendations: <ul style="list-style-type: none"> • all systems are inspected to determine if they are operating satisfactorily • inspect more frequently systems identified as high-risk or that are operating poorly • pump-out records are monitored to ensure systems are not overflowing or being illegally emptied • aerated Wastewater Treatment System (AWTS) reports are monitored to ensure owners are aware of maintenance that is required • approval and ongoing monitoring of AWTS contractors to ensure qualified technicians are carrying out quality services. 	GLC
21 Continue to initiate and support campaigns to reduce the reliance on plastic bags and other single-use plastics in the community that contribute to roadside litter and rural rubbish	GLC
22 Ensure compliance with the Karuah River Water Sharing Plan	DPI (NoW)
23 Include water quality, water sharing legislation and environmental flow information in rural landholder extension and education programs	DPI (NoW), GLC, DPI (Ag), LLS

MANAGEMENT ACTIONS - WATER

Management Actions

Participating Partners

Groundwater

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| <p>24 Investigate the current status of groundwater quality and quantity; develop and implement programs to mitigate any significant impacts</p> | <p>OEH, DPI (NoW), Miners and other large users of groundwater</p> |
| <p>25 Implement the Groundwater and Drinking Water Catchment Clause in the Great Lakes Standard Local Environment Plan (LEP)</p> | <p>GLC, MCW</p> |
| <p>26 Ensure that any future or current developments comply with the Great Lakes WQIP and do not adversely impact groundwater resources and ground water dependant ecosystems through development assessments</p> | <p>GLC, PSC</p> |

Research, Monitoring and Evaluation

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| <p>27 Investigate nutrient and sediment loads in order to identify 'nutrient and sediment hotspots' within the catchment. Use this information to determine priority areas for action and, in particular, assess nutrient and sediment source 'hotspots' during storm events</p> | <p>OEH, GLC, Research Institutions</p> |
| <p>28 Within GLC's Waterway and Catchment Report Card, undertake for the Karuah River Catchment: (a) water quality monitoring every two years, and (b) a catchment wide assessment of riparian and instream aquatic health, including seagrass, saltmarsh and mangrove habitat every five years. Investigate and pursue collaborations and potential partnership opportunities for completing the Report Card and riparian and instream aquatic health assessment</p> | <p>GLC, OEH, Duralie Coal, Forestry Corporation, NPWS, MCW, DPI (NoW), DPI (Fisheries), Research Institutions</p> |

"A river can be considered as a ribbon of life."

MANAGEMENT ACTIONS - LANDSCAPE, PRODUCTION AND COMMUNITY

Management Actions	Participating Partners
Agriculture - production and environment	
<p>29 In collaboration with landholders build understanding and capacity to increase the adoption of best management practices which address catchment degradation and encourage profitable farms. Opportunities for focused action may include focus farms, group mentoring programs, on-farm trials, farm sector advisory groups, demonstration sites, landholder champion programs, and property management planning activities</p>	<p>LLS, DPI (Ag), DPI (Fisheries), GLC, KGLL, Local Landholders</p>
<p>30 Targeting sediment and nutrient hotspots, work in collaboration with landholders to improve grazing/groundcover management, soil health (including organic carbon) and water use efficiency</p>	<p>LLS, DPI (Ag), DPI (Fisheries), GLC, KGLL, Local Landholders</p>
<p>31 In collaboration with the poultry industry explore and implement appropriate options for improved management of poultry litter throughout the whole poultry litter supply chain e.g. Fertcare</p>	<p>DPI (Ag), NSW Farmers Association, LLS, GLC, Local Landholders</p>
<p>32 Expand and implement a best practice fertiliser storage and application program, targeting hotspots of nutrient loss within the catchment</p>	<p>LLS, DPI (Ag), GLC, Local Landholders</p>
Oyster Production	
<p>33 Support the development of business plans and environmental management systems within the oyster industry</p>	<p>LLS, DPI (Fisheries), DPI (Food Authority), GLC, PSC, Oyster Industry</p>
<p>34 Encourage the sharing of knowledge and understanding between oyster growers, other primary producers and other users of the catchment's land and water resources</p>	<p>LLS, DPI (Fisheries), DPI (Food Authority), GLC, PSC, KGLL, Local Landholders, Oyster Industry</p>
<p>35 Continue to support the implementation of the NSW Oyster Industry Sustainable Aquaculture Strategy (OISAS)</p>	<p>Oyster Industry, DPI (Fisheries), DPI (Food Authority), GLC, PSC</p>
Mining and Large Scale Extractive Industry	
<p>36 In recognition of the high quality and sensitive catchment values, encourage new or existing large-scale extractive industry to achieve a beneficial effect on catchment health through:</p> <ul style="list-style-type: none"> • contributing to the Karuah Catchment improvement fund • contributing to improved understanding of catchment functioning and health • adopting best practice catchment management procedures on mine owned land. 	<p>GLC, LLS, Extractive Industry, MCW</p>

MANAGEMENT ACTIONS - LANDSCAPE, PRODUCTION AND COMMUNITY

Management Actions	Participating Partners
Planning	
<p>37 In collaboration with the poultry industry, review and update the development control requirements for new poultry sheds taking into consideration:</p> <ul style="list-style-type: none"> • the export of nutrients • odour and visual impacts • land use buffering to reduce conflict with neighbouring landuses • potential adverse effects to farm biosecurity. 	GLC, NSW FA, Poultry Farmers, Research Institutions
<p>38 In collaboration with the poultry industry investigate and implement incentive mechanisms for voluntarily retrofitting of existing poultry farms to achieve best practice. Potential improvements could include:</p> <ul style="list-style-type: none"> • practices to reduce the export of nutrients • wetland systems • riparian buffers • waste disposal • landscaping and screening practices • odour management. 	GLC, NSW FA, Poultry Farmers, LLS, DPI (Ag), Research Institutions
<p>39 Enforce provisions in the Great Lakes Standard Local Environment Plan as they pertain to rural land use.</p> <p>The key environmental provisions in the GLC LEP (2014) include:</p> <ul style="list-style-type: none"> • Acid Sulphate Soils (Clause 7.1) • Earthworks (Clause 7.2) • Stormwater Management (Clause 7.5) • Drinking Water Catchments (Clause 7.6) • Riparian Land and Watercourses (Clause 7.7) • Wetlands (Clause 7.8) • Limited Development on Foreshore Area (Clause 7.10) • Significant Extractive Resources (7.14) 	GLC
<p>40 Evaluate the merits of preparing and implementing an Agriculture Strategy for the Karuah River Catchment</p>	GLC



MANAGEMENT ACTIONS - LANDSCAPE, PRODUCTION AND COMMUNITY

Management Actions	Participating Partners
Research, mapping and monitoring	
41 Research the long-term impacts of regular applications of chicken litter on pastures in high rainfall areas and their influence on soil condition	Research Institutions
Education & Awareness	
42 Continue catchment management education programs, such as Water Watch, with local primary schools and community groups	LLS, GLC, Community
43 Continue to use communication and social marketing tools such as newsletters, extension, field days and websites to promote an understanding and awareness of catchment management within the community	LLS, DPI (Ag), DPI (NoW), DPI (Fisheries), GLC, KGLL, MCW
44 Explore and implement opportunities to build the capacity of rural lifestyle and absentee landholders to protect, maintain and restore catchment health. Opportunities could include: <ul style="list-style-type: none"> • the introduction of mentoring programs, the promotion of local champions and the development of focus groups • development of NRM information packages for rural lifestyle properties • encouragement of real estate agents to provide a package of 'Small Property Management' to potential buyers of rural lifestyle land • provision of information to new property owners through the Council's rating system 	LLS, DPI (Ag), DPI (Fisheries), GLC, KGLL, Local Landholders
Heritage and Culture	
45 Where activities are being proposed or undertaken, identify, monitor and protect sites of known significant Aboriginal and European heritage, and where there is uncertainty about the value of culture and heritage, adopt a precautionary approach	GLC, NPWS, DPI (Crown Lands), LLS, OEH, KLALC
46 Engage with local Aboriginal communities to identify key water and landscape related environmental, social, cultural and economic values and priorities for protection	KLALC, OEH, NPWS, LLS, DPI (Marine Parks), GLC
47 Incorporate information regarding local Aboriginal people's cultural history and their connections to land and water into educational material—the material to be used by the local community and visitors to the catchment	KLALC, OEH, NPWS, LLS, DPI (Marine Parks), GLC
48 Engage with local Aboriginal communities to incorporate, where appropriate, traditional land management knowledge into NRM programs	OEH, GLC, KLALC

MANAGEMENT ACTIONS - RESILIENT ECOSYSTEMS

Management Actions	Participating Partners
Landscape & habitat connectivity	
49 Implement the Tops to Lakes Initiative; monitor and report on outcomes; review and update, as necessary	GLC, LLS
Protect , maintain and restore native vegetation	
50 In collaboration with private landholders, utilise incentive and engagement mechanisms to protect and rehabilitate threatened species, ecological communities, areas of high biodiversity values, and to create vegetation corridors	LLS, DPI (Fisheries), GLC, KGLL, Local Landholders
51 Continue to investigate and implement opportunities to protect, restore and rehabilitate ecological values of State Forest	Forestry Corporation
52 Investigate and implement opportunities to foster the active management of native vegetation on private land for multi-use outcomes, which include the maintenance and restoration of biodiversity and protection water quality values. Opportunities could include carbon farming and timber production	LLS, Local Landholders, DPI (Ag) Hunter Farm Forestry Network
53 Support management of private native forests in accordance with Forest Stewardship Council Codes of Practice. Develop and implement an ecological thinning code of practice for even-aged derived forests to optimise production and biodiversity outcomes	LLS, DPI (Ag), GLC, Local Landholders
Pest Plants and Animals	
54 Eradicate weeds of national significance and environmental weeds that have a limited distribution within the Karuah River Catchment	MNCWCC, GLC, PSC, LLS, Forestry Corporation, NPWS, Duralie Coal, Hunter Water, Local Landholders
55 Continue to work with local landholders and the community to strategically control and reduce weed impacts on farming land and in the natural environment	MNCWCC, GLC, LLS, Local Landholders
56 Work collaboratively with multiple landholders and agencies to establish a prioritised and cross-tenure approach to monitoring and managing terrestrial vertebrate pests within the Catchment (and across the Great Lakes LGA). The approach should be consistent with state and regional management plans and priorities	MNCWCC, GLC, LLS, OEHL, DPI (Ag), Forestry Corporation, NPWS, Crown Lands, Local Landholders
57 Work collaboratively with multiple landholders and agencies to establish a prioritised and cross-tenure approach to managing invasive weeds within the Catchment (and across the Great Lakes LGA). The approach should be consistent with state and regional management plans and priorities	MNCWCC, GLC, PSC, LLS, OEHL, DPI (Ag), Forestry Corporation, NPWS, Crown Lands, Local Landholders

MANAGEMENT ACTIONS - RESILIENT ECOSYSTEMS

Management Actions		Participating Partners
Estuarine and instream habitat		
58	Protect, maintain and restore habitat adjoining marine sanctuary areas within the Karuah River Catchment to complement aquatic and terrestrial biodiversity conservation	DPI (Marine Parks), LLS, DPI (Fisheries), OEH, NPWS, Forestry Corporation, NPWS, GLC, PSC, Crown Lands
59	Install and maintain effective fish-ways that are in line with identified DPI (Fisheries) priorities	DPI (Fisheries), GLC
60	Investigate options for the monitoring of the recreational fishing catch	DPI (Fisheries), Fishing Clubs
61	Undertake a platypus community awareness program and platypus status assessments	MCW, Manning Great Lakes PACT, GLC, OEH, Local Landholders
62	Promote the importance of seagrass, saltmarsh, mangrove and other aquatic habitats, and promote their protection to stakeholders and the general community	DPI (Marine Parks), DPI (Fisheries), GLC
Inappropriate Fire Regimes		
63	Encourage landholders to undertake bushfire management training, such as the 'Hotspots Program', to encourage burning regimes sensitive to ecological needs	NSW Rural Fire Service, Nature Conservation Council NSW, LLS, Lower Hunter BFMC, Local Landholders
64	Maintain ecological burning programs to promote critical ecological processes and minimise the risk of high intensity wildfire	Forestry Corporation, NPWS
Roadside management		
65	Improve the capacity and mechanisms within Council to facilitate improved environmental management and rehabilitation of roadside environments	GLC, PSC, HCED
Biodiversity		
66	Develop and implement an over-arching biodiversity strategy for the Great Lakes LGA. Monitor and report on the implementation of the strategy and coordinate reviews and updates	GLC, HCED, NPWS, OEH, DPI (Fisheries)
67	Ensure that native vegetation clearing on private land (including private native forestry) complies with statutory controls and regulations	OEH, LLS
68	Adopt and implement a model NRM clause for terrestrial biodiversity in the Great Lakes Local Environment Plan (LEP)	GLC, HCED

Management Actions

Participating Partners

Research, mapping and monitoring

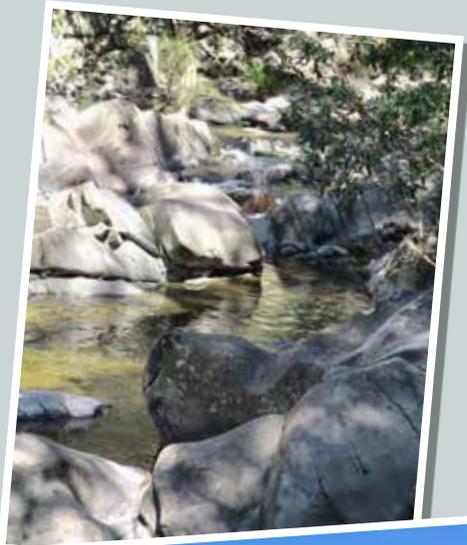
69	Progress the development of a Great Lakes vegetation classification scheme and fine-scale, accurate vegetation community mapping. Review and update as necessary	GLC, HCED
70	Explore and implement collaborative opportunities to expand and coordinate flora, fauna, and endangered ecological community monitoring to be undertaken by individual stakeholders	GLC, HCED, Forestry Corporation, NPWS, Duralie Coal, OEH, Research Institutions
71	Develop and implement a strategic biodiversity and assessment program to monitor and assess the effectiveness of pre-harvesting ecological mitigation strategies. Amend ecological management programs as appropriate	Forestry Corporation
72	Develop a Great Lakes Catchment Landscape Report Card: (a) utilising tools such as Land for Wildlife and native vegetation condition assessments, and (b) report on Landscape Condition to the community and stakeholders every five years.	GLC, HCED, LLS
73	Continue to investigate the threats posed to different landscapes and ecosystems by climate change and sea level rise, as well as the implementation of mitigation and adaptation options	LLS, NPWS, OEH, Crown Lands, DPI (NoW), DPI (Fisheries), DPI (Marine Parks), Research Institutions

"Healthy catchment = resilience = healthy community"

KARUAH RIVER Catchment Management Plan SNAPSHOT

For further information, please see the Karuah River Catchment Management Plan. Copies are available on the Council's website: www.greatlakes.nsw.gov.au.

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HEALTHY CATCHMENT, HEALTHY COMMUNITY

Prepared by:

Great Lakes Council
Natural Systems and Estuaries Section

Enquires should be directed to:

Great Lakes Council
PO Box 450
Forster NSW 2428
telephone: (02) 6591 7222
fax: (02) 6591 7221
email: council@greatlakes.nsw.gov.au

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