Department of Primary Industries
Water

Water Sharing Plan for the Nambucca Unregulated and Alluvial Water Sources

Background document

Published by the NSW Department of Primary Industries Water

Water Sharing Plan for the Nambucca Unregulated and Alluvial Water Sources - Background document

First published September 2016

More information:

Rural Water Planning

www.water.nsw.gov.au

Cover image: South Creek at Bowraville courtesy DPI Water Hydrometrics Unit

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Introduction

Water sharing plans are being progressively developed for rivers and groundwater systems across New South Wales following the introduction of the *Water Management Act 2000* (WMA 2000). These plans protect the health of our rivers and groundwater while also providing water users with perpetual access licences, equitable conditions, and increased opportunities to trade water through separation of land and water.

The first water sharing plans commenced in July 2004 covering 31 water sources and bringing around 80% of water extracted in NSW under the management and licensing provisions of the WMA 2000. By the end of 2012, over 95 per cent of all water extracted in NSW was covered by a water sharing plan. By the end of 2016 it is anticipated that all extraction in NSW will be covered by a water sharing plan.

In recent years, water sharing plans for unregulated[1] rivers and groundwater systems have been completed using a broad scale 'macro' approach based on whole river catchments or aquifer systems. Each macro plan covers a large river basin rather than a single sub-catchment, or in the case of groundwater systems, cover a particular type of aquifer (for example fractured rock). These macro plans generally apply to catchments or aquifers where there is less intensive water use.

The *Water Sharing Plan for the Nambucca Unregulated and Alluvial Water Sources 2016* (hereafter referred to as the Nambucca water sharing plan) covers 10 water sources that are grouped into two extraction management units.

This document provides background to the development of the rules in the Nambucca water sharing plan. It includes information on the purpose of the plan and the policy framework that supports it, a description of the Nambucca catchment including land and water use, and the process of developing the various water sharing rules in the plan. This document is part of a range of material available specifically on the plan including:

- the *Water Sharing Plan for the Nambucca Unregulated and Alluvial Water Sources 2016* - a legal instrument written in its required statutory format
- *An overview of water sharing plans for unregulated and alluvial water sources in coastal NSW*
- Rule summary sheets for each water source detailing the management rules.

General information on the macro planning process is available in the water sharing plans section of the NSW Department of Primary Industries Water (DPI Water) website www.water.nsw.gov.au. This includes:

- *Macro water sharing plans – the approach for unregulated rivers. A report to assist community consultation* – explains the method used to classify and set water sharing rules for unregulated streams across the state
- *Macro water sharing plans – the approach for unregulated rivers. Access and trading rules for pools* – explains the method used to set access and trading rules for pools in unregulated water sources across the state
- *Macro water sharing plans – the approach for groundwater. A report to assist community consultation* – explains the method used to classify and set water sharing rules for groundwater across the state

[1] The supply of water in unregulated rivers is typically not controlled by releases of water from dams but rather is dependent solely on rainfall and natural river flows.

- *Setting rules for water sharing plans* – information outlining the key steps for developing the rules.

Purpose of the plan

Why are water sharing plans being prepared?

Expansion of water extraction across NSW in the 20th century has placed most valleys at or close to the limit of sustainable water extraction. This has seen increasing competition between water users (towns, farmers, industries and irrigators) for access to water. This has also placed pressure on the health and biological diversity of our rivers and aquifers.

In December 2000, the NSW parliament passed the WMA 2000 which has the overall objective of "sustainable and integrated management of the State's water for the benefit of both present and future generations" (DLWC 2001). Water sharing plans play a major role in achieving this objective by providing a legal basis for sharing water between the environment and consumptive water users.

Under the WMA 2000, water sharing plans must protect water sources and their dependent ecosystems, and must protect the basic rights of landholders to extract water. In this way, environmental water and basic landholder rights are afforded priority over licensed water extractions. Among licensed water users, priority is given to water utilities and licensed stock and domestic use, ahead of commercial purposes such as irrigation and other industries.

Water sharing plans also recognise the economic benefits that commercial users such as irrigation and industry can bring to a region. When a plan commences, access licences held under the *Water Act 1912* are converted to access licences under the WMA 2000 which separates the water licences from land tenure. This facilitates the trade of access licences and encourages more efficient use of water resources. It also allows new industries to develop as water can move to its highest value use.

In conjunction with the WMA 2000, water sharing plans also set rules so that commercial users can continue to operate productively. In general, commercial licences under the WMA 2000 are granted in perpetuity, providing greater commercial security of water access entitlements. Water sharing plans define the access rules for commercial users for 10 years providing all users with greater certainty regarding sharing arrangements.

Benefits for water users

The introduction of water sharing plans will benefit water users by providing:

- greater certainty by setting water sharing arrangements for a 10 year period
- clear trading and access rules which will help foster trading of water
- greater security with existing water licences converted to perpetual water access licences under the WMA 2000.

Environmental considerations

Water sharing plans are required to reserve water for the overall health of the river and to protect specific ecosystems that depend on river flows, such as wetlands, lakes, estuaries and floodplains. This share of water reserved for the environment is also intended to sustain the river system's aquatic fauna and flora. The Nambucca water sharing plan sets rules for unregulated streams and alluvial aquifers in the plan area. The scope of the plan is discussed later.

Unregulated streams

Rivers naturally experience a range of flows which are necessary for different hydrologic, geomorphic, biological and chemical processes to occur. Flood flows are required to scour channels, rework sediments, and inundate floodplains; medium flows oxygenate water and allow fish passage; and low flows maintain connectivity and assist the survival of aquatic and riparian flora and fauna. To preserve a healthy river system this range of stream flows must be maintained.

In order to protect a proportion of these flows for the benefit of the environment, water sharing plans impose new access restrictions on days when stream flows are low. This is achieved by establishing cease-to-pump rules that require users to stop taking water when flows fall below a set level.

Each water source in the Nambucca plan area has been classified as having high, medium or low instream values. Water sources with high instream value are protected through the plan by not allowing any water licences to be traded into the water source. Trades are allowed into some water sources with lower value in order to encourage the movement of extraction from higher to lower environmental value areas.

Alluvial aquifers

Aquifers are underground layers of water-bearing permeable rock or unconsolidated materials (gravel, sand, silt or clay) from which groundwater can be extracted. Aquifers can store large volumes of water, often accumulated over thousands, or tens of thousands of years. Water enters (or recharges) aquifers via rainfall, surface flows from rivers and lakes, or flow from adjacent aquifers. Water sharing plans aim to achieve sustainable groundwater extraction by limiting extractions to a proportion of the aquifer recharge. The remainder of the recharge is reserved for the environment.

The Nambucca water sharing plan defines cease-to-pump rules for alluvial aquifers in the plan area. It also includes rules on the location of new works and extraction from existing works to protect high priority groundwater dependent ecosystems and other environmentally sensitive areas such as rivers or streams.

Water sharing rules for fractured rock and porous rock aquifers are dealt with in the *Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016.* Water sharing rules for coastal sand aquifers in the plan area are included in the *Water Sharing Plan for the North Coast Coastal Sands Groundwater Sources 2016.*

Objectives of the plan

The objectives of the Nambucca water sharing plan are to:

a) protect, preserve, maintain and enhance the important river flow dependent and high priority groundwater-dependent ecosystems of these water sources

b) protect, preserve, maintain and enhance the Aboriginal, cultural and heritage values of these water sources

c) protect basic landholder rights

d) manage these water sources to ensure equitable sharing between users

e) provide opportunities for enhanced market based trading of access licences and water allocations within environmental and system constraints

f) provide water allocation account management rules which allow sufficient flexibility in water use

g) contribute to the maintenance of water quality

h) provide recognition of the connectivity between surface water and groundwater

i) adaptively manage these water sources

j) contribute to the “environmental and other public benefit outcomes” identified under the “Water Access Entitlements and Planning Framework” in the *Intergovernmental Agreement on a National Water Initiative (2004)*.

Scope of the plan

The Nambucca water sharing plan covers two discrete water resources: unregulated rivers and alluvial groundwater. Since there are no regulated rivers in the plan area, the water sharing plan applies to all rivers in the plan area.

Incorporating both the surface and groundwater resources into the one plan recognises their interaction and allows for the development of water sharing rules that are linked and are equitable within and between these resources.

Water sharing plans divide plan areas into several “water sources”, which usually coincide with sub-catchment boundaries. Access and trading rules are developed for each of these water sources. If water sharing rules need to be more refined, water sources may be divided into management zones. Conversely, rules about annual extractions are generally made at a broader scale within Extraction Management Units (EMUs), which usually consists of several water sources.

The Nambucca water sharing plan defines two EMUs through which eight unregulated water sources are managed:

Nambucca River Extraction Management Unit:

- Buckrabendinni Creek Water Source
- Coastal Nambucca River Water Source
- Missabotti Creek Water Source
- North Arm - Nambucca River Water Source
- South Creek Water Source
- Taylors Arm Water Source
- Warrell Creek Water Source

Deep Creek and Oyster Creek Extraction Management Unit:

- Deep Creek and Oyster Creek Water Source.

The plan also includes one groundwater source, the Coastal Nambucca Floodplain Alluvial Groundwater Source, through which alluvial aquifers on the lower floodplain are managed.

The location and extent of these water sources and EMUs are shown on the map in Appendix 1.

Policy framework

A number of national, state and regional plans and policies guided the development of water sharing plans for the NSW North Coast, including:

- *Water Management Act 2000* (WMA 2000)
- Access Licence Dealing Principles Order 2004
- National Water Initiative
- Natural Resource Commission state-wide targets
- Northern Rivers Catchment Action Plan
- Water planning policies and other considerations.

The Water Management Act 2000

The WMA 2000 is based on the concept of ecologically sustainable development i.e. managing current development so that it will not threaten the availability of resources for future generations. The WMA 2000 recognises the need to allocate water for the environmental health of our rivers and groundwater systems, while also providing licence holders with more secure access to water and greater opportunities to trade water through the separation of water access from land title.

Water sharing plans are the main tool through which the WMA 2000 achieves its objective. The major changes required to water management have meant that the WMA 2000 has been progressively implemented, and the *Water Act 1912* progressively phased out as water sharing plans commence.

The latest copy of the WMA 2000 is available from the NSW government legislation website.

Access Licence Dealing Principles

The Access Licence Dealing Principles Order 2004 (hereafter referred to as the Dealing Principles) draws on the objects and water management principles of the WMA 2000 and provides state-wide guidance and rules for applications to undertake water dealings including trade.

The Dealing Principles specify that dealings must consider:

- the impacts on other water users
- the impacts on the water source
- the impacts on indigenous, cultural, heritage and spiritual matters
- maximising social and economic benefits.

The Dealing Principles specify rules for different types of dealings (such as conversion to a new category, subdivision, consolidation, assignment of rights or allocation, changing water sources, amending extraction components and interstate dealings). They specify the requirements that must be met for a dealing to be permitted, and the conditions under which dealing is prohibited.

Water sharing plans must be consistent with the Dealing Principles. Water sharing plans can also put additional restrictions in place such as restricting trade into a particular area due to its environmental values or hydrologic stress.

National Water Initiative

The National Water Initiative (NWI) was signed by the Council of Australian Governments (COAG) in June 2004. Through the NWI, governments across Australia, including NSW, have agreed on actions to achieve a more cohesive national approach to managing, measuring, planning, pricing and trading water. The NWI recognises the continuing need to

increase the productivity and efficiency of Australia's water use, whilst servicing rural and urban communities, and ensuring the health of river and groundwater systems.

The NWI sets out guidelines, outcomes and timelines for water plans and planning processes. Until 2014 the NWI was implemented and monitored by the National Water Commission, an independent statutory body responsible for providing advice to COAG on national water issues. The Commission was responsible for undertaking a biennial assessment of each state's progress with implementing the NWI. The role of the National Water Commission will cease in December 2014 and some of its water management functions will be transferred to other agencies.

Natural Resource Commission targets

The Natural Resource Commission (NRC) was established in 2003 to provide the NSW Government with independent advice on natural resource management issues. To achieve this, the NRC has developed a Standard for Quality Natural Resource Management, along with 13 state-wide targets for natural resource management which have been embedded in the NSW State Plan. The standard is designed to apply to natural resource management at all scales including at the state, regional, catchment and local level.

The NRC's standard requires the use of the best available knowledge, appropriate information management systems, delivery of integrated outcomes, engagement of the community and regular monitoring, measuring, evaluation and reporting to specify how delivery of the targets are progressing. The NRC reviews water sharing plans against this standard and its associated targets. In 2013 the NRC reviewed 31 water sharing plans that were due to expire in 2014 and provided advice to the Minister for Primary Industries. A further seven water sharing plans were reviewed by the NRC in 2015.

In 2012 the NRC reviewed the state-wide standard and targets, including monitoring, evaluation and reporting arrangements in NSW. They recommended five new state-wide targets that provide a sharper focus on the key long-term issues of concern to the Government and community and revised the monitoring, evaluation and reporting strategy to support the implementation of the new targets.

Catchment Action Plan

Catchment action plans are statutory, non-regulatory plans that were previously prepared by the state's catchment management authorities under the *Catchment Management Authorities Act 2003* (now repealed). In January 2014 the NSW Government established Local Land Services and transferred the functions of catchment management authorities into this new organisation to provide agricultural support, natural resource management and emergency management to rural communities through a single organisation. The Northern Rivers Local Land Services (LLS) will be responsible for continuing the delivery of natural resource management programs in the Nambucca region.

The Northern Rivers Catchment Action Plan 2013-23 (Northern Rivers CMA 2013) sets targets for natural resource management and sustainable agriculture in the Northern Rivers region over the next 10 years. The plan was approved by the Minister in 2013 following significant community input and effort. Implementation of the plan will continue to be a priority for Northern Rivers LLS and will form a transitional strategic plan for the natural resource management component of Local Land Services operations.

The objectives of the water sharing plan are consistent with Strategy 2.1.10 of the CAP which is to *"Investigate and implement appropriate and sustainable environmental flow management to improve water quality, water quantity and aquatic habitats".*

Water planning policies and considerations

A number of policies and guidelines have been developed since commencement of the WMA 2000. These policies have arisen in response to specific water management issues

that need to be considered during the development of water sharing plans. These policies directly influence the planning process and the formulation of water sharing rules.

Protecting pools, lagoons and lakes

Pools in NSW can provide an important source of water for licence holders, landholders and communities. Pools also have a key ecological function as a critical refuge and habitat for flora and fauna. For the purpose of this policy a pool refers to any lentic water bodies (standing water) within or associated with unregulated rivers in NSW, including water bodies that fall within the definition of a lake according to the Dictionary of the WMA 2000 (the exception is tidal pools and estuaries).

The policy document *Macro water sharing plans – the approach for unregulated rivers. Access and trading rules for pools* can be found on the DPI Water website www.water.nsw.gov.au. This document provides guidance for Interagency Regional Panels in setting water access and trading rules for pools that are covered by unregulated river water sharing plans.

The general approach is to establish a default access rule where no draw down is allowed below full pool capacity for the majority of pools. This default rule may be reviewed where it is justifiable and feasible to do so, to allow limited access to pools based on local hydrological, environmental and socio-economic considerations.

Default rules vary depending on the pool type. Generally the default rule for artificial pools is to adopt the existing licence conditions; however in some circumstances where this may not be appropriate, alternate rules will need to be developed. For natural pools, the default rule requires users to stop pumping when the pool is less than its full capacity (approximated by the greatest pool volume at which there is no visible flow leaving the pool).

The plan process does allow for more lenient access rules to be set if the default rules would significantly impact on current irrigation operations.

Managing surface water and groundwater connectivity

A key objective of the NWI is ‘recognition of the connectivity between surface and groundwater resources and connected systems managed as a single resource’. Most alluvial aquifers have a relatively high degree of connectivity with their associated surface water sources. Accordingly, most alluvial water sources are included in a water sharing plan that covers both surface water and its connected alluvial groundwater. Conversely, most porous rock, fractured rock and coastal sands aquifers are considered to have a lesser degree of connectivity and are included in groundwater-specific plans.

The document *Macro water sharing plans – the approach for groundwater. A report to assist community consultation* provides further information about the principles used to develop water sharing rules for groundwater sources.

Protecting basic landholder rights

As defined under the WMA 2000, basic landholder rights (BLR) consist of domestic and stock rights, harvestable rights and native title rights. Water may be extracted under these rights without the need for a water access licence; although where groundwater is accessed under a domestic and stock right, the bore must still be approved by the DPI Water.

The WMA 2000 requires that water sharing must protect BLR. The plan does this by identifying the requirements for domestic, stock and native title rights at the start of the plan and considering these requirements when designing the rules for licensed water extraction. Because the access rules for licensed extraction do not apply to BLR, extractions taken under BLR are afforded higher priority than licensed extractions.

The requirements of harvestable rights have been inherently considered in the water sharing process, as access rules are based on river flows that result after harvestable rights

extractions have occurred. There are currently no extractions for native title rights, however the plan allows for these rights should they be activated during the plan's ten year term.

Domestic and stock rights can be restricted by the Minister to protect the environment or public health, or to preserve existing BLR. However, these restrictions are outside the framework of the water sharing plan.

The Nambucca water sharing plan provides an estimate of the water requirements for BLR within each water source, noting that these rights may increase during the life of the plan. The water sharing plan cannot limit or restrict these rights, but the WMA 2000 provides for restrictions on BLR through the development of mandatory guidelines.

Protecting town water supply access

Under the WMA 2000, extractions for town water supply are afforded a higher priority than extractions for commercial purposes such as irrigation. Water sharing plans recognise this priority by ensuring that a full share of water is allocated for annual town water supplies except where exceptional drought conditions prevent this. Local water utilities such as local councils are issued with local water utility access licences. The WMA 2000 allows for annual trade but not permanent trade of entitlement between local water utility access licences.

Protecting Aboriginal values

Aboriginal people have a spiritual, customary and economic relationship with land and water that provides an important insight into natural resource management. The NSW Government established the Aboriginal Water Initiative in 2012 to facilitate effective engagement with Aboriginal communities in the water sharing process and ensure that measurable Aboriginal water outcomes are achieved. The Initiative aims to build Aboriginal peoples' capacity to participate as water users, protect their rights to water, maintain a healthy environment, and take full advantage of economic opportunities.

Water sharing plans recognise the importance of rivers and groundwater to Aboriginal culture. The plans will allow Aboriginal communities to apply for water access licences for cultural purposes such as manufacturing traditional artefacts, hunting, fishing, gathering, recreation and for cultural and ceremonial purposes. Aboriginal cultural licences can also be used for drinking, food preparation, washing and watering domestic gardens. These cultural licences are limited to 10 ML per year per application. Opportunity for granting licences for Aboriginal cultural purposes throughout the Nambucca catchment is included in the water sharing plan.

For further information refer to *Our Water Our Country. An information manual for Aboriginal people and communities about the water reform process* which is available from the DPI Water website www.water.nsw.gov.au

Protecting estuary health

Streamflow and groundwater discharge have an influence on many ecological components of an estuary, and play a significant role in the health of these systems. Water extraction from surface water or groundwater sources may have an impact on the ecological health of estuaries. Some estuaries are highly sensitive to freshwater inflows, whilst others are more resilient to changed inflows. The size and shape of estuaries vary and this, combined with the amount of freshwater inputs and extractions, determines the estuary's overall sensitivity to freshwater extraction. Where possible, extractions will be limited in catchments found to be highly sensitive to freshwater inflows.

The document *Macro water sharing plans – the approach for unregulated rivers. A report to assist community consultation* provides further information about the principles used to determine estuary sensitivity to freshwater inflows.

Water interception activities

Changes in land use activities can potentially result in the interception of significant quantities of surface runoff and throughflow. Activities that can impact on water quantity include increased farm dam capacity or the development of significant areas of new forestry plantations in a catchment. Under the National Water Initiative, significant interception activities should be accounted for within a plan's extraction limit.

Water sharing plans cannot restrict the volume of water collected under harvestable rights[2] but can place restrictions on instream dams – dams that are located on streams of third order or higher. Under state-wide policy the construction of new instream dams is prohibited in those water sources in which high instream values have been identified.

Placing restrictions on forestry activities is beyond the scope of the water sharing plan. DPI Water recognises the potential impacts of forestry activities on catchment hydrology and is currently developing state-wide policy in relation to this issue.

[2] The maximum harvestable right dam capacity is calculated based on providing the ability to harvest 10% of the mean annual runoff from the landholder's property. It is determined using a calculator provided on the Office of Water website, with input parameters being property location and property size.

Description of the plan area

Catchment description

The area covered by the Nambucca water sharing plan (Appendix 1) comprises the Nambucca River catchment and adjoining small coastal catchments of Deep Creek and Oyster Creek. It contains a total of 10 surface water sources covering an area of around 1,426 km^2 and one underlying alluvial water source covering 48 km^2 on the north coast of NSW.

The western part of the plan area borders the New England plateau and is dominated by steep slopes and valleys while the eastern part of the plan area is characterised by gentle slopes and river floodplains.

The Nambucca River drains the northern half of the catchment. It is joined near Macksville by Taylors Arm which drains the southern part of the catchment. Warrell Creek also flows from the south and enters the Nambucca estuary near the entrance. The plan area includes two separate coastal catchments to the north of the Nambucca River. Deep Creek is an intermittently open coastal lagoon that drains a catchment of 94 km^2 to the south-west of Valla Beach. North-west of Valla Beach the small catchment of Oyster Creek drains an area of 17 km^2.

The plan area generally aligns with the Nambucca Shire local government area. The major town of Nambucca Heads lies at the entrance of the Nambucca River and has a population of 6,200. Other towns within the plan area are Macksville and Bowraville, both located on the Nambucca River, and the small coastal settlements of Scotts Head and Valla Beach.

The Nambucca River estuary covers around 20% of the catchment area. The tidal waterways of the estuary extend upstream along the Nambucca River to Bowraville, along Taylors Arm to Boat Harbour Road at Utungun, and along Warrell Creek to the Pacific Highway near the hamlet of Warrell Creek.

Since the commencement of European settlement, the Nambucca River has been altered substantially. The channel entrance and main channel have been trained with break walls and have been subject to dredging in the past. Many of the tributaries have been affected by erosion and deposition, gravel extraction and the removal of riparian vegetation (NSC 2011). Due to their accessibility, the riparian zones of the region were originally cleared for their high quality timber, particularly red cedar. The cedar getters were followed by pioneers who extensively cleared the alluvial floodplains for agriculture (NSC 2011).

Water management structures

All of the rivers and creeks in the Nambucca water sharing plan area are unregulated with no major dams for water supply or instream structures. Most water users rely on natural flows for their water supply, although small dams and weirs may be present.

An off-river storage at Bowraville was completed in 2015 to provide drought security for the Nambucca Shire. The storage is filled by pumping from the Nambucca River during times of high flow (see section on local water utility requirements for further information).

Aboriginal history

The Nambucca catchment is the traditional home of the Gumbaynggirr people (north of the Nambucca River) and the Dhanggati people (south of the Nambucca River). Historic recollections indicate that there was at least some seasonal movement in any given year. Coastal visits occurred in late autumn and early winter when the mullet were running and lily-pilly trees were fruiting (Thomas 2013).

Aboriginal life and customs were threatened by the entry of timber cutters to the region. Serious conflicts occurred between the Aboriginal people and cedar cutters at Yarrahapinni and along the Nambucca River in the 1840s (NSC 2003).

Stuart Island was gazetted as an Aboriginal Reserve in 1883 and was occupied for 72 years until 1955 when the island was leased to the present day Golf Club. Aboriginal people on the island were then moved to a new reserve on Bellwood Road. In Bowraville Aboriginal people lived on an unofficial reserve from 1887 up to the 1950s when they were moved to a reserve along Gumbayngirr Road, land now held by the Local Aboriginal Land Council.

There are 256 Aboriginal heritage sites listed within the Nambucca local government area (NSC 2011). These sites include artefact scatters, middens, ceremonial grounds and carved trees.

Early European settlement and land use

Explorer John Oxley surveyed the estuary in 1830. Cedar getters arrived in the valley in the early 1840s although the entrance to the river proved difficult for transporting goods to market. Ships were wrecked or stranded in the harbour for months due to the dangerous sand bar at the river mouth. In the early days of timber getting logs were floated down-river by raft and then hauled along the beach by drays to the Macleay River where they were loaded onto ships.

By 1867 a ferry service had been established across the river to service around 50 people who were living along the Nambucca River at this time. The town of Nambucca Heads originally developed around the inner harbour but was later moved to the top of the hill. The first of several sawmills was built adjacent to the harbour in 1870. The town was surveyed in 1874 and the first blocks of land were sold in 1879. The village of Nambucca Heads was proclaimed in 1885.

To address the on-going difficulties created by the sand bar, work commenced on a breakwater in 1895, enabling ships to travel upriver as far as Macksville. This allowed further opening up of the valley to pastoralism. Dairying emerged as a successful industry in the 1890s and the first butter factory in the valley opened at Macksville in 1903. However the industry declined in the 1930s due to soil depletion, economic depression and a shift to beef cattle.

A horticultural industry developed in the Nambucca Valley during the 1930s, supported by the arrival of the railway in 1933. The railway also encouraged the emergence of Nambucca Heads as a popular holiday destination which continues to this day.

Current land use and community profile

The Nambucca Valley has growing manufacturing, service and retail sectors which support the local region. Together these industries employ around 30% of the valley's population. Health, education and public administration are other major areas of employment within the valley (Bureau of Statistics 2011 Census).

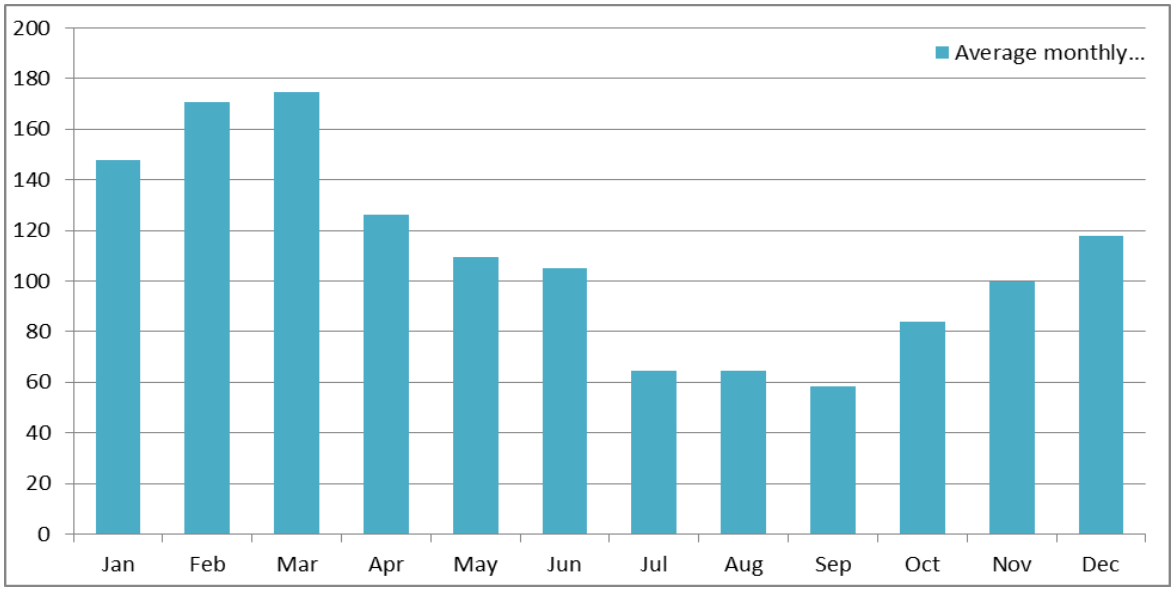
Agricultural activities continue to be an important land use for the valley. The main industries include beef cattle, dairy, and horticulture including fruit orchards, flowers macadamias and vegetables. Recreation and tourism further contribute to the valley's economy (Nambucca Shire Council 2013 – Factsheet).

The 2011 census recorded 18,644 people living within Nambucca Shire. The population of the local government area has grown by 5.8% since 2001. This is consistent with the average population growth for NSW but far less than other north coast local government areas such as Tweed, Port-Macquarie-Hastings and Coffs Harbour (NRCMA 2012).

Climate

The Nambucca catchment is characterised by a sub-tropical climate. The mean annual rainfall is 1,337 mm at Macksville and 1,407 mm on the coast at Nambucca Heads (BOM 2015). Rainfall is highest in summer and autumn with July, August and September being significantly drier than the rest of the year (Figure 1).

Figure 1: Mean monthly rainfall at Macksville



The mean maximum temperature is around 27°C in summer and 18°C in winter while mean minimum temperatures are around 11°C in winter and 19°C in summer (BOM 2015). These figures are measured at South West Rocks, the nearest station recording temperature.

Ecological values

The Nambucca River estuary is a wave-dominated barrier estuary that is permanently open to the sea due to the construction of training walls. Most of its estuarine wetlands are protected under State Environmental Planning Policy 14.

The Nambucca River estuary is used by migratory shorebirds along the East Asian-Australasian Flyway. These birds breed in the northern hemisphere summer and visit Australia and New Zealand in the southern spring and summer. Several species, including Bar-tailed Godwit and Eastern Curlew are regularly observed on the tidal flats around the Nambucca estuary. In total the estuary provides habitat for 33 bird species that are listed in international migratory bird agreements. It also supports a number of vegetation communities that are threatened in NSW including saltmarsh, swamp oak forest and littoral rainforest.

The ecological values and threatened species known or expected to occur in each of the Nambucca water sources are identified in Appendix 2. These species have been considered as part of the macro-classification approach in determining water sources with high environmental values.

Relative to other catchments on the north coast the Nambucca River supports only moderate levels of fish biodiversity with no threatened fish species recorded.

There are eight threatened frog species known to occur within the Nambucca catchment including the Giant Barred Frog, the Sphagnum Frog, the Green and Golden Bell frog and the Green-thighed Frog. Buckrabendinni Creek, North Arm, South Creek and Taylors Arm support the largest numbers of threatened frog species (7-8 species each).

Ten threatened bird species are known to occur within the plan area, with the estuary of the coastal Nambucca Water Source providing the most important habitat for threatened bird

species. Threatened bird species that have been recorded in the plan area include the Black-necked Stork, the Australasian Bittern, the Black Bittern, and the Brolga. The sand island in the middle of the Nambucca estuary is home to a small population of critically endangered Beach Stone-curlew as well as the endangered Pied Oystercatcher which breeds on the island and forages on adjacent tidal flats (NSC undated).

Estuary sensitivity

Estuary specialists from DPI Water and Office of Environment and Heritage (OEH) have assessed each of the state's estuaries to determine how sensitive they are to changes in freshwater inflows (DWE 2009).

The assessment ranks the sensitivity of estuaries based on their physical attributes – size, shape and the ratio of catchment size to the surface area of the estuary. Small estuaries, such as Oyster Creek and Deep Creek tend to be highly sensitive to inflow variations, with both of these being only intermittently connected to the ocean. Barrier estuaries such as the Nambucca estuary are generally less sensitive to inflow variations. As they mature and infill with sediment they tend to be long and narrow 'river' estuaries.

Table 1 lists the sensitivity of each of the estuaries in the plan area. The method used for assessing estuary sensitivity is detailed in '*Macro water sharing plans – the approach for unregulated rivers. A report to assist community consultation*'.

Table 1: Inflow sensitivities for the estuaries within the plan area

Estuary	Inflow sensitivity
Nambucca River	LOW The Nambucca Estuary has low sensitivity to the extractions of low flows
Deep Creek	MEDIUM The Deep Creek Estuary has medium sensitivity to the extractions of low flows.
Oyster Creek	HIGH The Oyster Creek Estuary was assessed to be highly sensitivity to extractions of low flows.

Groundwater

Groundwater aquifers in the Nambucca catchment are found in fractured rock, unconsolidated alluvial sediments and coastal sands.

The catchment is underlain by the fractured rocks of the New England Fold Belt Groundwater Source and this is the most utilised aquifer in the catchment. Aquifers within the New England Fold Belt Groundwater Source are managed within the *Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016*. Small areas of coastal sand aquifers occur in the coastal zone around Nambucca Heads. These aquifers are part of the Bellinger-Nambucca Coastal Sands Groundwater Source which is managed through the *Water Sharing Plan for the North Coast Coastal Sands Groundwater Source 2016*.

Alluvial aquifers associated with the Nambucca River floodplain are managed within the Coastal Nambucca Floodplain Alluvial Groundwater Source as part of the Nambucca water sharing plan. The alluvial deposits generally consist of fine grained sand, silts and clays which are underlain by acid sulfate soils. Groundwater levels are typically close to the surface resulting in a high dependence from groundwater dependent ecosystems. Bore yields are generally low with the main use of the water being stock watering and small scale irrigation.

River flows

There are currently three active gauges within the Nambucca catchment that monitor streamflows on a daily basis (Table 2). These gauges are the flow reference points which are used to define the water sharing rules within the plan.

Historical records are available for some discontinued gauges throughout the catchment, however the continuity of flow records within the Nambucca catchment is generally poor. The longest running gauge in the catchment was established on the Nambucca River at Bowraville in 1959, but was discontinued in 2006 just one month after the current gauge at Bowraville commenced operation.

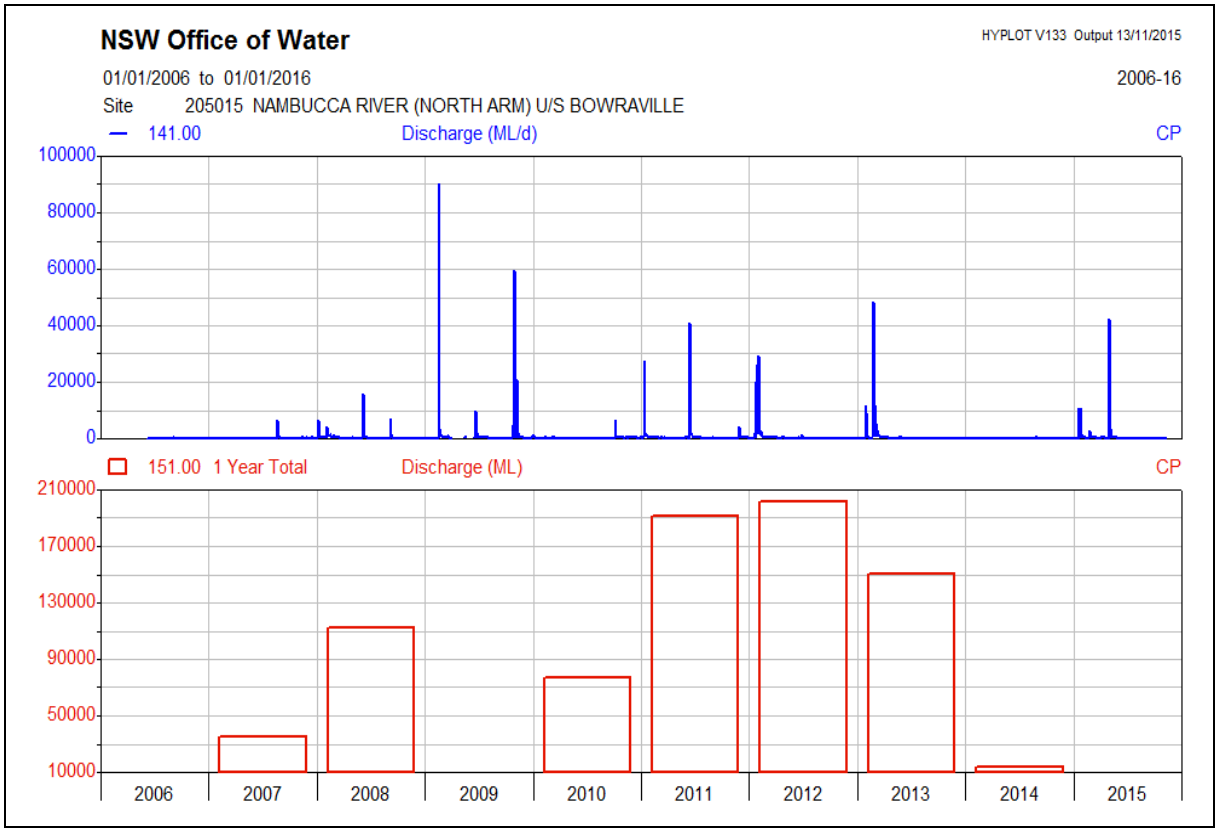
Annual streamflows were the lowest since 2006 when records began on the new gauge on the Nambucca River at Bowraville, with just 14,169 ML recorded. The highest annual flows occurred in 2012 when more than 201,000 ML was recorded (Figure 2).

Small flood events occur in the Nambucca River in most years with peak daily flows generally in excess of 30,000 ML/d (Figure 2).

Table 2: Current river gauges in the Nambucca catchment

Gauge	Location	Catchment area	Mean Annual Flow	Commenced
205015	Nambucca River (North Arm) upstream Bowraville	250 km^2	111,694 ML	02/06/2006
205017	Taylors Arm at Upper Taylors Arm	216 km^2	110,987 ML	17/09/2011
205018	South Creek at Bowraville	89 km^2	53,750 ML	16/07/2011

Figure 2: Daily and annual stream flows in the Nambucca River at Bowraville



Entitlement and water use

At the commencement of the water sharing plan, there were approximately 202 surface water licences in the Nambucca water sharing plan area, totalling 4,952.5 ML of entitlement (Table 3). An additional 5,415 ML of entitlement has been issued for alluvial groundwater licences (Table 4).

There has been an embargo on granting new surface water licences on the north coast since 2007. Alluvial aquifers were embargoed in 2008. The Nambucca water sharing plan assumes full development of all entitlement in setting the extraction limits that form part of the water sharing rules. For the Nambucca water sharing plan the peak demand for all water sources totals 75.8 ML/d.

These figures do not include extractions from the Nambucca tidal pool that are currently not licensed under the *Water Act 1912*. Under the WMA 2000, which takes effect when a water sharing plan commences, any works located in the tidal pool will need to be licensed. Should any unlicensed works be identified DPI Water will determine the associated history of use and establish whether such licences should be granted in the Nambucca River tidal pool.

Water extraction in the unregulated water sources

Water users in the Nambucca catchment have had informal water sharing arrangements in place managed through the Nambucca Water Users and Management Group. These arrangements included cease-to-pump when there was no visible flow in tributaries, and a cease-to-pump of 4 ML/d in the Nambucca River at Bowraville.

Of the total surface water entitlement, 92% is for irrigation, with the remainder used for industrial, stock, domestic and farming purposes. Long-term records of water use are not available as no broad scale metering is yet in place for unregulated catchments on the north coast.

Table 3: Total entitlement and number of licences for each water source at plan commencement

Water source	Surface water entitlement* (ML/yr)	Number of SW licences
Buckrabendinni Creek	450	9
Coastal Nambucca River	673	41
Deep Creek and Oyster Creek	789	35
Missabotti Creek	471	13
North Arm - Nambucca River	965	29
South Creek	382	10
Taylors Arm	646.5	42
Warrell Creek	576	23
TOTAL	**4,952.5**	**202**

* Under the WMA 2000, licences are granted “share component” rather than “entitlement”. The term “entitlement” has been retained in this document due to its common usage. Share component is granted as unit shares for unregulated river access licences, and as ML/yr for local water utility and domestic & stock access licences. For ease of reporting, the total share component has been recorded as ML/yr.

Water extraction in the alluvium

Alluvial groundwater licences are found along the North and South Arms of the Nambucca River and its major tributaries including Warrell Creek, Missabotti Creek, and Taylors Arm. Alluvial sediments within the plan area can be categorised as “upriver alluvium” or “coastal floodplain alluvium”. Upriver alluvium nominally occurs upstream of the tidal limit and is

sandier than coastal floodplain alluvium. Upriver alluvium is managed through the corresponding unregulated water source. Coastal floodplain alluvium occurs on the floodplain of the Nambucca River and is managed through the Coastal Nambucca Floodplain Alluvial Groundwater Source.

The total groundwater entitlement in each water source is shown in Table 4. Of the total groundwater entitlement, 97% is held by Nambucca Shire Council for town water supply. The remainder is used for irrigation, farming, domestic and stock purposes. Although domestic and stock bores need to be licensed, water access licences are not issued for groundwater extracted for domestic and stock purposes.

Table 4: Total groundwater entitlement in each water source at plan commencement

Water Source	Alluvial entitlement (unit shares)
Buckrabendinni Creek	0
Coastal Nambucca River	16
Deep Creek and Oyster Creek	8
Missabotti Creek	32
North Arm - Nambucca River	5,095
South Creek	16
Taylors Arm	36
Warrell Creek	113
Coastal Nambucca Floodplain Alluvial	99
TOTAL	**5,415**

Detailed water use is not available in the alluvial groundwater sources because there is not yet broad scale metering in these water sources. The NSW government is exploring this issue through the Water Use Monitoring Program.

Local water utility requirements

Town water within the plan area is provided by Nambucca Shire Council. Up to 3,100 ML per year is licensed for extraction from eight alluvial bores which are located beside the Nambucca River to the north of Bowraville.

The Nambucca Shire Water Supply System serves around 6,500 properties within the towns of Nambucca Heads, Macksville, Bowraville, Scotts Head, Valla Beach and Hyland Park as well as some rural properties. The gravel beds provide natural filtration of the water and only minimal treatment is required to reach drinking water standards. After treatment the water is pumped to a pair of balance tanks which are located on a high point east of Bowraville. From here the water is gravity fed through 51km of pipes to all the reservoirs in the Shire.

During the extended drought of 2002/2003, increased water restrictions came into place and the existing supply came close to failure prompting Council to activate its drought emergency response strategy. When the drought broke in early 2003 it was estimated that there was between 30 to 60 days' supply of water available. In response Council and the then Department of Energy Utilities and Sustainability commissioned a review of the Nambucca water security requirements based on information obtained during the drought. This review concluded that the Nambucca Water Supply Scheme is highly vulnerable to droughts and additional security was needed as soon as possible.

The new Bowraville off-river water storage aims to secure the Nambucca water supply against drought. It was chosen from a range of alternatives following community consultation in 2006. The project has involved construction of a series of new bores, collection tank, water transfer pipeline, water pumping station and a new water storage all within the Bowraville area. The water storage will be filled by pumping water from an enlarged borefield during times when river flow is not low. Environmental flows will be maintained in the river by feeding the stored water directly into the town water supply system during periods of low river flows.

The first water was pumped to the dam in September 2014 as part of commissioning works on the transfer pump station. During the filling phase Council is required to release a percentage of the runoff from rainfall events to Bowra Creek. Once the dam reaches 60% capacity all runoff water must be released. The new storage was officially opened by the Minister for Infrastructure and Regional Development on 28 February 2015 and named Bowra Dam.

The process of developing the Nambucca water sharing plan

DPI Water is responsible for implementing the WMA 2000, including developing water sharing plans for the state's water resources. DPI Water established several interagency panels to assist with the development of water planning policies and water sharing plans. The preparation of the Nambucca water sharing plan was guided by three panels:

- the State Interagency Panel
- the North Coast Working Group
- the North Coast Interagency Regional Panel.

The role of each of these panels is discussed below.

In summary, the draft Nambucca water sharing plan was prepared based on:

- the indicative rules generated by a risk and values classification (explained later in this section),
- the deliberations of the Working Group and the Regional Panel, and
- feedback from stakeholders during targeted consultation.

The draft plan was publicly exhibited throughout the plan area. Comments and feedback received during the public exhibition period were considered by the Working Group and the Regional Panel in finalising the water sharing plan.

This section describes the panels and briefly discusses the process of developing the Nambucca water sharing plan including the risks and values classification, refining the indicative rules, and the specific outcomes of panel deliberations, targeted consultation and public exhibition.

Full details of the macro-planning approach and the classification method is available in the document *Macro water sharing plans – the approach for unregulated rivers. A report to assist community consultation*. This document is available on the DPI Water website www.water.nsw.gov.au.

State Interagency Panel

The State Interagency Panel has overall responsibility for the strategic direction of water planning in NSW, to ensure that adequate resources are available from each agency and that the varying policy and statutory requirements of the relevant NSW Government agencies are met. The State Interagency Panel also has the role of making water sharing decisions in cases where regional panels cannot reach agreement or where the issue has state-wide significance.

The State Interagency Panel is chaired by DPI Water and comprises representatives from the DPI Water, OEH, LLS (formerly catchment management authorities), and agriculture, fisheries and aquaculture specialists from the NSW Department of Primary Industries (DPI). DPI Water is responsible for the overall project management.

North Coast Working Group

The North Coast Working Group (the Working Group) comprises a range of officers representing the various functions of DPI Water such as plan and policy development, licensing and compliance, hydrometrics and environmental protection. The Working Group was responsible for collating information and developing recommendations to be considered by the Interagency Regional Panel.

Interagency Regional Panel

The North Coast Interagency Regional Panel (the Regional Panel) comprises representatives from DPI Water, OEH, DPI Agriculture and the North Coast LSS (formerly

Northern Rivers Catchment Management Authority) as an observer. Appendix 3 lists the names of panel representatives and their areas of expertise, and also lists relevant colleagues who the panel had access to for specific technical and scientific information.

The key responsibilities of the Regional Panel were to:

- ensure water sharing rules are consistent with state policy
- review the water management units provided by DPI Water
- review economic, social and environmental values and undertake risk and value assessments to classify each unregulated water source
- review existing and generic water sharing rules as to their applicability
- make recommendations on water access and dealing rules for each water source
- assist with consultation on the proposed rules
- review submissions from targeted consultation and public exhibition, and make changes where necessary to the water sharing rules.

The Regional Panel used local knowledge and expertise in developing and recommending the water sharing rules through a consensus decision-making approach.

Water source classification method

In developing water sharing plans for unregulated rivers, DPI Water classifies each water source based on the risks and values of water extraction.

Specifically the classification process involves assessing:

- instream values (such as threatened fish species) and the risk to these values posed by existing or increased extraction
- hydrologic stress, based on the demands for licensed extraction relative to river flows
- the risk to instream values posed by extractions
- extraction value, a qualitative assessment of the economic value of the agriculture which relies on the water licensed for extraction
- the economic dependence of the local community on activities requiring licensed water extraction
- the sensitivity of estuaries to the removal of freshwater inflows.

For the Nambucca water sharing plan, each water source was classified according to these values and risks. The Regional Panel then reviewed these classifications against a range of reference material and data including irrigation data, hydrologic data, aquatic ecology information, fisheries data, and threatened species data. Extraction patterns by local water utilities were also examined. A list of data and reference material that was used by the panel can be found in Appendix 4.

As part of this review, the Regional Panel revised the indicative classifications for several water sources:

- North Arm – Nambucca River Water Source: Risk to instream value from extraction was revised from HIGH to MEDIUM as the high instream values were located upstream of the majority of extractions.
- Taylors Arm Water Source: Hydrologic stress was revised from LOW to MEDIUM following the analysis of updated hydrologic data.
- Taylors Arm Water Source: The risk to instream values from extraction was revised from LOW to MEDIUM due to the presence of high value, geomorphically intact reaches of channel between Upper Taylors Arm and Utungun.

The finalised water source classifications (Appendix 5) were used to generate indicative access and trade rules which provided the basis for deliberations and the development of draft water sharing rules.

Refining the indicative rules

Guided by the indicative access and trade rules, the Regional Panel used local knowledge and expertise to develop the access and trade rules for the draft water sharing plan. Indicative rules were revised based on site specific considerations such as:

- the availability of infrastructure (for example river gauges)
- the availability of management systems (for example ability to manage the rules)
- any existing management rules (for example existing licence conditions or Water Users Association rostering rules)
- whether flow regimes within different areas of a water source required differing management rules for those sub-areas.

For example, water users in the Nambucca catchment have previously recognised the need for a cease-to-pump and have willingly participated in informal water sharing arrangements. These existing arrangements, plus any licence restrictions in place as a result of Land Board hearings were examined by the Regional Panel to determine whether they achieved the required level of environmental protection and provided for BLR.

Consideration was also given to each of the estuaries in the plan area to see if any additional catchment-wide protection was required. The specific requirements of threatened species in relation to reproductive needs, migration or other particular ecological activities were considered where information was available.

Consultation

The draft rules formulated by the Regional Panel have undergone targeted consultation with specific interest groups[3] and water users who had the opportunity to provide input to proposed water management rules before the plan was drafted.

Preparation of the Nambucca Water Sharing Plan commenced in 2006. Draft rules were developed and presented to stakeholders at a series of meetings held in early 2006 as part of the preparation of macro-plans for north coast catchments. Meetings were held on:

- 24 January at Nambucca Heads Golf Club - information for key stakeholder groups
- 10 February at Kempsey Golf Club - Nambucca Shire Council and others (town water supply issues)
- 28 March at Nambucca Entertainment Centre – Nambucca licensed water users (attended by 37 licence holders)
- 8 May – Aboriginal community

Ten submissions were received as a result of these consultations, resulting in a number of changes to the draft rules. However due to state-wide priorities being focussed on the Murray-Darling Basin at this time many coastal plans, including the Nambucca, were put on hold.

Preparation of the Nambucca Water Sharing Plan recommenced in 2014. The working group updated licence information, streamflow data and environmental data and the draft rules from 2006 were reviewed and revised. DPI Water discussed the revised draft rules with water

[3] Targeted consultation refers to informal consultation held with key stakeholders to test the suitability of the proposed water sharing rules and provide feedback on the rules potential impacts.

users of the Nambucca valley at meetings held at Macksville RSL and two landholder properties on 10 March 2015.

The early consultation process in 2006 was facilitated by the Northern Rivers CMA whose role was to ensure that all stakeholders and interested parties had an opportunity to examine and comment on the proposed water sharing rules.

In particular, stakeholders were encouraged to provide:

- feedback on the potential economic and social impacts of proposed rules
- local knowledge and expertise, for example, other natural or socio-economic values that have not yet been considered by the panel
- feedback on the practical elements of the proposed water sharing rules to ensure they are easily implemented by the licence holders. This included the suitability of the proposed water sources and management zones, flow reference points and access and trading rules where significant changes were proposed from current management.
- confirmation that there were no unintended outcomes from the plan
- specific comments on the Minister's notes included in the draft water sharing plan.

The following organisations were consulted during the targeted consultation process:

- Nambucca Shire Council
- NSW Farmers – Nambucca Valley Branch
- Nambucca Valley Landcare
- Aboriginal communities

Public exhibition

Public exhibition is the formal exhibition of a draft water sharing plan where the Minister invites submissions on the draft plan and in particular seeks comment on a range of key issues. The draft Nambucca water sharing plan was on public exhibition from 30 November 2015 until 1 February 2016 with the plan documents available for viewing at four locations in the region (LLS at Coffs Harbour, DPI Water at Kempsey, Nambucca Shire Council at Macksville, and Nambucca Landcare at Bowraville). Licence holders were sent letters advising of the public exhibition period.

The objectives of the public exhibition were:

- to provide background to stakeholders as to why the water sharing plan was being developed, how it had been developed to date, what rules were proposed in the various areas and how stakeholders could provide feedback
- to formally consult with a broad range of stakeholders to explain the proposed water sharing rules and how they would be implemented
- to seek feedback in writing from stakeholders and the general community about the proposed water sharing rules.

During the exhibition period members of the public were invited to attend individual appointments to seek clarification about any aspect of the plan or discuss particular rules that might affect their operations. Three people took this opportunity while others were able to have queries addressed through phone calls.

In response to a request from NSW Farmers – Nambucca Valley Branch, DPI Water offices met with six water users on 11 March 2016 to discuss several water management issues, some pertaining to the water sharing plan, but some outside the scope of the water sharing plan.

Eight written submissions were received from stakeholders including landholders, water users, environmental groups and Nambucca Shire Council. The main issues raised in the submissions related to cease-to-pump rules. The Regional Panel considered all of the issues raised in written submissions and those voiced at public consultation meetings. A summary of these issues and the resulting outcomes and decisions of the Panel are presented in Appendix 6.

Water sharing rules

The Nambucca water sharing plan establishes a framework for water sharing that defines:

- planned environmental water to protect instream environmental values
- water that is required to meet BLR
- water that is required to meet licensed water extraction (including domestic and stock, local water utilities, unregulated river access licences and aquifer access licences)
- extraction limits and available water determinations (AWDs) for each water source
- rules for granting access licences
- rules for water allocation account
- flow classes and daily access rules for managing licensed extraction from unregulated rivers and alluvial aquifers
- rules for water supply work approvals
- access licence dealing rules, which control the trade of water within the plan area.

The following section provides further background on each of these components, and outlines the information and methods used in developing the specific water sharing rules.

Planned environmental water

The water sharing plan identifies and protects water for environmental purposes in each water source. This is defined as 'planned environmental water' and consists of water that is remaining within the stream or aquifer after water has been taken for BLR and access licences in accordance with the rules of the plan.

In unregulated streams planned environmental water is generally delivered through two mechanisms:

- On a daily basis environmental water is protected through the implementation of cease-to-pump rules which are applied to water access licences.
- On an annual basis environmental water is protected through the establishment of long term average annual extraction limits.

The Regional Panel has set cease-to-pump rules for each water source in the Nambucca catchment which are discussed in the section on daily flow rules. For water sources where cease-to-pump rules could not be practically linked to a gauging station, the plan applies simple visual rules to protect environmental water such as a 'no visible flow' rule, and no pumping from instream or off-river pools when the pool is less than full capacity.

For the Coastal Nambucca Floodplain Alluvial Groundwater Source the planned environmental water is equal to 5,635 ML and is comprised of:

- 100% of rainfall recharge generated over areas of high environmental value (918 ML)
- A minimum of 75% of rainfall recharge generated over the remainder of the aquifer (4,717 ML). At the start of the plan this figure equates to 86% of rainfall recharge (6,289 ML), however should unassigned water be allocated during the life of the plan the planned environmental water will be reduced to a minimum of 75% of rainfall recharge over areas that are not high environmental value.

Requirements for water

The water sharing plan defines all of the licensed and unlicensed requirements for water within the Nambucca water sources.

Basic landholder rights (comprising domestic and stock, and native title rights) must be provided for and protected within a water sharing plan. The water sharing plan provides an

estimate of the water requirements for domestic and stock rights within each water source. BLR requirements were estimated using the number of properties with river frontage in each water source, and estimated water usage based on property size, climatic region and land use.

At the start of the Nambucca water sharing plan:

- BLR were estimated at 743 ML per year
- domestic and stock access licences accounted for 145 ML of entitlement per year
- local water utility access licences accounted for 5,000 ML of entitlement per year
- unregulated river access licences accounted for 4,894.5 unit shares (a unit share is equivalent to 1 ML in years where 100% of entitlement is allowed to be extracted)
- aquifer access licences accounted for 328 unit shares.

Managing extractions

The Nambucca water sharing plan establishes long term average annual extraction limits (LTAAELs) to manage extractions from surface water resources and alluvial groundwater in each of the EMUs.

The LTAAEL for the Coastal Nambucca Floodplain Alluvial Groundwater Source is 857 ML/year which equates to the current licensed entitlement plus an estimate of future water requirements over the life of the plan.

The LTAAEL for the Deep Creek/Oyster Creek EMU comprises:

- the number of share components in the Deep Creek and Oyster Creek EMU at plan commencement (797 unit shares), plus
- an estimate of BLR in this EMU (59 ML/year).

The LTAAEL for the Nambucca River EMU comprises:

- the number of share components in the Nambucca River EMU water sources at plan commencement (9471.5 unit shares), plus
- an estimate of BLR in these water sources (648 ML/year).

To protect water for the environment and the supply to existing users, it is important to control any growth in water use that is above the LTAAEL. For both of the surface water EMUs and the Coastal Nambucca Floodplain Alluvial Groundwater Source, a reduction in allocated water may be triggered if the average annual usage over any three year period exceeds the LTAAEL by more than five per cent.

Reductions in allocation will be implemented by reducing the available water determination (AWD) which is the basis of crediting water into the water allocation account of each water access licence. The AWD for unregulated river access licences is set at 1 ML per unit share unless a reduction in allocation is required. If a reduction in allocation is required, the AWD for unregulated river access licences will be reduced to less than 1 ML per unit share in order to manage extractions.

Specific purpose access licences such as domestic and stock or local water utility access licences, will be permitted to extract 100% of their share component, except in years of exceptional drought. During periods of extremely low stream flow, daily access rules may limit extraction so that the full annual entitlement cannot be realised.

This approach to managing long term extractions in the Nambucca water sharing plan is the default position adopted for all unregulated rivers across the state.

Granting new access licences

Consistent with the WMA 2000, the Nambucca water sharing plan does not permit the granting of new unregulated river access licences. Any new commercial development must purchase entitlement from existing access licences consistent with the dealing rules defined in the water sharing plan. The water sharing plan does however permit the granting of access licences for Aboriginal community development and Aboriginal cultural purposes.

Aboriginal community development access licences

Many of the rivers in NSW already have a high number of irrigation licences and are generally judged to be stressed, particularly during dry times when river flows are low. This effectively prevents the issuing of any new irrigation licences. However in some coastal rivers, higher and more reliable flows are common and provide an opportunity for licences to be granted for Aboriginal community development activities, provided this additional extraction would not negatively impact on ecological values.

In coastal catchments, Aboriginal community development licences[4] (ACDLs) may be granted which allow water to be pumped from rivers during the high flows and stored in farm dams or tanks, to be used as needed. For the purpose of issuing these licences, high flows are defined as those that are exceeded 50% of the time (the top half of the flow regime).

The North Coast Regional Panel recommended that no new licences be granted in water sources with high conservation value, or in areas that could not support high flow licences. On this basis, the Nambucca water sharing plan has made provision for the granting of ACDLs in the following water sources:

- Buckrabendinni Creek Water Source (up to 127 ML/year)
- Missabotti Creek Water Source (up to 160 ML/year)
- South Creek Water Source (up to 127 ML/year).

The restriction of ACDLs to high flows has been raised as a general issue across all water sharing plans. DPI Water is currently working with the Aboriginal community through the Aboriginal Water Initiative to address these concerns and look at options for allowing limited access to lower flows.

Aboriginal cultural access licences

Aboriginal cultural access licences of up to 10 ML per year may be granted to Aboriginal persons or Aboriginal communities for any personal, domestic or communal purpose such as drinking, washing, gardening, making traditional artefacts, or for recreation or ceremonial purposes. The water sharing plan allows for the granting of these licences in any water source.

High-flow-only access licences

Many of the coastal unregulated rivers within NSW have significant competition for water during dry periods. Therefore, there is merit in developing incentives that aim to move extraction out of the low flows and into the higher flows, to improve environmental conditions and reduce competition. To utilise higher flows, it is generally necessary to construct on-farm water storage. Water can then be pumped during periods of higher flow and stored for use at a later time, therefore enhancing security of supply.

State-wide guidelines recommend that high flow conversions only be adopted in specified water sources if:

[4] These are a sub-category of unregulated river and aquifer access licences called “Aboriginal community development.” This new category of licences is not fully commercial. While they may be temporarily traded, they cannot be permanently traded and as such will remain in the Aboriginal community for the life of the licence.

- the water source is classified as having important instream values at high risk from extraction or in water sources having high hydrological stress
- there are adequate mechanisms in place to ensure the surrendered low flow is reserved for the environment
- there is a no highly sensitive estuary or other identified high flow sensitive feature such as a wetland within the EMU
- there is no significant extraction already occurring in high flow periods
- conversion would not significantly impact on tidal pool users or town water supplies.

The Regional Panel considered these factors in relation to the Nambucca plan area and concluded that the provision for high flow conversions was unlikely to result in any clear environmental benefits and was therefore not warranted for any water sources in the Nambucca water sharing plan.

Water allocation accounts

Water usage by individual licence holders is managed through water allocation accounts. Water is credited to the account when an AWD is made (at the start of the water year), and debited as water is extracted throughout the water year. A licence holder's account is not permitted to go into debit.

Unregulated rivers have enormous variation in annual flow volumes between years. It is important to allow this variability to be reflected in water accounting practices. Unused water allocation may be carried over from one water year to the next. The maximum amount that may be carried over in unregulated river access licence accounts is 100% of the share component, where share component is expressed in megalitres; or 1 ML per unit share, where share component is expressed in unit shares.

Unregulated river access licence accounts are managed under three-year accounting rules, subject to compliance with the daily access rules. AWDs combined with any carryover allowance will enable licence holders to use up to twice their water allocation in a year provided that over a consecutive three year period they do not exceed the sum of their water allocations for those three years.

Flow classes and daily access rules

Following public exhibition and consideration of the issues raised during public exhibition, the water sharing rules were finalised. The rules for several water sources were revised from the indicative rules to reflect discussions with stakeholders and to incorporate feedback from the targeted consultation and public exhibition processes. Specific changes included:

- adoption of less restrictive access rules for Buckrabendinni Creek and South Creek Water Sources; and
- adoption of less restrictive access rules for Taylors Arm Water Source.

The final water access rules including flow classes and cease-to-pump rules are summarised in Table 5. This information may also be found on individual rule summary sheets for the Nambucca plan area that are available on the DPI Water website www.water.nsw.gov.au.

In water sources where the existing cease-to-pump rule under the *Water Act 1912* was more stringent than the proposed rule, the existing access rule was generally adopted. This was based on the premise that with no change to current operations there should be no adverse social or economic impact. This was the case for Buckrabendinni, Taylors Arm and South Creek Water Sources where voluntary restrictions were already in place. In such circumstances the Regional Panel acknowledges that the existing cease-to-pump rules had been negotiated by water users or stipulated as outcomes of Rural Land Board hearings, had

been in place for a period of time; and seemed to be adequately protecting values while providing certainty for water users.

Access to very low flow

Those activities that are considered critical human needs or animal health requirements are permitted to access very low stream flows, that is, flows below the cease-to-pump. Licences with access to very low flows are listed in Schedule 2 of the plan. They include the taking of water for:

- domestic supply (provided not more than 1KL/house/day)
- town water supply
- fruit washing
- cleaning of dairy plant and processing equipment for the purpose of hygiene
- poultry washing and misting
- cleaning of enclosures used for intensive animal production for the purposes of hygiene.

Alluvial licences

For management purposes, the Nambucca water sharing plan will establish a 40 metre wide buffer zone along the river from the high bank. This recognises the strong connectivity between groundwater and surface water at the boundary between the two.

Existing bores located within the 40 metre buffer zone will be managed according to the same daily access rules that apply to surface water licences in the water source. The exceptions are access licences for stock and domestic, local water utility, food safety or essential dairy care purposes which are exempt from these constraints. The access rules summarised in Table 5 will apply to alluvial water users from Year 6 of the plan to allow them to become familiar with the cease-to-pump concept and adjust their management practices.

In addition to the plan rules, alluvial bores may be subject to local impact rules, which are developed to address local groundwater issues, and are implemented through Ministerial Orders.

Table 5: Summary of access rules for the Nambucca water sharing plan

Water source	Flow class	Flow rule	Flow reference point
Buckrabendinni Creek	Not defined	Cease to pump when no visible flow at pump site Access allowed for no more than 8hr/d when flow is less than 3 ML/d	South Creek at Bowraville gauge (205018)
	A Class	No access when the flow is less than or equal to 19 ML/d	
	C Class	High-flow access allowed when flow is greater than 19 ML/d	
Coastal Nambucca River	Not defined	CTP when no visible flow at pump site	Pump site
Coastal Nambucca Floodplain Alluvial	Not defined	No daily access rules	N/A
Deep Creek and Oyster Creek	Not defined	CTP when no visible flow at pump site	Pump site
Missabotti Creek	Very Low Flow Class	No access when flow is less than or equal to 5 ML/d	Nambucca River (North Arm) upstream of Bowraville (205015)
	A Class	Access allowed when flow is greater than 5 ML/d, and less than or equal to 53 ML/d Access allowed for no more than 8 hrs/d when flows are less than or equal to 10 ML/d No access allowed for 24 hours after flows first exceed 5 ML/d following any period of 48 hours or more during which flows were less than or equal to 5 ML/d	
	C Class	High-flow access allowed when flow is greater than 53 ML/d	
North Arm – Nambucca River	Very Low Flow Class	No access allowed when flow is less than or equal to 5 ML/d	Nambucca River (North Arm) upstream of Bowraville (205015)
	A Class	Access allowed when flow is greater than 5 ML/d Access allowed for no more than 8 hrs/d when flows are less than or equal to 10 ML/d No access allowed for 24 hours after flows first exceed 5 ML/d following any period of 48 hours or more during which flows were less than or equal to 5 ML/d	

Water source	Flow class	Flow rule	Flow reference point
South Creek	Not defined	Cease to pump when no visible flow at pump site Access allowed for no more than 8hr/d when flow is less than 3 ML/d	South Creek at Bowraville gauge (205018)
	A Class	No access when the flow is less than or equal to 19 ML/d	
	C Class	High-flow access allowed when flow is greater than 19 ML/d	
Taylors Arm	Not defined	Access allowed for no more than 8 hr/day when flow is less than or equal to 3 ML/d CTP when no visible flow at pump site	Taylors Arm at Upper Taylors Arm gauge (205017),
Warrell Creek	Not defined	CTP when no visible flow at pump site	Pump site

Water supply works approvals

Construction of dams

Consistent with state-wide policy, the Nambucca Water Sharing Plan prohibits the construction of instream dams in the following water sources which have been assessed to have high instream values:

- North Arm - Nambucca River Water Source
- Taylors Arm Water Source

Construction of bores in alluvial aquifers

The Nambucca Water Sharing Plan sets the distances that new bores may be permitted to be constructed from streams, other bores, GDEs and cultural sites. These distance rules were set based on state-wide recommendations.

The plan prohibits new bores within 40 metres of a third order stream or higher, except for bores that:

- are the result of a conversion from an unregulated river access licence; or
- are drilled into the underlying non-alluvial material, and the slotted intervals of the production bore commence deeper than 30 metres; or
- the applicant can demonstrate that the bore will have minimal impact on base flows in the stream.

In relation to distances from other bores, new groundwater bores are not permitted within:

- 200 metres of an approved water supply bore nominated by another access licence
- 200 metres of an approved water supply bore from which BLR is being extracted
- 100 metres from the property boundary unless the owner of the adjacent property consents in writing
- 500 metres from an approved water supply bore that is used by a local water utility or major water utility
- 100 metres from a Department observation or monitoring bore.

These restrictions do not apply if the new bore is solely for accessing BLR, or is replacing an existing groundwater bore or is for the purpose of monitoring or environmental management. The Regional Panel recommended that new bores may be permitted closer than the minimum distances if a hydrologic assessment is undertaken and can demonstrate that the impacts of extraction will be minimal.

The water sharing plan specifies rules for new bores located near high priority GDEs and culturally significant groundwater dependent sites. High priority GDEs are identified in Appendix 4 of the water sharing plan. At the start of the plan they consist of SEPP 14 wetlands in the Nambucca estuary which overly highly connected alluvium. Further GDEs or cultural sites may be identified during the life of the plan. The plan rules state that no new works will be approved within 100 metres of either type of site for bores that supply BLR, and within 200 metres for any new water access licences.

Dealing rules

The objective of dealing rules (trading rules) is to allow the development of a water market whilst recognising and protecting the needs of the environment and third party interests. The NWI has established guidelines for water trading. Trading of water entitlement within the water sharing plan area needs to maximise the flexibility for users to be able to use water to its highest value without having an adverse impact on water sources or existing water users.

The water sharing plan prohibits trade into three water sources and permits trade into five water sources (Table 6).

Alluvial groundwater licences are subject to the same dealing rules as surface water licences, that is, they are not permitted to be traded into areas with high instream values or high hydrological stress. They may be traded between alluvial aquifers, subject to assessment but may not be converted to surface water licences.

Surface water licences are permitted to be converted to alluvial groundwater licences, subject to assessment.

Table 6: Summary of water dealing rules

Water source	Dealing rule	Justification
Buckrabendinni Creek	Trade into water source permitted from Missabotti Creek, North Arm-Nambucca River, and South Creek Water Sources. . Trade within water source permitted, subject to assessment.	Medium instream values and medium hydrologic stress
Coastal Nambucca River	Trade into water source permitted, subject to assessment. Trade within water source permitted, subject to assessment.	Medium instream values
Coastal Nambucca Floodplain Alluvial	Trade into water source not permitted. Trade within water source permitted, subject to assessment.	Medium risk to the environment
Deep Creek and Oyster Creek	Trade into water source not permitted. Trade within water source permitted, subject to assessment.	Small watercourses with considerable level of existing entitlement (high hydrologic stress)
Missabotti Creek	Trade permitted from North Arm-Nambucca River, South Creek or Buckrabendinni Creek Water Sources. Trade within water source permitted, subject to assessment.	Medium instream values
North Arm – Nambucca River	Trade into water source not permitted. Trade within water source permitted, subject to assessment.	High instream values and high hydrologic stress
South Creek	Trade permitted from North Arm-Nambucca River, Missabotti or Buckrabendinni Creek Water Sources. Trade within water source permitted, subject to assessment.	Medium instream values
Taylors Arm	Trade into water source not permitted. Trade within water source permitted, subject to assessment.	High instream values
Warrell Creek	Trade into water source permitted provided there is no net gain in entitlement. Trade within water source permitted, subject to assessment.	Medium instream values but high hydrologic stress

Adaptive management

Adaptive management refers to the practice of change in response to new information such as monitoring or some other improvement in understanding. In the case of water sharing plans, such information could include socio-economic studies, hydrological modelling, ecological studies and information about Aboriginal cultural values.

Adaptive management is a requirement of both the WMA 2000 and the NWI, and has been allowed for during the life of the Nambucca water sharing plan through the inclusion of amendment provisions. These provisions allow some aspects of the water sharing plan to be changed within defined limits. Specific amendment provisions in the Nambucca water sharing plan are discussed below. Following this is a discussion about monitoring, evaluation and reporting which are key activities for the adaptive management of water sharing plans.

Amendment provisions

The Nambucca water sharing plan includes a number of specified amendments that may be made to the plan during its 10 year period of operation. Standard amendments that apply to all water sharing plans include:

- amending water sources, management zones or EMUs
- establishing new or additional flow classes in any water source where management zones are added or amended
- amending water sources for which dams on third order streams or higher will not be granted
- amending requirements for metering or record keeping in relation to licensed access works
- updating information in Schedules or deleting them if no longer required.

The final Nambucca plan also includes a number of amendments that are specific to the Coastal Nambucca Floodplain Alluvial Groundwater Source.

- The plan allows for variation in the amount of long term average annual recharge which is reserved as planned environmental water as a result of updated recharge studies or increases to the LTAAEL for the groundwater source.
- The plan allows modification of the LTAAEL (to a defined upper extraction limit of 1,572 ML/year) as a result of recharge studies or new socio-economic information.

The plan allows for the amendment or establishment of new flow classes, and flow reference points (after Year 5 of the plan) should new gauges be installed in the following water sources:

- Buckrabendinni Creek
- Missabotti Creek
- North Arm – Nambucca River
- South Creek
- Taylors Arm

Monitoring, evaluation and reporting

DPI Water has developed a Monitoring, Evaluation and Reporting Framework in collaboration with key stakeholders. The framework conforms to NSW and Commonwealth government guidelines for monitoring, evaluation and reporting, and demonstrates an adaptive management approach to water planning required under the principles of the WMA 2000. The evaluation framework aims to inform the community of the outcomes of water

sharing plans, and to collate the results of various legislatively required evaluations and relevant knowledge to inform the review of the water sharing plans. The framework will assess the inputs, outputs and outcomes of the water sharing plans and their operations. The assessment will consider:

- the process of plan development (appropriateness)
- the performance of the plan during operation (efficiency)
- the socio-economic, environmental and cultural outcomes of the plan (effectiveness).

The main strategies in place to assist in evaluating water sharing plans include:

- assessment of performance indicators (using an Environmental Flows Monitoring and Modelling program)
- an audit of plans
- review of each plan at the end of its ten year term.

Performance indicators

Part 2 of the water sharing plan includes a number of standard performance indicators that will be monitored over the life of the water sharing plan. It is not practical to monitor all issues in all water sources. The performance indicators identify that monitoring will be undertaken for specific issues in key water sources. The actual procedure for monitoring each indicator may change over the period of the water sharing plan as improved methods are developed.

In order to assess performance indicators, DPI Water has established an Environmental Flows Monitoring and Modelling program which is designed to make the results of environmental flow studies more transferable between water sources and to develop more generic relationships between flow, hydraulics and ecological responses. This will enable a more efficient and effective evidence based approach to support monitoring and evaluation of water sharing plans in NSW.

Audit

The WMA 2000 requires that water sharing plans be audited regularly, at intervals of not more than five years, to determine whether the provisions of the plan are being implemented. Under section 44 of the Act the Minister for Lands and Water must appoint an Audit Panel to undertake this review.

The Audit Panel reflects the membership of the State Interagency Panel and comprises representatives from DPI Water, OEH, DPI and LLS. Representatives from the NSW Natural Resources Commission and NSW Fisheries are invited to participate in the audit process as observers.

Reflecting the requirements of the WMA 2000 the focus of the audit is on the extent to which the provisions in the plan have been implemented. The audit does not attempt to assess the outcomes or effectiveness of the plan in achieving its objectives (this is considered by the DPI Water through its monitoring and evaluation process).

When conducting an audit the panel will review a range of analysis and material provided by DPI Water:

- identify patterns of implementation activities across water source types, across plans and types of water sharing plan provisions
- identify actions required to address instances of partial and non-implementation
- develop broad recommendations for improving the implementation of existing plans and the robustness of new plans
- identify opportunities for linking the audit findings with other related processes, particularly the review of catchment action plan targets.

Plan review

At the end of the water sharing plan's 10 year life the Minister may, on recommendation by the NRC (under Section 43A of the WMA 2000), extend a water sharing plan for another 10 years or replace the plan. An extension does not allow for any changes to the water sharing plan. If any changes are proposed, then a replacement water sharing plan needs to be prepared.

The WMA 2000 requires that when deciding whether to extend or replace an existing plan, the Minister must consider

- the most recent audit of water sharing plans conducted under section 44
- a report from the NRC prepared within the previous five years, on the extent to which the water sharing plan has contributed to relevant state-wide natural resource management standards and targets of the relevant LLS catchment action plan.

Under the WMA 2000 a water sharing plan may be extended for 12 months past the expiry date of the plan to allow for a replacement plan to be prepared.

Glossary

Many of the terms in this document are defined in the WMA 2000 and are therefore not redefined here. However, there are some terms not included in the legislation that are defined below to assist with understanding the water sharing plan.

Account water: The balance in an access licence water allocation account at a particular time. An access licence water allocation account records water allocations accrued under the licence as well as water allocations taken, assigned or re-credited. The operation of the account is also governed by rules for the carrying over of credits from one accounting period to the next and rules for the maximum credit that may be allowed to accumulate in the account as established in a water sharing plan.

Alluvial, alluvium: Sediment deposited by a stream of running water, in particular along riverbeds or floodplains.

Aquifer: An underground layer of water-bearing permeable rock or unconsolidated materials (gravel, sand, silt or clay) from which groundwater can be usefully extracted. The volume of water stored in an aquifer, the rate at which water can recharge, the volume of water extracted from it, and the rate at which water can move through the aquifer are all controlled by the geologic nature of the aquifer.

Conversion factor: The adjustment factor that is to be applied to share components when they are cancelled and reissued in a different water source and vice versa, or as a different category. It is designed to allow movement of water from one water source to another or from one licence category to another whilst minimising the impacts on third parties of such movements. These impacts result in that the value of a unit of share component (in terms of the average water allocations) that result from it may vary from one water source to another or from one licence category to another.

Critical habitat: Areas of habitat (land or water) that are crucial to the survival of particular threatened species, populations or communities.

Cumulative impact: The combined impact of all surface water extraction.

Ecological values: The intrinsic or core attributes associated with naturalness, diversity, rarity and special features, but excluding representativeness used to classify water sources for apportioning water management rules.

Endangered ecological communities: Ecological communities listed in Schedule 1 of the *Threatened Species Conservation Act 1995* or Schedule 4 of the *Fisheries Management Act 1994*.

Ephemeral: Temporary or intermittent; for instance, a creek or wetland which dries up periodically.

Extraction of water: Removal of water from a river for off-stream storage or consumptive use.

Extraction management unit: A group of water sources; defined for the purpose of managing long-term annual average extraction.

Flow classes: The range of daily flow rates in a river which provides the framework for sharing water on a daily basis.

Flow duration curve: A plot that shows the percentage of time that flow in a stream is likely to equal or exceed some specified value of interest.

Flow gauge: A device used to measure the height of a river, from which the flow in the river can be calculated.

Flow reference point: The site from which the flow data is calculated to determine the rates associated with a flow class and then to implement the daily access rules during the life of the plan.

Full capacity: The volume of water that is impounded in the pool, lagoon or lake when the level of water in the pool, lagoon or lake is at the highest water level where there is no visible flow out of that pool.

Groundwater: The water beneath the earth's surface that has filtered down to the zone where the earth or rocks are fully saturated.

Groundwater dependent ecosystems: Ecosystems that rely on groundwater for their species composition and their natural ecological processes.

Individual daily extraction limit (IDEL): The daily volume limit that may apply for a particular licence holder for each flow class. The IDEL will be specified as part of the extraction component on the access licence. It establishes a share of the TDEL for that flow class.

Instream refuge habitat: Stream habitat containing pools that retain water for longer periods of time during drought and low flow. Instream biota will migrate to these more permanent habitats to survive.

Long-term average annual extraction limit (LTAAEL): The target for total extractions (under all water access licences plus an estimate of BLR within an EMU) which is used to assess whether growth-in-use has occurred. The actual annual extractions (metered plus estimated) are averaged over a fixed period of time defined by the water sharing plan when comparing with the LTAAEL. If the fixed period of time is greater than one water year, then in any one water year, extractions can exceed the LTAAEL without triggering a growth-in-use response.

Macro water sharing plans: Plans which apply to a number of water sources across catchments or different types of aquifers. The macro planning process is designed to develop broader-scale plans covering most of the remaining water sources in NSW.

Management zone: An area within a water source used for defining the location of applicability of water sharing rules, but secondary to the water source. A management zone is more likely to be designated where local dealing restrictions are in place or where 'cease-to-pump' rules for works approvals apply.

Pools: Lentic water bodies (standing water), including anything falling within the definition of a "lake" found in the Dictionary of the WM Act, except for tidal pools and estuaries.

Riparian: Relating to or living or located on the bank of a natural watercourse, such as a river or stream.

Total daily extraction limit (TDEL): The total limit on the daily volume of water that access licence holders in a particular category can take from a flow class. It is the sum of all the IDELs in that flow class.

Visible flow: The continuous downstream movement of water that is perceptible to the eye.

Water sharing plan: A plan made under the WMA 2000, which sets out the rules for sharing water between the environment and water users within whole or part of a water management area or water source

Water year: The 12 months running from 1 July to 30 June.

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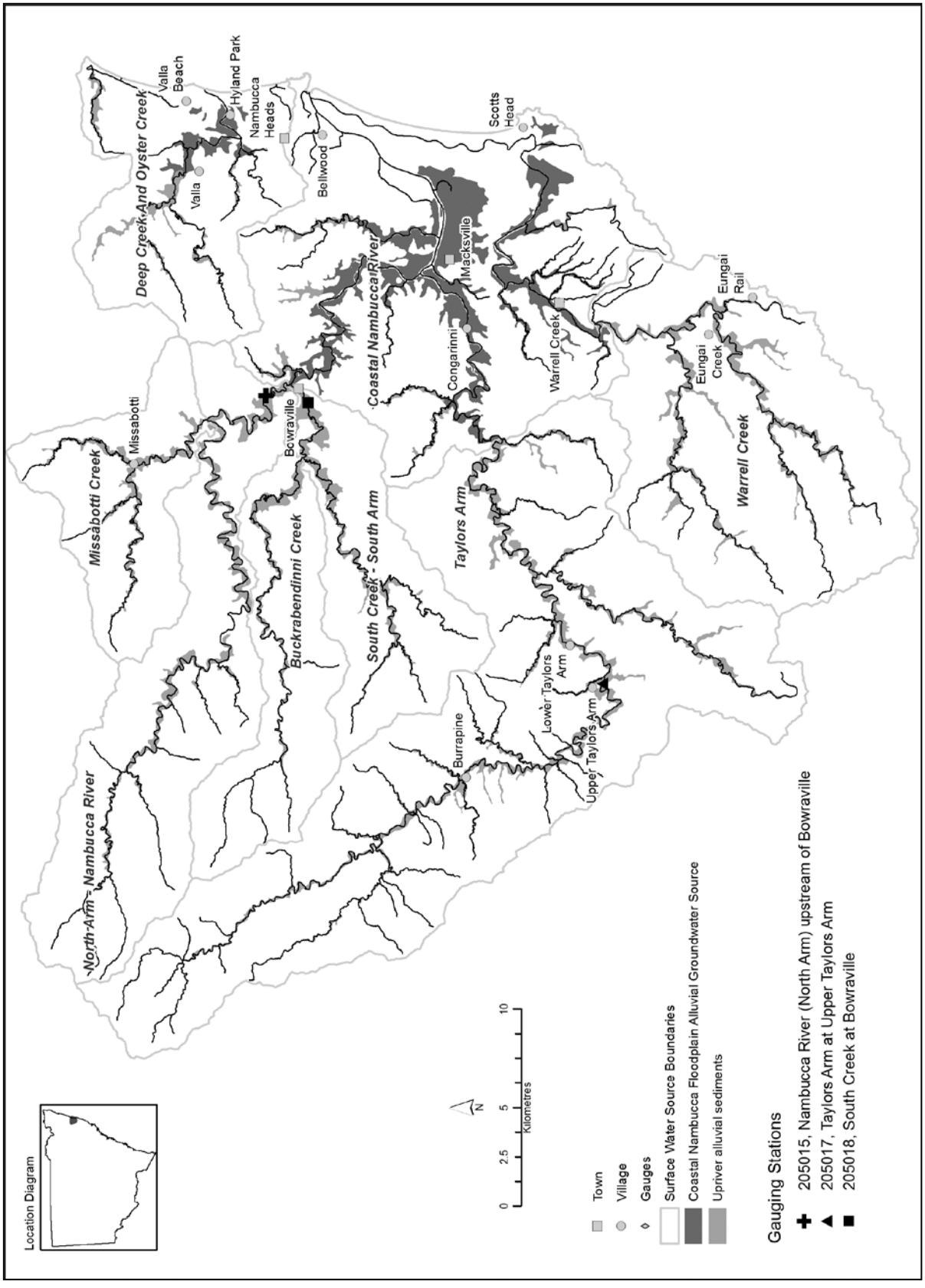
Appendix 1: Water sharing plan map



Appendix 2: Identified threatened species

The macro water sharing plan process is concerned with protecting instream water values that relate to extraction. Therefore, only threatened species that are likely to be sensitive to extraction have been considered when assessing the water source values. It should also be noted that some threatened species are highly sensitive to low flow extraction, whilst other threatened species, such as plants that occur in the riparian zone, are less sensitive. Threatened species considered to be highly sensitive to low flows are given a higher priority for protection.

Table 2A shows threatened species that are known (K) or expected (E) to occur in each of the unregulated water sources.

Table 2A: Threatened species known or expected to occur in the Nambucca unregulated water sources

	Buckrabendinni Creek	Coastal Nambucca	Deep Creek and Oyster Creek	Missabotti Creek	North Arm – Nambucca River	South Creek	Taylors Arm	Warrell Creek
Threatened frog species								
Booroolong Frog	E			E	E	E	E	
Giant Barred Frog	E	E	K	E	K	E	K	K
Glandular Frog	E				E	E	E	
Green and Golden Bell Frog		K	E	K			K	K
Green-thighed Frog	E	E	K	E	E	E	E	K
Sphagnum Frog	K				K	K	K	
Stuttering Frog	E	E	E	E	E	E	K	E
Wallum Froglet	E	E	E	E	E	E	E	E
Threatened bird species								
Australian Bittern		K	K					
Beach Stone-curlew		K	K					
Black Bittern	E	K	K	E	E	E	E	K
Black-necked Stork	E	K	K	E	E	K		E
Brolga		K						
Comb-crested Jacana		K	K					K
Mangrove Honeyeater		K						
Osprey		K	K					
Sanderling		K						
Terek Sandpiper		K	K					
Other fauna								
Large-footed Myotis					K			

Disclaimer:

The Office of Environment and Heritage (OEH) has provided assessments on the presence of threatened species and their sensitivity to extraction to inform the classification of water sources through the macro water sharing planning process. The assessments were undertaken for the specific purpose of developing an initial classification of water sources. They were based on the most accurate and relevant data/ information sourced and analysed at the time.

Initial classifications were a first step to inform panel deliberations. Regional Panels considered a range of information and used local knowledge in determining a final classification. The assessments are not absolute – for example the absence of threatened species for an assessment does not necessarily mean the threatened species are not present.

These assessments should not be used for any purpose other than classification of catchment management units as part of the macro water sharing planning process.

Appendix 3: Interagency Regional Panel and support staff

Table 3A: North Coast Regional Panel-membership and expertise

Name	Agency	Role	Expertise
Rik Whitehead	DPI Agriculture	Agency representative	Knowledge of local and statewide water planning issues
Marcus Riches / Pat Dwyer	DPI Fisheries	Agency representative	Aquatic ecology and knowledge of flow requirements of specific fish species
Tim Rabbidge / David Miller	DPI Water	Agency representative	Knowledge of local and statewide water planning issues
Toong Chin	Office of Environment and Heritage	Agency representative	Knowledge of local and statewide water planning issues

Table 3B: Support staff and expertise

Name	Agency	Role	Expertise
Andrew Craig	DPI Water	Plan coordination	
Peter Hackett		Water licensing	Licensing knowledge, local knowledge of catchment and water management issues
Frances Guest		Plan writer	
Allan Raine		Provide advice about environmental priorities and objectives	Environmental flow requirements
Jeanie Dewhurst		Plan support	
Kristylee Marr		Plan support	

Appendix 4: Reference information used by Interagency Regional Panel

DPI Water data sets

- Licensing Administrator System – the DPI Water statewide database holding the licence details including volume of entitlement, location details and stream orders.
- Hydstra – Hydstra is a DPI Water database that holds all flow data.
- Regional Groundwater Monitoring Network – DPI Water is developing a regional groundwater monitoring network to be used to monitor alluvial groundwater levels and assess stream / surface water connectivity.
- Volumetric Conversion Database – used to help determine the Peak Daily Demand for each water source.
- Regional Geographic Information Systems – DPI Water land use and topographic information

Other data sets

- Stressed rivers reports – used as the basis for identifying where there are instream barriers.
- Threatened species (fish) – Data supplied by DPI Fisheries.
- Threatened species (other) – Data supplied by OEH.
- Index of Social Disadvantage – Australian Bureau of Statistics.
- Employment in Agriculture - Australian Bureau of Statistics

Other agency data

- National Parks and Wildlife (OEH) Wildlife Atlas – statewide flora and fauna database
- DPI Fisheries modelled data sets (Fish Community Index, Fish Community Vulnerability).
- DPI Fisheries freshwater and saltwater recreational fishing database.

Appendix 5: Final classification summary

Table 5A: Value matrix used to determine indicative dealing rules for unregulated water sources

	Low hydrologic stress or hydrologic risk	Medium hydrologic stress or hydrologic risk	High hydrologic stress or hydrologic risk
High Instream Values	**a**	**b** Taylors Arm	**c** North Arm – Nambucca River
Medium Instream Values	**d** Oyster Creek	**e** Buckrabendinni Creek Missabotti Creek South Creek	**f** Deep Creek Warrell Creek
Low Instream Values	**g**	**h**	**i**

* Represents a change to the initial classification based on Regional Panel local knowledge

Table 5B: Risk matrix used to determine indicative access rules for unregulated water sources

	Low dependence on extraction	Medium dependence on extraction	High dependence on extraction
High Risk to Instream Values	**A**	**B**	**C**
Medium Risk to Instream Values	**D**	**E** North Arm – Nambucca River* Buckrabendinni Creek Missabotti Creek South Creek Taylors Arm Warrell Creek	**F** Deep Creek and Oyster Creek
Low Risk to Instream Values	**G**	**H** Coastal Nambucca	**I**

* Represents a change to the initial classification based on Regional Panel local knowledge

Appendix 6: Summary of issues raised during public exhibition of the draft plan

Issue	Concerns raised	Outcomes and decisions
Cease-to-pump rules – Buckrabendinni Creek and South Creek Water Sources	During consultation with licence holders in March 2015, DPI Water proposed that the Cease to Pump (CTP) level for the Buckrabendinni Creek and South Creek Water Sources be set at 2 ML/day at the South Creek gauge. Licence holders expressed concern that a CTP set at this level would be too restrictive and impact businesses.	Upon further review, DPI Water decided that, in light of the short period of record for this river gauge (commissioned 16/07/2011), that a visible flow rule be set for these water sources for the first five years of the plan, with a possible review of the CTP to be conducted if necessary in Year 6.
Cease-to-pump rules – Taylor Arm Water Source	During consultation with licence holders in March 2015, DPI Water proposed that the Cease to Pump (CTP) level for the Taylors Arm Water Source be set at 2 ML/day at the Taylors Arm gauge. Licence holders expressed concern that a CTP set at this level would be too restrictive, and impact businesses.	Upon further review, DPI Water decided that, in light of the short period of record for this river gauge (commissioned 17/09/2011), that a visible flow rule be set for these water sources for the first five years of the plan, with a possible review of the CTP to be conducted if necessary in Year 6.
Cease-to-pump – Bakers Creek	The CTP is relevant to upstream rain events often in the form of storms that can be localised to different catchment areas. Bakers Creek could have flow when the CTP has none or vice versa.	The CTP rule (Years 1 to 5) is visible flow at the pump site so this comment is not relevant unless the CTP level is later revised and linked to stream flow at a gauge.
Town water supply	The draft Plan stated that the local water utility is authorised to take 3,100 ML/year. Nambucca Shire Council's licences were amended in September 2014 to allow an increase in the amount of water to be extracted to 5,000 ML.	The correct extraction limit of 5,000 ML/yr was included in the final Plan.
Other	The Nambucca Valley Water Users expressed concerns that the water sharing plan should not be finalised until a review of the harvestable rights policy for coastal catchments has been conducted.	Water sharing plans only set rules in relation to licensed water usage, so the issue of harvestable rights is outside the scope of the water sharing plan. DPI Water is currently consulting key stakeholder groups, including the Nambucca Valley Water Users, to assess whether a review of the harvestable rights policy is warranted.