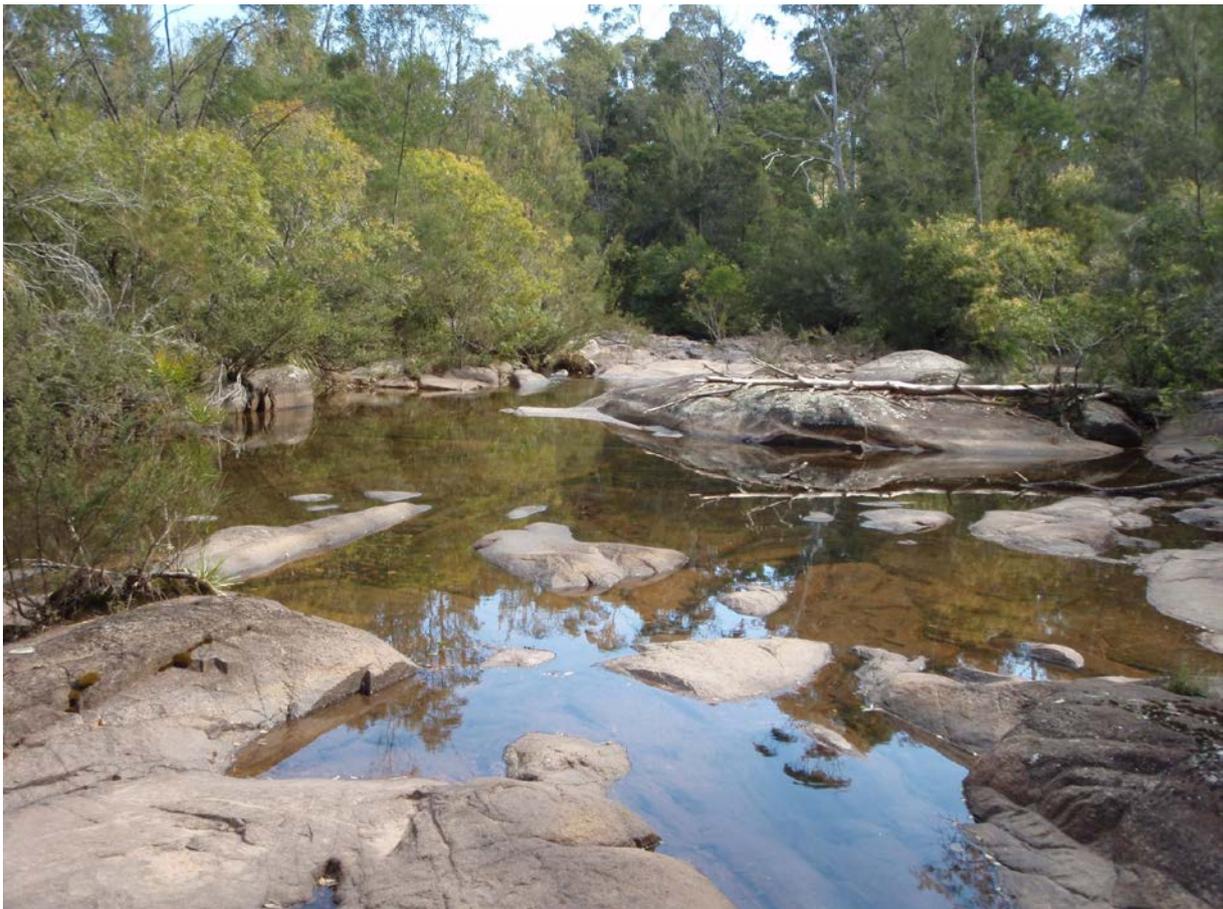




Water Sharing Plan for the Deua River Unregulated and Alluvial Water Sources

Background document



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Water Sharing Plan for the Deua River Unregulated and Alluvial Water Sources: Background document

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More information

Rural Water Planning

www.dpi.nsw.gov.au

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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 round of water sharing plans commenced on 1 July 2004. The development of these plans resulted in around 80% of the water use in NSW being managed under the WMA 2000. By the end of 2012, over 95% 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.

Water sharing plans for the unregulated¹ rivers and groundwater systems have been completed using a broad scale 'macro' approach based on whole river catchment or aquifer systems. Each macro plan covers a large river basin rather than a single subcatchment, or in the case of groundwater systems, cover a particular type of aquifer (for example fractured rock). These river basin or aquifer macro plans will generally apply to catchments or aquifers where there is less intensive water use.

This document provides background to the development of the rules in the Deua River water sharing plan. It includes information on the purpose of the plan and the policy framework that supports it, a description of the Deua 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 specifically on the plan including:

- the *Water Sharing Plan for the Deua River 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*
- Summary sheets for each water source detailing the proposed management rules.

General information on the macro planning process is available in the water sharing plans section of the 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
- *Setting rules for water sharing plans* – information outlining the key steps for developing the rules.

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.

Why are water sharing plans being prepared?

Expansion of water extraction across NSW in the twentieth 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 ten 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 ten year period
- clear trading and access rules which will help foster trading
- 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 Deua River 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 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.

Environmental water can also be protected through trading rules. Each water source in the Deua 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 Deua River water sharing plan defines cease-to-pump rules for alluvial aquifers in the plan area. Water sharing rules for fractured rock and porous rock aquifers are dealt with in the *Water Sharing Plan for the South Coast Groundwater Sources 2016*. The Deua River water sharing plan also includes rules controlling the location of new works and extraction from existing works to protect groundwater dependent ecosystems and areas of cultural significance.

A water sharing plan for the Deua River

Water users in the Deua River catchment have been voluntarily sharing water for many years. This water sharing plan formalises water sharing arrangements in the river and provides a consistent approach to managing water across the plan area.

Objectives of the plan

The objectives of the Deua River 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, and
- (b) protect, preserve, maintain and enhance the Aboriginal, cultural and heritage values of these water sources, and
- (c) protect basic landholder rights, and
- (d) manage these water sources to ensure equitable sharing between users, and
- (e) provide opportunities for enhanced market based trading of access licences and water allocations within environmental and system constraints, and
- (f) provide water allocation account management rules which allow sufficient flexibility in water use, and
- (g) contribute to the maintenance of water quality, and
- (h) provide recognition of the connectivity between surface water and groundwater, and
- (i) adaptively manage these water sources, and
- (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 *Water Sharing Plan for the Deua River Unregulated and Alluvial Water Sources* (the Deua River 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 Deua River water sharing plan establishes a number of water management units including eight water sources and two EMUs (Table 1). The location and extent of these water sources are shown on the map in Appendix 1.

Table 1: Extraction management units and water sources for the Deua River water sharing plan

Extraction Management Unit	Water Source
Deua River Extraction Management Unit	Bettowynd and Moodong Creeks
	Burra Creek
	Deua River
	Mogendoura Creek
	Moruya River
	Upper Deua River
	Wamban Creek
Araluen Creek Extraction Management Unit	Araluen Creek Water Source

Policy and planning framework

A number of national, state and regional plans and policies guide the development of water sharing plans on the south coast. These include:

- *Water Management Act 2000*;
- *Access Licence Dealing Principles Order 2004*;
- National Water Initiative;
- Natural Resource Commission state-wide targets;
- Catchment Action Plans; and
- Water planning policies and other considerations.

The Water Management Act 2000

The *Water Management Act 2000* (WMA 2000) was passed by NSW Parliament in December 2000, establishing a new statutory framework for managing water in NSW. The objective of the Act is to ensure the sustainable and integrated management of the state's water for the benefit of both present and future generations.

The WMA 2000 is based on the concept of ecologically sustainable development – managing current development so that it will not threaten the availability of resources for future generations. The WMA 2000 also 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 [Water Management Act 2000](#) is available from the NSW government legislation website.

Access Licence Dealing Principles

The *Access Licence Dealing Principles Order 2004* (the Dealing Principles) draws on the objects and water management principles of the WMA 2000 and provides statewide guidance and rules for applications to undertake water dealings including trade.

The 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; and
- 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 a 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 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.

Until the end of 2014 the NWI was implemented and monitored by the National Water Commission. Its responsibility for assessing each state's progress with the NWI and providing independent advice to the Commonwealth Government has now been taken over by the Commonwealth Productivity Commission.

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 were extended to 2016, and provided advice to the Minister for Primary Industries.

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 Plans

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. South East Local Land Services are responsible for continuing the delivery of natural resource management programs on the south coast.

The Southern Rivers Catchment Action Plan 2023 is a 10-year strategic plan that sets the direction for the sustainable use and care of the natural resources of the south coast and Snowy region. The Clyde River water sharing plan contributes to the goals and targets of this plan, in particular Goal 3, relating to the maintenance of diverse, healthy, connected and productive natural environments. The implementation of water sharing plans on the south coast is one of the key strategies to be implemented in supporting land and water managers to maintain or improve the condition of priority freshwater, marine and estuarine assets (SRCMA 2013).

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 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 allows 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 less connected to surface water sources 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 DPI Water.

The WMA 2000 requires that water sharing arrangements 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 Deua River 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 (LWUs) 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/yr per application. Opportunity for granting licences for Aboriginal cultural purposes throughout the Deua 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 NWI 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 rights² 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 DPI Water website, with input parameters being property location and property size.

Description of the plan area

Catchment description

The area covered by the Deua River water sharing plan comprises the Deua River catchment and the small coastal catchments of Congo Creek and Meringo Creek (Appendix 1). It contains eight water sources covering an approximate area of 1,669 km² on the south coast of NSW.

The Deua River rises in the Minuma Range approximately 35 km inland from the coast. The Deua River becomes the Moruya River at the tidal pool near the confluence with Wamban Creek, approximately 20 km upstream from the river mouth. The Moruya River flows into the sea at Moruya Heads. The major tributaries flowing into the Deua River include Moodong Creek, Bettowynd Creek, Araluen Creek, Burra Creek, Wamban Creek and Mogendoura Creek.

Around 60% of the catchment comprises rugged forested mountains, while the coastal plain surrounding the estuary has mostly been cleared for agriculture. The major town in the catchment is Moruya (population 3,562) which is located on the banks of the Moruya River 7 km upstream of the estuary entrance. The small village of Araluen is located alongside Araluen Creek in the north of the catchment.

The Moruya estuary covers an area of approximately 6.1 km² (OEH 2012a). The estuary is classified as a mature barrier estuary (Roy 2001) and has undergone significant in-filling with fluvial sediments from the upstream catchment. The estuary entrance has been stabilised with twin training walls and remains permanently open.

Congo Creek is a small coastal stream that drains a catchment of 43 km² while Meringo Creek drains an even smaller catchment of 5 km². Both creeks terminate in small estuarine lagoons that are intermittently open to the sea (OEH 2012b).

All of the rivers and creeks in the Deua River water sharing plan area are unregulated, having no major dams for the storage and supply of water. Most water users rely on natural flows for their water supply.

Aboriginal history

Prior to European settlement the Yuin people were the traditional custodians of the south coast region. They occupied the coastal plains from the Shoalhaven River in the north to the Murray River in the south, and within this tribal area 13 sub tribal groups existed (Patterson Britton & Partners Pty Ltd 2009). The Moruya River acted as a boundary between tribal groups and provided an economic and spiritual substance to the Aboriginal people (Patterson Britton & Partners Pty Ltd 2009). The people in and around the Moruya area were the Bugelli-Manji clan (Magee 2006).

Although Aboriginal people have occupied the south coast for at least 20,000 years, sites in the Moruya district only date back as far as 4,000 years (Magee 2006). Artefact scatters provide evidence of campsites, food preparation and the manufacturing of canoes, tools, containers, shields and shelters (Patterson Britton & Partners Pty Ltd 2009).

The Yuin people travelled throughout the coastal zone and west into the Monaro tablelands for a variety of reasons including the sharing of resources and ceremonial purposes (Goulding and Waters 2005).

The Yuin people were displaced from their land due to European settlement and the associated landuse changes that occurred in the region. The arrival of whaling and sealing vessels travelling to the south coast during the early 1800s may have also transmitted diseases to the local Aboriginal people resulting in declining population numbers (Goulding and Waters 2005). Records from the Aboriginals Protection Board show a population of 67

Aboriginal people living in Moruya in 1882, which had declined to 21 people by 1899 and 16 people by 1911 (Goulding and Waters 2005).

Early European history and land use

Land in the Moruya district was first settled in 1828 when the official Limits of Location were moved to the north bank of the Moruya River (Magee 2006). By 1840 all of the river flats along the north bank had been claimed. In 1851 the township of Moruya was established on the southern bank of the river and a punt began operating to ferry people and goods across the river.

Transport to and from the region was hampered by a sandbar at the mouth of the Moruya River which prevented large ships from entering the mouth. For many years local produce was taken to Broulee and shipped to Sydney from there (Magee 2006). Although many alternatives were tried a permanent solution to the transport problem was not found until reliable road transport became available (Magee 2006).

Early crops in the region included potatoes, wheat, maize and other grains while livestock production was focussed on beef cattle, sheep and pigs (Magee, 2006). By the 1880s attention was slowly turning to dairying and cheese production. At its peak there were 18 cheese factories in the Eurobodalla region, including two at Moruya, one at Mogendoura and one on the Deua River (Magee 2006). The Moruya Co-operative Cheese Factory was established in 1892 in order to compete with imports and other increasingly active dairy regions (Magee 2006). The dairying and cheese industry began to decline in the early 1900s and between 1919 and 1930, 27 dairy farms around Moruya were either abandoned or taken over by larger companies.

Gold was discovered in the Deua catchment at Araluen in 1851. Within months there were reportedly 15,000 men in the Araluen Valley and it became the second most important gold field in NSW after Ophir (SMH 2008). A road between Araluen and Moruya was constructed between 1856 and 1861, but the gold rush was relatively short-lived and was over by the end of the century (Magee 2006).

In 1925 a granite quarry on the north side of Moruya became the main source of stone for the construction of pylons for the Sydney Harbour Bridge. Ninety stonemasons and their families, mostly from Scotland, moved into the area. A small village called Granite Town was established with a population of about 300 people. This settlement provided a much needed stimulus for Moruya. By the time the bridge opened in 1932, the quarry had closed, the stonemasons had dispersed and the village was largely dismantled.

Current land use

The main agricultural land use is grazing which covers 13% of the catchment, mostly on the coastal floodplain and in the Araluen valley. The Araluen valley also supports a commercial stonefruit industry.

Fifty-five per cent of the catchment is protected for conservation. These protected areas include Deua, Monga and Eurobodalla national parks; Berlang, Frogs Hole and Majors Creek state conservation areas; and Araluen Nature Reserve. The Moruya River also falls within the Batemans Bay Marine Park which includes the Malabar Lagoon Sanctuary Zone. A further 10% of the catchment is state forest and 18% is privately owned native vegetation (Bureau of Rural Sciences 2001).

Urban land covers around 2.5% of the catchment (Bureau of Rural Sciences 2001). Eurobodalla Shire Council has predicted that population growth in the shire is expected to grow by 40% over the next 25 years (Patterson Britton & Partners Pty Ltd 2009). This has the potential to put additional stresses on the rivers in the catchment and could cause an increase in nutrient loading and pollutants from sewage effluent, wet weather system

overflows and stormwater runoff as well as turbidity and litter (Patterson Britton & Partners Pty Ltd 2009).

The Moruya district has moved from its beginnings as an agriculturally based society to support a diverse range of employment opportunities. Today less than 5% of the working population are engaged in agriculture, forestry or fishing. The main employment groups, in order, are retail; health and community services; accommodation, cafes and restaurants; and construction (Magee 2006).

The Moruya estuary supports a small oyster industry and the estuary is an important recreational area for tourists and local residents. The most popular recreational activities are fishing and boating (both motorised and non-motorised).

Climate

The Deua River catchment is characterised by a temperate climate. Average annual rainfall varies from 850 mm in the upper Deua valley to over 1,200 mm on the ranges in the north and middle of the catchment (Figure 1). Mean annual rainfall at Moruya is 954 mm as measured at Moruya Heads Pilot Station (BOM 2016). Rainfall is summer dominant with the driest months being July to September. Monthly rainfall varies from 107 mm in March to 55 mm in August (BOM 2016) (Figure 2).

January and February are the hottest months with the mean maximum temperature being 24.0°C at Moruya Heads in February. Winter temperatures rarely fall below 6°C which is the mean minimum temperature for July and August (BOM 2014).

Figure 1: Average annual rainfall across the Moruya catchment

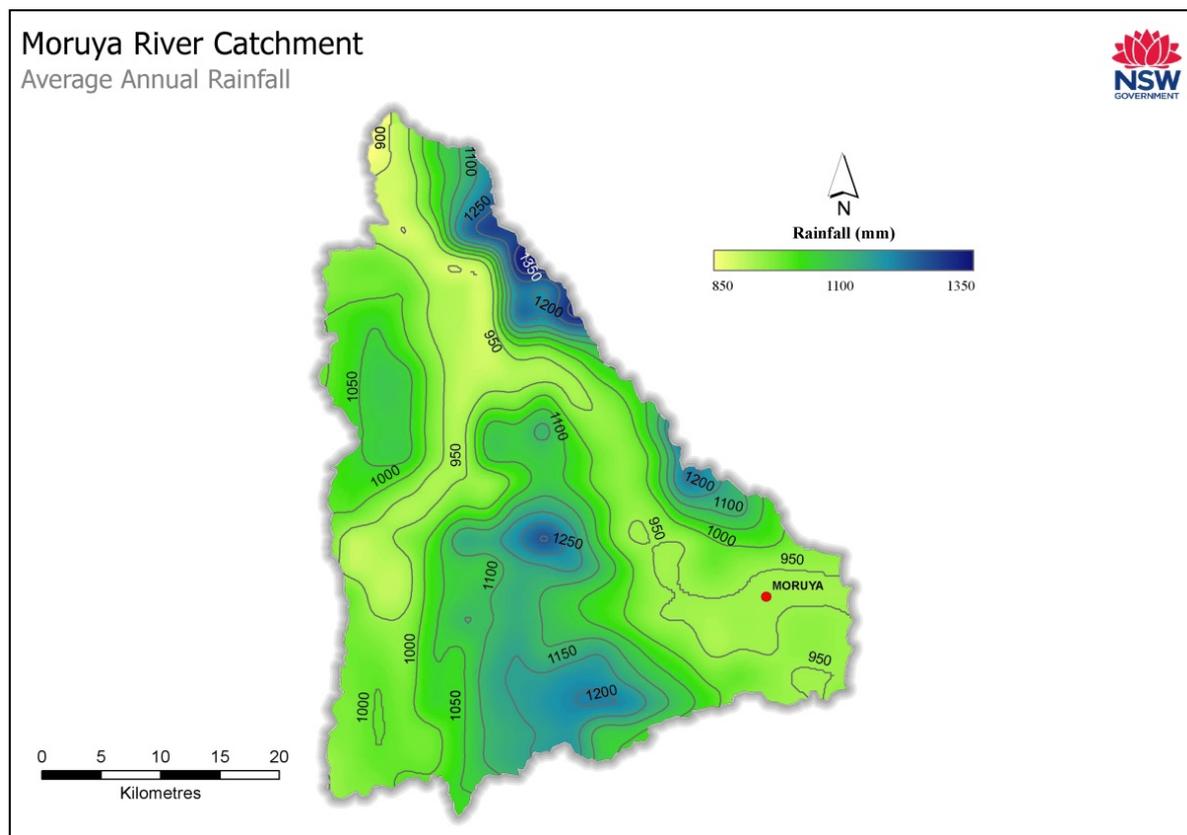
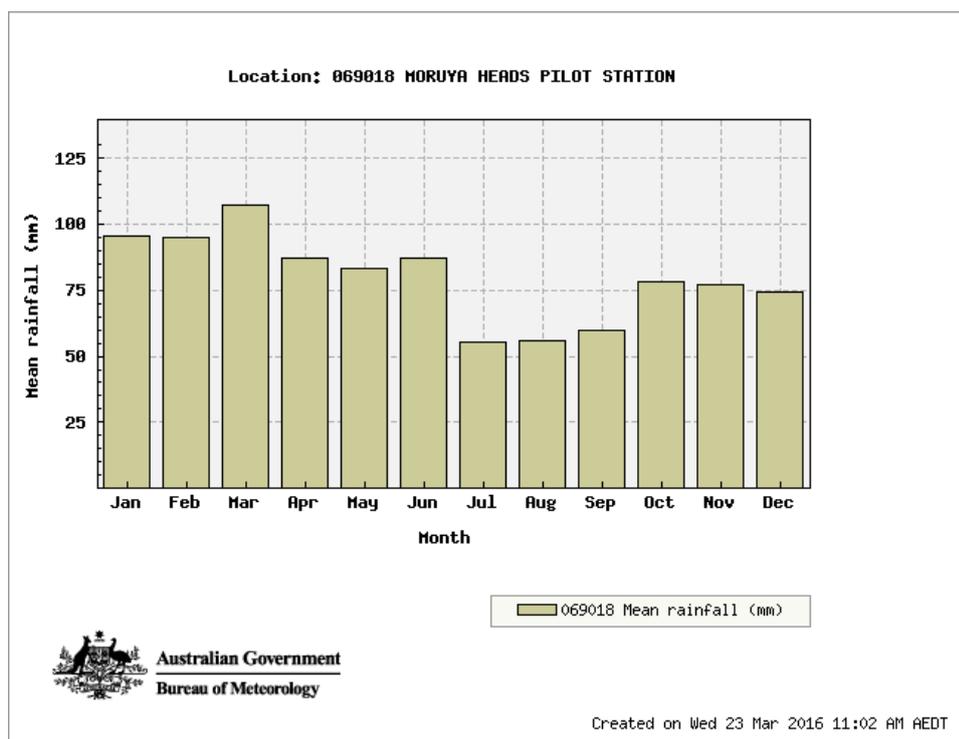


Figure 2: Mean monthly rainfall at Moruya Heads Pilot Station 1875-2015



Source: BOM 2016 Climate Data Online

Ecological values

There are 32 discrete wetland areas that are protected under *State Environmental Planning Policy 14 for Coastal Wetlands* (SEPP 14). This includes mangrove and saltmarsh wetlands located around the Anchorage, Ryans Creek, Malabar Lagoon, Mogendoura Creek, at the estuary mouth, and at Congo Creek and Meringo Creek. Some large freshwater wetlands on the coastal plain are also listed under SEPP 14 including Pedro Swamp and Old Man Bed Swamp to the south and an un-named wetland west of Moruya Airport on the north side of the estuary.

The saltmarshes of the Moruya River estuary are listed as of national importance in the 'Directory of Important Wetlands in Australia' (Department of the Environment 2010). This listing covers saltmarshes at the Anchorage, Ryans Creek and Malabar Lagoon.

As well as sustaining wetlands along its banks, the Moruya estuary contains large areas of sea grass beds and supports a valuable fish nursery (Patterson Britton & Partners Pty Ltd 2009). The dominant seagrass is *Zostera spp.* with smaller areas of *Halophila spp.* and *Ruppia megacarpa*. Together these species cover nearly 1.2 km² of the Moruya estuary (Creese *et al* 2009).

The shallow margins and mudflats of the estuary provide habitat for 20 migratory bird species that are listed under international agreements. Local and migratory waders are most commonly seen using the sand flats in the river east of the Anchorage and the tidal sand flats south of the river breakwall (Crowley 2005).

The long-necked turtle (*Chelodina longicollis*) is very common in freshwater wetlands adjacent to the Moruya River and platypus (*Ornithorhynchus anatinus*) occur in the upper parts of the Deua River (Crowley 2005).

Threatened species

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

The Deua River catchment supports a known population of Australian Grayling, an endangered fish species that is listed as Vulnerable under the *Threatened Species Conservation Act 1995* (TSCA 1995). The Australian Grayling occurs in coastal streams and lagoons from the Shoalhaven River southwards to the Otway Ranges of Victoria and in Tasmania. Adult fish spawn in freshwater and the newly hatched larvae drift downstream and out to sea where they remain for around six months. Juveniles then return to the freshwater environment in late spring where they remain for the rest of their lives (Backhouse *et al.* 2008).

There are no reliable population estimates for Australian Grayling however the species is reported to be relatively uncommon. All rivers and streams where this species is found are therefore important to the species' survival as it is unknown which populations are the most effective in terms of reproductive success (Department of the Environment 2013). Australian Grayling have been regularly recorded in fish surveys by NSW DPI in the Deua River. Further research and surveys on the size and distribution of Australian Grayling populations are being undertaken as part of a national recovery plan for the species (Backhouse *et al.* 2008).

Green and Golden Bell Frog (*Litoria aurea*) was previously a very common frog in the Moruya area, but its population has declined dramatically along the east coast and it is now listed as Endangered under the TSCA 1995. This species was recorded in freshwater wetlands such as Pedro Swamp, Newstead Reserve and wetlands adjacent to Ryans Creek until the 1970s (Crowley 2005). Other threatened frog species known to occur within several of the Deua River water sources include Alpine Tree Frog, Giant Burrowing Frog, Little John's Tree Frog, Southern Bell Frog and Stuttering Barred Frog.

The Deua River catchment supports 13 threatened bird species that rely on aquatic habitat. The catchment's freshwater wetlands also provide habitat for waterwheel plant (*Aldrovanda vesiculosa*) which is listed as endangered under the TSCA 1995. Waterwheel plant is an aquatic member of the sundew family which occurs in freshwater lagoons and wetlands from the Clyde River catchment south to Wallaga Lake. The plant floats below the water surface where it traps and digests aquatic insects.

Estuary sensitivity

Estuary specialists from the Office of Environment and Heritage and former Department of Water and Energy 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 tend to be highly sensitive to inflow variations, with most being only intermittently connected to the ocean. Barrier estuaries such as the Moruya River estuary are generally less sensitive to inflow variations. As they mature and infill with sediment they tend to be long and narrow 'river' estuaries. The study found the Moruya Estuary has a low sensitivity to low flows and high flows.

Groundwater

The Deua River catchment covers several groundwater sources including the aquifers of the Lachlan Fold Belt fractured rocks, the South East Coastal Sands and the unconsolidated alluvial aquifers. The most utilised aquifer is the fractured rock of the Lachlan Fold Belt.

The Lachlan Fold Belt Coast groundwater source and the South East Coastal Sands groundwater source are managed under the Water Sharing Plan for the South Coast Groundwater Sources 2016.

The geology of the Deua River catchment is dominated by sandstone and metamorphic rocks with significant areas of granitic rocks also present. These sandstone and granite rocks are significant as they weather to sand and produce sandy alluvium (AMOG 2003).

The main alluvial aquifer in the catchment stretches along Araluen Creek. Numerous groundwater studies have been undertaken on the Araluen alluvium (Sanders 1997, DMR 1999, Pritchard 1999, Willing 1998 and Pritchard & Russell 2000). DPI Water has nine monitoring bores in the Araluen valley which have been operating since 1999.

The Araluen alluvium has a dominant groundwater flow in a south-easterly direction and follows the major surface drainage feature of Araluen Creek. During wet periods, Araluen Creek recharges the surrounding alluvium and during dry periods, when water levels in the creek are lower than the water table, the hydraulic gradient reverses so that the alluvium provides base flows to Araluen Creek (Pritchard and Russell, 2000). Rainfall is the major contributor of recharge to the system, however, because of the reduced transmission of the alluvium (due to mining), much of the rainfall is diverted and drains directly into Araluen Creek (Pritchard and Russell 2000).

Other highly connected alluvial aquifers occur along Mogendoura Creek, Wamban Creek, and the Deua/Moruya River downstream of Riverview gauge (217007).

River flows

There are currently two active gauges within the Deua River catchment that monitor streamflows on a daily basis (Table 2). Historical records are also available for several discontinued gauges throughout the catchment.

Table 2: River gauges in the Deua River catchment

Gauge	Location	Catchment area	Mean Annual Flow	Period
217002*	Deua River at Wamban	1,207 km ²	233,823 ML	1959 - 2013
217006	Araluen Creek at Neringla Road	111 km ²	5,089 ML	1997 - present
217007	Deua River at Riverview	1,180 km ²	insufficient record	2011 - present

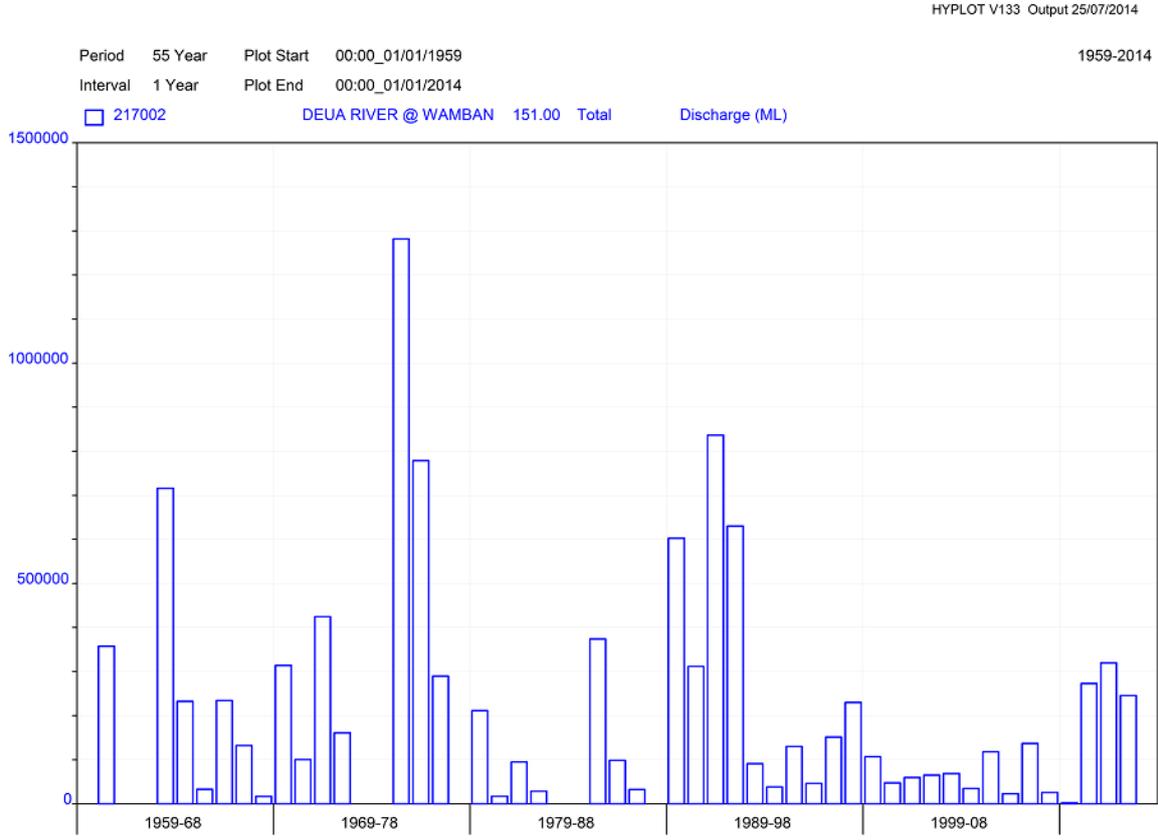
*Discontinued once correlation with Riverview gauge was achieved.

The gauge at Riverview on the Deua River is the only gauge being used as a flow reference point in the Deua River water sharing plan. It commenced in 2011 to replace gauge 217002 which was located a short distance downstream at Wamban. The Wamban gauge had been in place since 1959 however it was considered to be unreliable at low flow as it did not accurately reflect the pattern of recession. This was partly due to its location on a sand and gravel bar which was subject to movement after flood events. The new gauge at Riverview was established on a rock bar to provide a more accurate flow reference point for managing the low flow water sharing rules in the plan. The gauge at Wamban was discontinued in June 2013 once a reliable correlation with the Riverview gauge had been achieved.

Mean annual flow in the Deua River at Wamban has ranged from 1,281,611 ML in 1975 to just 1,696 ML in 2009. The river has experienced extended periods of low or no flow such as summer 2002-03 when the river stopped flowing for six months from September 2002 to February 2003 and in 2009 when flows were less than 5 ML/d for eight months from July

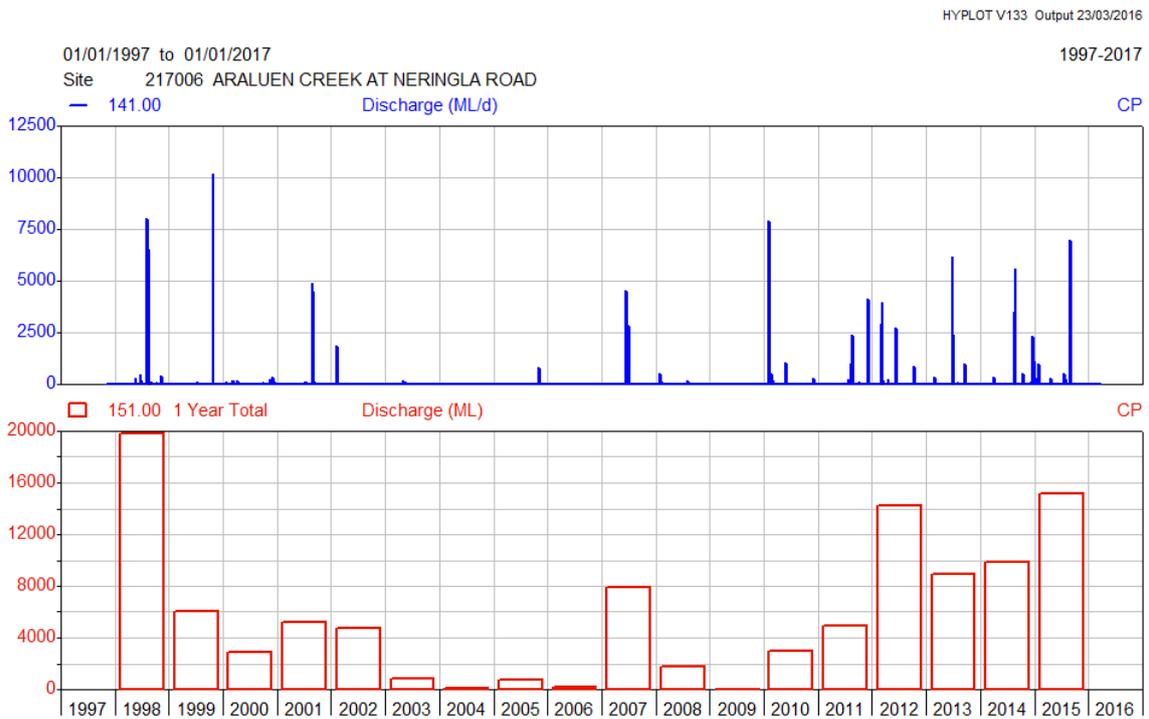
2009 to February 2010. The largest recorded floods in the river occurred in 1961 and 1975 with both events recording peak heights of around 220,000 ML/d at Wamban.

Figure 3: Annual flows in the Deua River at Wamban*



* Record contains missing data for some years

Figure 4: Daily and annual stream flows in Araluen Creek



Flow in Araluen Creek is highly variable, ranging from nearly 20,000 ML in 1998 to less than 1 ML in 2009 when there was no flow in the creek for most of the year (Figure 3). Since 1997 daily flow in Araluen Creek has been less than 1 ML/d for 35% of the time, and the creek has ceased to flow completely for 7% of the time. For this reason there is a high dependence on groundwater in the valley.

Entitlement and use

There are approximately 79 water licences in the Deua River water sharing plan area, totalling 5,911.5 ML of entitlement (Table 3). This entitlement comprises 5,568.5 ML of unregulated surface water and 343 ML of alluvial groundwater. The majority of licences are used for irrigation, with a significant proportion used for town water supply.

There has been an embargo on granting new surface water licences on the south coast since 2007. Alluvial aquifers were embargoed in 2008.

The water sharing plan assumes full development of all entitlement in setting the extraction limits that form part of the water sharing rules. For the Deua River catchment the sum of the peak demands for all water sources has been calculated as 31.1 ML/d.

These figures do not include extractions from the 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, all works located in the tidal pool will need to be licensed. Therefore DPI Water has developed a tidal pool licensing regulation and is currently identifying unlicensed works, determining the associated history of use and establishing whether a licence should be granted under that regulation in the Moruya River tidal pool.

Water extraction in the unregulated water sources

The majority of the unregulated surface water licences are located along Araluen Creek in the Araluen Water Source, and along the lower reaches of the Deua River. The major irrigated crops in these areas are stonefruit and pasture for dairy cows (Hope & O'Connor 2003). The remainder of the catchment contains few licences due to the area largely being state forest or national park.

Table 3: Total entitlement and number of licences for each water resource

Water source	Unregulated river entitlement (ML)	Aquifer access entitlement (ML)	Number of licences
Araluen Creek	374	309	36
Bettowynd and Moodong Creeks	20	0	2
Burra Creek	42	0	2
Deua River	4,809	8	19
Mogendura Creek	11	0	1
Moruya River	166.5	26	13
Upper Deua River	61	0	3
Wamban Creek	85	0	3
Total	5,568.5	343	79

Of the total unregulated entitlement in the plan area, 78% is for town water supply, 19% is for irrigation and the remainder is for industrial, stock and domestic purposes.

Araluen Creek is the only water source in the plan that was classified as being of high economic significance to local communities due to their dependence on commercial water extraction. Water users in the Araluen valley have had voluntary water sharing arrangements in place since 1997. These arrangements were implemented by the Araluen Community Water Users Association with the assistance of the Department of Land and Water Conservation in response to community concerns over water shortages in domestic bores and competition for water by irrigators.

Long term records of water use are not available in the Deua River catchment because there is no broad scale metering in unregulated catchments on the south coast.

Water extraction in the alluvium

Most of the alluvial groundwater licences are located in the alluvium along the main trunk of Araluen Creek in the Araluen Creek Water Source.

Of the total alluvial entitlement across the Deua River water sharing plan, 81% is for irrigation purposes, 17% for stock and domestic purposes and 1% for farming purposes.

As with surface water licences, detailed water use is not available in the alluvial groundwater sources as there is no broad scale metering of bores in the plan area. DPI Water is exploring the issue of pump metering through the Water Use Monitoring Program.

Local water utility requirements

A number of town water supplies are located within the Deua River catchment, including storages and pumps for river extraction (extractions from coastal sand aquifers are legislated under the South Coast groundwater sharing plan.) These supplies are administered through Eurowater, a subsidiary of Eurobodalla Shire Council. As noted previously, the requirement for town water supplies comprises 78% of all entitlement in the Deua River water sharing plan area.

The main source of town water supplies is the Deua River at Wamban. Water extracted from the Deua River is fed directly into the reticulation system after being disinfected with chlorine. This supply provides for towns between Long Beach in the north and Tuross Heads in the south (DPWS 2010). The supply infrastructure was augmented in 2010 to increase the maximum pump capacity from 16.4 ML/d to 34 ML/d (Harvey Lane, Eurobodalla Shire Council, pers. comm). In addition to water fed directly into the water reticulation system, extractions from the Deua River provide the bulk of water stored in Deep Creek Dam in the Clyde River catchment.

With the continued increase in population within the Clyde River catchment together with the drought events experienced over the last decade, Eurobodalla Shire Council are currently investigating ways to increase their bulk water supplies. Council has developed an integrated water cycle management strategy (DPWS 2010) that investigates options available for securing the region's town water supplies during drought periods. These options include raising the wall of Deep Creek Dam, creating new southern off-river storage on the Tuross River, creating new central off-river storage on the Moruya River and desalination (DPWS 2010). Any town water supply augmentations will need to meet conditions specified in the plan to protect environmental flows in accordance with the plan.

The process of developing the water sharing plan

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

- the State Interagency Panel;
- the South Coast Working Group; and
- the South Coast Interagency Regional Panel.

The role of each of these panels is discussed below.

The draft Deua River 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 Deua River water sharing plan preparation 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 statewide significance.

The State Interagency Panel is chaired by DPI Water and comprises representatives from the Department of Primary Industries (water, fisheries and agriculture), the Office of Environment and Heritage and Local Land Services (formerly catchment management authorities). DPI Water is responsible for the overall project management.

South Coast Working Group

The South 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 Regional Panel.

Interagency Regional Panel

The South Coast Interagency Regional Panel (the Regional Panel) comprises representatives from the Department of Primary Industries, the Office of Environment and Heritage and the South East Local Land Services (formerly Southern 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; and
- 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; and
- the sensitivity of estuaries to the removal of freshwater inflows.

For the Deua River 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:

- Araluen Creek – Hydrologic stress was revised from medium to high due to the peak daily demand being greater than the 80th percentile daily flow.

- Araluen Creek – Instream values were revised from high to medium due to the considerable level of agricultural development in this water source.
- Deua River – Hydrologic stress was revised from low to medium, and risk to instream values was revised from low to high due to the significant level of town water entitlement in this water source.

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 such as river gauges;
- the availability of management systems;
- any existing water sharing arrangements; and
- whether flow regimes within different areas of a water source required differing management rules for those sub-areas.

For example, water users in the Araluen Valley have participated in water sharing arrangements since 1997. These existing water sharing 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 underwent targeted consultation with specific interest groups³ and water users who had the opportunity to provide input to proposed water management rules before the plan was drafted.

Targeted consultation on the proposed rules for the Deua River draft water sharing plan began in late 2005 and continued through the development of the water sharing plan until public exhibition in May 2013. The consultation process was facilitated by the Southern 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

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.

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; and
- specific comments on the Minister's notes included in the draft water sharing plan.

The following organisations were consulted during the targeted consultation process:

- Eurobodalla Shire Council;
- Araluen Community Water Users Association;
- NSW DPI;
- Southern Rivers CMA;
- Coast Watchers (environmental organisation); and
- Aboriginal community through Aboriginal Officers at the Southern Rivers CMA.

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. Public exhibition of the draft Deua River water sharing plan was held from 6 May to 28 June 2013 with the plan documents available for viewing at five locations on the NSW South Coast (Nowra, Milton, Moruya, Narooma and Bega). Licence holders were sent letters advising of the public exhibition period. Public meetings were held at Araluen and Moruya on 22 May 2013. The objectives of this meeting 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; and
- to seek feedback in writing from stakeholders and the general community about the proposed water sharing rules.

Ten written submissions were received from stakeholders including landholders, water users, environmental groups and Eurobodalla Shire Council. The main issues raised in the submissions related to the cease-to-pump rules, the suitability of the Araluen gauge as a flow reference point, limited opportunities available for new water users to enter the market and potential socio-economic impacts of the proposed plan 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 Deua River 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);
- long-term extraction limits for each water source;
- flow classes and daily access rules for managing licensed extraction in unregulated rivers;
- daily access rules for managing groundwater extraction from alluvial aquifers; and
- access licence dealing rules, which control the trade of water within or into other water sources.

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 and total daily extraction limits 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 Deua River catchment which are discussed in detail under the section on daily flow rules.

Requirements for water

The water sharing plan defines all of the licensed and unlicensed (BLR) requirements for water within the Deua River catchment. BLR (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 ABS data of houses without reticulated water supply and estimated water usage based on climatic / landscape region and land use. At the start of the plan there were no native title rights, however these rights may be exercised during the life of the plan.

At the start of the Deua River water sharing plan:

- BLR were estimated at 199 ML per year;
- domestic and stock access licences account for 30.5 ML of entitlement per year;
- local water utility access licences account for 4,345 ML of entitlement per year;

- unregulated river access licences account for 1,193 unit shares (a unit share is equivalent to 1 ML in years where 100% of entitlement is allowed to be extracted); and
- aquifer access licences account for 284 unit shares (a unit share is equivalent to 1 ML in years where 100% of entitlement is allowed to be extracted).

Managing extraction

The Deua River water sharing plan establishes a long term average annual extraction limit (LTAAEL) to manage extractions from each EMU.

The LTAAEL for the Araluen Creek EMU comprises:

- the number of share components in the Araluen Creek Water Source at plan commencement (653 ML); plus
- an estimate of BLR in this water source (30 ML); plus
- any share components granted in the water sources over the life of the plan under the *Water Management (General) Regulation 2011*.

The LTAAEL for the Deua River EMU comprises:

- the number of share components in the Bettowind and Moodong Creeks, Burra Creek, Deua River, Mogendoura Creek, Moruya River, Upper Deua River and Wamban Creek Water Sources at plan commencement (5,199.5 ML); plus
- an estimate of BLR in these water sources (169 ML), plus
- any share components granted in the water sources over the life of the plan under the *Water Management (General) Regulation 2011*.

At plan commencement, the LTAAELs for the Deua River EMU and the Araluen Creek EMU were 5,368.5 ML/yr and 683 ML/yr, respectively.

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 the Deua River EMU and the Araluen Creek EMU, 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 Deua River 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 Deua River 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 several other categories of access licence: Aboriginal community development, Aboriginal

cultural, domestic and stock licences (only from tidal pools) and high flow only access licences.

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 of the 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 these coastal catchments, Aboriginal community development licences (ACDLs)⁴ 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 South Coast Regional Panel recommended that no new licences would be granted in water sources with high conservation value, or in areas that could not support high flow licences. The Deua River water sharing plan has made provision for the granting of Aboriginal community development licences in the following water sources: Bettowynnd and Moodong Creeks, Burra Creek, Deua River, Mogendoura Creek, Upper Deua River, and Wamban Creek. The water sharing plan allows for a total of 500 ML/year to be granted across all water sources where ACDLs are permitted.

The restriction of Aboriginal community development licences 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

An Aboriginal cultural access licence of up to 10 ML/year may be granted to an Aboriginal person or Aboriginal community 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.

Domestic and stock access licences

Domestic and stock access licences may be granted where applicants can demonstrate a history of extraction within the tidal pool of the following water sources: Deua River, Mogendoura Creek, and Moruya River.

This provision recognises that under the *Water Act 1912* no licence was required to extract water from a tidal pool and therefore there are a number of existing users that will need to obtain a licence under the WMA 2000.

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. These arrangements are currently being reviewed by DPI Water.

High-flow-only access licences

In water sources where there is extreme competition for water during dry periods, there is merit in developing incentives that aim to move extraction out of the low flows and into the higher flows. To utilise higher flows, it is generally necessary to construct on-farm water storage so that water can then be pumped during periods of higher flow and stored for use at a later time, thereby enhancing security of supply.

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

- 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 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; and
- the conversion would not significantly impact on tidal pool users or town water supplies.

The Regional Panel considered these factors and determined that no high flow conversions would be permitted in any water sources in the Deua River water sharing plan. The panel considered that in the Araluen Creek and Deua River Water Sources high flow conversion would not significantly reduce the low flow stress, and in other water sources there was not sufficient hydrologic stress to warrant high flow conversion.

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 licences 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.

Access licence rules

The water sharing 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. These revisions are listed below and discussed in the following sections:

- daily access rules in the Araluen Creek Water Source;
- trading rules in the Araluen Creek Water Source; and
- trading rules in the Deua River Water Source.

Daily access rules in the Araluen Creek Water Source

The draft plan proposed a cease-to-pump of 1 ML/day at the Araluen gauge. This is the minimum flow that can be accurately measured at the gauge and equates to the 70th percentile flow for the period 1997 to 2006. During public exhibition, the proposed cease-to-pump level was criticised by many stakeholders as being far too restrictive and there were concerns that it would threaten the viability of stonefruit and lucerne enterprises in the Araluen Valley. After reviewing the submissions and feedback from the public meeting and updated streamflow data, the regional panel agreed that the proposed cease-to-pump was relatively stringent, and agreed to a review and further investigations.

Field inspections were conducted by DPI Water hydrometric staff who were unable to recommend any suitable alternative flow gauging points within the catchment. Two meetings were held with the Araluen community to consider alternative cease-to-pump options which included setting a cease-to-pump based on groundwater levels and setting a cease-to-pump based on visible flow.

The practicality of using existing departmental observation bores for monitoring groundwater levels was investigated. However correlation between groundwater levels and stream flows showed an unacceptable level of variation due to the low to moderate transmissivity of the alluvial and weathered rock aquifers in the Araluen valley.

Potential flow reference points for a visible flow rule were discussed with the community. The general opinion was that Araluen Creek at the Neringla Road Bridge is the most practical and fairest site for a flow reference point as it is publically accessible and located downstream of the bulk of entitlement. Licence holders and other Araluen residents supported the revision of the cease-to-pump to a visible flow rule which will apply to the instream pool immediately downstream of the Neringla Road Bridge. The visible flow rule was therefore endorsed by the panel and incorporated into the final plan.

The draft plan proposed cease-to-pump rules for surface water users from year one of the plan, and alluvial groundwater users from year six of the plan. This was based on a general policy decision by DPI Water to allow alluvial users to adjust to the concept of a cease-to-pump which has never previously applied to this group of users. After public exhibition and submissions by Araluen water users the panel agreed to impose the cease-to-pump on all water users at the same time. All water users will therefore be subject to cease-to-pump rules from year three of the plan making water access rules equitable for all users.

Trading rules in the Araluen Creek Water Source

Instream values were revised from high to medium due to the considerable level of agricultural development in the water source. Hydrologic stress was revised from medium to high due to the peak daily demand of the water source being greater than the 80th percentile flow. Trading into the water source was therefore not permitted.

Trading rules in the Deua River Water Source

Hydrologic stress was revised from low to medium and risk to instream values was revised from low to high. This was due to the significant level of town water entitlement in the water source which was not included in the initial risk and value assessment. Trading into the water source was therefore not permitted.

Final water access rules

Following public exhibition and consideration of the issues raised during public exhibition, the water sharing rules were finalised. The final water access rules including flow classes, cease-to-pump rules and the staged implementation approach adopted by the Regional Panel are summarised in Table 4.

For some water sources, the Regional Panel recommended that cease-to-pump rules be implemented incrementally to provide water users time to adapt to the new rules.

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. In these circumstances the Regional Panel acknowledged that many of 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.

This information may also be found on individual rule summary sheets for the Deua River catchment that are available on the DPI Water website www.water.nsw.gov.au. These rules were developed using the risk and value assessment, a wide range of resources, targeted consultation and public exhibition.

Table 4: Final water sharing rules for the Deua River water sharing plan

Water Source	Flow classes	Access rules	Flow reference point
Araluen Creek	No flow classes	Visible flow in river	Instream pool on Araluen Creek at Nerringla Road bridge
Bettowynd and Moodong Creeks	Very low flow ≤ 1 ML/d (Year 1-5) ≤ 5 ML/d (Year 6-10)	No access except for specified purposes	217007 Deua River at Riverview
Burra Creek	A Class: 1-40 ML/d (Year 1-5)	Cease-to-pump at 1 ML/d (Yr 1-5) Cease-to-pump at 5 ML/d (Yr 6-10)	
Deua River	5-40 ML/d (Year 6-10)	TDELs will apply in Burra Creek and Deua River water sources	
Mogendoura Creek	B Class = 40-160 ML/d	TDELs will apply for Local Water Utility	
Upper Deua River	C Class ≥160 ML/d	No TDELs	
Wamban Creek			
Moruya River	No flow classes	Visible flow in river	Pump site or the outflow of the pool from which water is taken

All water sources except for Araluen Creek and Moruya River will be managed according to the flow reference point on the Deua River (217007 Deua River at Riverview). Water users in Araluen Creek and Moruya River water source will be managed according to a basic cease-to-pump rule that prevents pumping when there is no visible flow in the river.

Access to very low flow

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

- domestic supply;
- town water supply, until major augmentation of the schemes infrastructure occurs;

- fruit washing;
- cleaning of dairy plant and processing equipment for the purpose of hygiene;
- poultry washing and misting; and
- cleaning of enclosures used for intensive animal production for the purpose of hygiene.

The plan provides an estimate of the water requirements for domestic and stock rights within each of the water sources, noting that these rights may increase during the life of the plan. The plan cannot limit or restrict these rights, but the WMA 2000 itself provides for restrictions on BLR through mandatory guidelines that are currently under development.

Total daily extraction limits

One of the plan's main objectives is to share water between users during low flows, as well as providing water for the environment. These objectives are achieved through the use of total daily extraction limits (TDELs). A TDEL is the total volume of water that may be extracted daily under access licences from an unregulated river in a particular flow class. They are used where peak daily demands exceed supply and a cease-to-pump rule alone is not sufficient to ensure an adequate environmental share of the water within that flow class.

After considering peak daily demands for the Deua River the Regional Panel considered that it was necessary to introduce TDELs within the Burra Creek Water Source and the Deua River Water Source (downstream of Coopers Creek). The plan allows for TDELs to be established in other water sources at a later date, if required.

Daily extraction limits are calculated based on a policy method developed by DPI Water that assigns a proportion of extraction from the upper limit of each flow class. Full details of this policy can be found in the document *Advice to Water Management Committees. No. 6 Daily extraction management in unregulated rivers* which is available on the DPI Water website www.water.nsw.gov.au.

Under this policy daily extraction limits should generally be set at less than 30% of the flow threshold. However where demands for extraction are already very high and the economic impact of a significant reduction in access would be high, the volumes may be set at up to a maximum of 60% of the upper limit of the flow class.

TDELs calculated as a percentage of the top of a flow class can be problematic as the amount of water theoretically available for extraction at the lower end of the flow class may be greater than the volume of water in the river. During the targeted consultation process, water users and Eurobodalla Shire Council expressed concerns about the calculation of TDELs calculated as a percentage of the top of the flow class.

Based on recommendations from DPI Water, the Regional Panel agreed to a means of calculating TDELs based on daily flows rather than the flow at the top of the flow class. The panel allocated a maximum of 50% of daily flow to be available for extraction (shared between water access licences and the local water utility).

The TDELs that will apply to each flow class for the Burra Creek Water Source and the Deua River Water Source (downstream of Coopers Creek) are shown in Table 5. The TDEL for town water supply restricts Eurobodalla Shire Council's extractions from A Class to 16 ML/day. The estimated peak daily demand of unregulated river access licences in these water sources is 3.9 ML/day. The maximum daily extractions from A Class flows should therefore be 19.9 ML/day, which represents 50% of the upper limit of the flow class.

Although the extraction limit may be 50% of the upper limit of the flow class, extractions as a proportion of stream flow vary throughout the flow classes. TDELs are structured so that they permit water users access to the lower end of each flow class, whilst water in the upper end of each flow class is reserved for the environment. For example from year six of the

plan, water users are permitted to extract all flows in A Class between 5 and 25 ML/day, whilst all flows from 25 to 40 ML/day are reserved for environmental flows.

Table 5: Total daily extraction limits for Burra Creek and Deua River water sources

TDELS	Flows between	TDEL TWS	TDEL Other
Very Low Flow Class	<1 ML/d (Yrs 1-5) <5 ML/d (Yrs 6-10)	No access	No access
A Class	1–40 ML/d (Yrs 1-5)	80% of daily flows above 1 ML/day up to a maximum of 16 ML/d (Yrs 1-5)	20% of daily flows above 1 ML/day
	5-40 ML/d (Yrs 6-10)	80% of daily flows above 5 ML/d up to a maximum of 16 ML/d (Yrs6-10)	20% of daily flows above 5 ML/d
B Class	40-160 ML/d	16 ML/day plus 100% of daily flows above 40 ML/day (to maximum pump capacity of 34 ML/d)	No TDEL
C Class	>160 ML/d	No TDEL	No TDEL

Alluvial licences

For management purposes, the Deua River 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. These access rules will apply to alluvial water users from year three of the plan to allow them to become familiar with the cease-to-pump concept and adjust 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.

Water supply works approvals

Construction of dams

The capture and storage of rain water runoff in a farm dam does not require a licence if the dam is within the maximum harvestable right of a property⁵, and the dam is not spring-fed. Extraction of water in excess of a property's harvestable right requires a licence under the WMA 2000. The provisions relating to harvestable rights are unaffected by any of the rules identified in the water sharing plan.

Consistent with state-wide policy, the Deua River water sharing plan prohibits the construction of new instream dams in those water sources which have been assessed to have high instream values: Bettowind and Moodong Creeks, Deua River, Moruya River, and Upper Deua River.

⁵ 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 DPI Water website, with input parameters being property location and property size.

Construction of bores in alluvial aquifers

The Regional Panel adopted the following state-wide recommendations regarding the construction of new groundwater bores:

- prohibit new bores within 40 metres of first and second order streams, except for bores as a result of a conversion of an unregulated river access licence (unless they are drilled into the underlying parent material, and the slotted intervals of the production bore commence deeper than 30 metres, and the applicant can demonstrate that the bore will have minimal impact on base flows in the stream);
- prohibit new bores within 40 metres of a third order or higher stream except for bores as a result of conversion of an unregulated river access licence;
- allow new bores within 40 metres of an unregulated river (but only as a result of the conversion of an unregulated river access licence) in which case the surface water daily access rules will apply immediately; and
- apply the standard local impact rules for alluvial groundwater and the standard provisions for newly identified GDEs.

In relation to distances from other bores, the Regional Panel recommended that approval for the construction of new groundwater bores will not be granted within:

- 100 metres of an approved water supply bore nominated by another access licence;
- 100 metres of an approved water supply bore from which BLR is being extracted;
- 50 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; and
- 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 also 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. At the start of the plan there is one specified GDE and no cultural sites. 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. These restrictions do not apply if the bore is for environmental management or is replacing an existing bore, or if a hydrologic assessment can demonstrate that there will be no significant impact.

Dealing rules

The objective of dealing rules (or 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 National Water Initiative 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 Deua River water sharing plan prohibits trade into three water sources, and permits trade into five water sources up to a specified level of entitlement (Table 6).

Table 6: Summary of water dealing rules

Water Source	Dealing rule	Justification
Araluen Creek	Trade into water source not permitted	High hydrologic stress and competition for water
Bettowind and Moodong Creeks	Trade into water source permitted up to a total entitlement of 130 ML*	High instream values in headwaters but low hydrologic stress.
Burra Creek	Trade into water source permitted up to a total entitlement of 106 ML*	Medium instream values and low hydrologic stress
Deua River	Trade into water source not permitted.	High instream values and high hydrologic stress from town water supply extraction.
Mogendoura Creek	Trade into water source permitted up to a total entitlement of 35 ML*.	Medium instream values and low hydrologic stress
Moruya River	Trade into water source not permitted.	High instream values in estuary and already considerable entitlement in water source
Upper Deua River	Trade into water source permitted up to a total entitlement of 130 ML*.	High instream values in headwaters so trade permitted up to 10% of 80 th percentile (minus BLR)
Wamban Creek	Trade into water source permitted up to a total entitlement of 78 ML*.	Medium instream values and low hydrologic stress

Alluvial groundwater licences are:

- subject to the same dealing rules as surface water licences i.e. they are not permitted to be traded into areas with high instream values or high hydrological stress;
- may be traded between alluvial aquifers, subject to assessment; and
- are not permitted to be converted to surface water licences.

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

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 National Water Initiative, and has been allowed for during the life of the Deua River 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 Deua River water sharing plan are discussed below. Following this is a discussion about the monitoring, evaluation and reporting framework for water sharing plans. Monitoring, evaluation and reporting are key components to adaptive management.

Amendment provisions

The Deua River 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;
- establishing, amending or removing TDEs in water sources or management zones;
- 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; and
- updating information in Schedules or deleting them if no longer required.

The final Deua River plan also includes the following amendments that are specific to the Deua catchment.

Deua River cease-to-pump

The Deua River water sharing plan contains a provision to amend the cease-to-pump established in year six in the Deua River Water Source to approximate the 95th percentile flow, if future flow data from the new Riverview gauge (217007) indicates that the 95th percentile is significantly different from 5 ML/d.

Very low flow class for the Araluen Water Source

The plan contains a clause that will allow amendment of the Very Low Flow Class for the Araluen Creek Water Source if an alternative gauge site for Araluen Creek is established. In this case the upper limit of the Very Low Flow Class should approximate the 95th percentile stream flow in Araluen Creek (where days of zero flow have been excluded from the percentile calculations).

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); and
- 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; and
- 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 WMA 2000, the Minister for Natural Resources, 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 the Department of Primary Industries, Office of Environment and Heritage and Local Land Services. 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 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; and

- 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 Natural Resources Commission (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; and
- a report from the Natural Resources Commission 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 Local Land Service 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 that are not and have therefore been 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* (NSW) or Schedule 4 of the *Fisheries Management Act 1994* (NSW).

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 (EMU): 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 gauging station: 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 (GDEs): Ecosystems that rely on groundwater for their species composition and their natural ecological processes.

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 (MZ) 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 WMA 2000, 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.

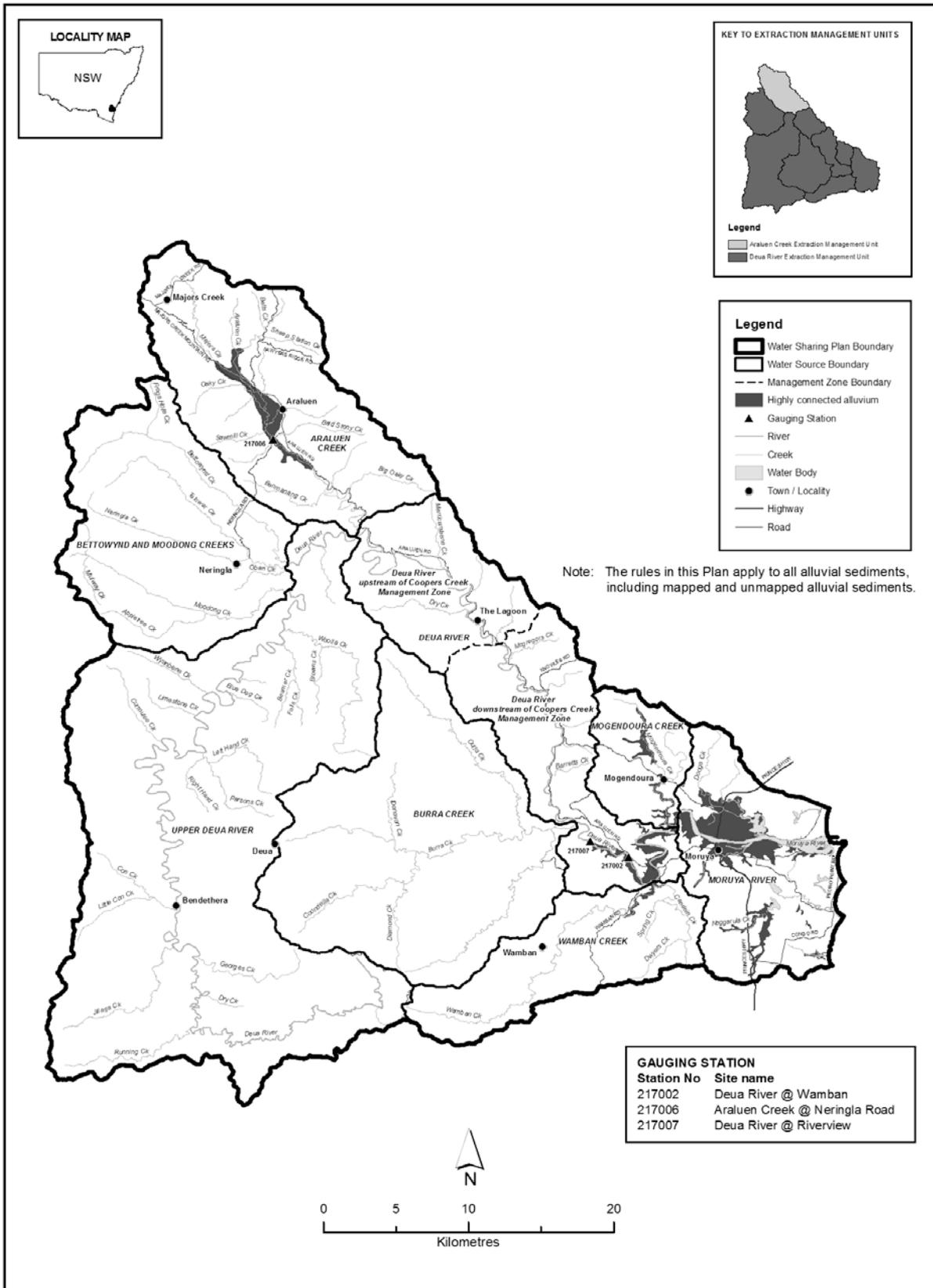
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Appendix 1

Water sharing plan map



Appendix 2

Identified threatened species

It is important to note that 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. Accordingly, threatened species considered to be highly sensitive to low flows are given a highly priority for protection.

The tables below show threatened species that are known (K) or expected (E) to occur in each water source.

Table 7: Threatened fish species known or expected in the Deua River water sharing plan area

	Deua River	Mogendura Creek	Wamban Creek	Burra Creek	Araluen Creek	Bettwynd & Moodong Creeks	Upper Deua River	Moruya River
Threatened fish species								
Australian Grayling	K	K	K	K	K	K	K	K
Threatened frog species								
Alpine Tree Frog	E	E	E	E	K	E	E	
Booroolong Frog					K			
Giant Burrowing Frog	K	K	K	K	K	K	K	K
Green and Golden Bell Frog	K	K	K	K	K	K	K	K
Little John's Tree Frog	K	K	K	K	K	K	K	E
Red-crowned Toadlet					K			
Southern Bell Frog					K	K	K	
Stuttering Barred Frog	E	E	E	K	K	K	K	E
Yellow-spotted Bell Frog					K			
Threatened macroinvertebrate species								
Adam's Emerald Dragonfly					K			
Giant Dragonfly					K			
Threatened bird species								
Australasian Bittern	K	K	K	K	K	K	K	K
Black Bittern	K	K	K	K	K	K	K	K
Black-tailed Godwit	K	K	K					K

	Deua River	Mogendura Creek	Wamban Creek	Burra Creek	Araluen Creek	Bettownd & Moodong Creeks	Upper Deua River	Moruya River
Blue-billed Duck					K			
Little Tern	K	K	K					K
Freckled Duck	K	K	K		K			K
Great Knot	K	K	K					K
Greater Sand-plover	K	K	K					K
Lesser Sand-plover	K	K	K					K
Osprey	K	K	K					K
Regent Honeyeater	K	K	K	K	K	K	K	K
Sanderling	K	K	K					K
Terek Sandpiper	K	K	K					K
Threatened mammal species								
Greater Broad-nosed Bat	K	K	K	K	K	K	K	K
Large-footed Myotis	K	K	K	K	K	K	K	K
Threatened wet flora								
Waterwheel plant	K	K	K					K
Threatened populations								
South east corner bioregion	K	K	K					K
Freshwater wetlands on coastal floodplains	K	K	K					K
Declared locations								
Aquatic reserves								K
Declared wilderness areas				K	K		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 Reference Panel and support staff

Table 8: Regional Panel membership and expertise

Name	Agency	Role	Expertise
Tracey Brownbill	DPI Water	Agency representative	Water planning and policy, catchment management, consultation
Brett Miners	Local Land Services (previously Southern Rivers CMA)	Observer	Catchment management and river rehabilitation
Anne Muir	Department of Primary Industries	Agency representative	DPI regional input to water reforms, agriculture, catchment management and land use/strategic planning.
John O'Connor	Department of Primary Industries	Agency representative	Catchment management, local knowledge of catchments, agricultural issues.
John Patten (replaced by Dan Wiecek)	Office of Environment and Heritage	Agency representative	OEH regional input to water reforms, conservation issues.
Dan Wiecek	Office of Environment and Heritage	Agency representative	OEH regional input to water reforms, conservation issues.

Table 9: Support staff membership and expertise

Name	Agency	Role	Expertise
Robyn Bevitt	DPI Water	Hydrological support	Aquatic ecology and environmental flow monitoring
Bob Britten		Hydrogeological support	Groundwater analysis and hydrology.
Andrew Craig		Water sharing plan coordination	Local knowledge, facilitation and consultation
Christine Hill		Socio-economic support	Economic and social policy
Kylee Wilton		Plan writer	Water planning and policy
Craig Jones		Compliance support	Water licensing and monitoring
Wayne Ryan		Licensing support	Licensing support, local knowledge.
Simon Williams		Environmental water	Aquatic ecologist, knowledge of flow requirements for freshwater biota.
Kimberley Williamson		Planning support	Facilitation and consultation
Peter Ledwos		Urban water support	Urban water supply management

Appendix 4

Regional Panel reference materials

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 statewide database that holds all flow record 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 NSW 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
- NSW DPI Fisheries modelled data sets (Fish Community Index, Fish Community Vulnerability)
- NSW DPI Fisheries freshwater and saltwater recreational fishing database

Appendix 5

Final classification summary

Value matrix

	Low hydrologic stress or hydrologic risk	Medium hydrologic stress or hydrologic risk	High hydrologic stress or hydrologic risk
High Instream Values	a Upper Deua River Bettowynd and Moodong Creeks Moruya River	b Deua River*	c
Medium Instream Values	d Burra Creek Mogendoura Creek Wamban Creek	d	f Araluen Creek*
Low Instream Values	g	h	i

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

Risk matrix

	Low dependence on extraction	Medium dependence on extraction	High dependence on extraction
High Risk to Instream Values	A	B Deua River*	C
Medium Risk to Instream Values	D	E	F Araluen Creek
Low Risk to Instream Values	G Moruya River Bettowynd and Moodong Creeks Burra Creek Mogendoura Creek Upper Deua River Wamban Creek	H	I

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

Appendix 6

Summary of submissions received on the draft plan

Table 10: Summary of issues raised in written submissions for the draft Deua River water sharing plan

Issue	Concerns raised	Outcomes and decisions
Cease-to-pump (general)	<p>Phasing in of cease-to-pump over first five years not supported</p> <p>Practicality of policing cease-to-pump and daily access rules</p>	<p>No change to proposed cease-to-pump rules.</p> <p>Staged approach is designed to give users time to adjust and prepare for a higher cease-to-pump</p> <p>Acknowledged. In the absence of metering NOW relies on water users voluntarily observing access rules and licence conditions, peer pressure, and information from public about possible breaches.</p>
Access to very low flow	<p>Access to very low flows not supported</p> <p>BLR users should not be allowed to access very low flow</p>	<p>No change to very low flow rule.</p> <p>NOW is unable to limit BLR as it is a basic right, but is developing reasonable use guidelines.</p>
Town water supply	<p>Access to very low flow to provide for critical human needs during drought</p>	<p>Increased TDEL for local water utility from 1 ML/d to 2 ML/d when the storage level in Deep Creek Dam falls below 40%.</p>
Granting new access licences	<p>Concern over licences issued in perpetuity</p> <p>Likely to be many unlicensed users in the catchment extracting water for domestic use.</p>	<p>No change to current rules. This is defined by WMA 2000 and is outside the scope of the plan</p> <p>Landholders whose properties have river frontage are permitted to extract water under BLR. Landholders whose properties do not have river frontage will need to purchase entitlement to extract water.</p>
Water trading	<p>Limited opportunities to purchase entitlement due to small number of licences in the catchment</p> <p>Difficulties in identifying buyers and sellers due to privacy issues</p> <p>Eurobodalla Council is encouraging new sustainable agriculture and horticulture to develop a local produce market. The water sharing plan will affect existing small-scale growers and discourage others from setting up market gardens.</p>	<p>No change to water trading rules.</p> <p>The panel considered an amendment clause to allow revision of trade rules if it could be demonstrated that the water market in the Deua was restricting development of small scale market gardens. However the panel thought that this may delay any potential trades from happening and therefore decided not to proceed with an amendment clause.</p>
Flow reference point for Araluen water source	<p>Araluen gauge not accurate at low flows due to past dredging in the riverbed</p> <p>Concern over lack of access for extended periods making orchard activities unviable</p>	<p>DPI Water discussed the issue further with stakeholders at several public meetings. The revised access rules are believed to address the concerns of water users.</p>
Cease-to-pump for Araluen water source	<p>Cease-to-pump for surface water user ceases in Year 6 of the plan.</p>	<p>Panel acknowledged inequity and agreed to apply the cease to pump in year 3 for both surface water and alluvial licences.</p>

Issue	Concerns raised	Outcomes and decisions
Highly connected groundwater in Araluen water source	<p>Suitability of 40m buffer where surface water rules will apply</p> <p>Around 90% of groundwater users in Araluen are not covered by the cease-to-pump rules</p>	<p>Buffer is based on statewide policy. Hydrogeological advice indicated that 40 m was appropriate for Araluen Creek.</p> <p>The fractured rock aquifer is not thought to contribute substantially to base flow in Araluen Creek or its alluvial sediments.</p>
Consultation	<p>Insufficient notification regarding plan exhibition and public meeting</p> <p>Insufficient time to consider plan contents</p>	<p>Exhibition period was extended till June 28 and several subsequent meetings were held following public exhibition.</p>
Other	<p>Forestry activities pose serious threats to water quality and quantity. Regrowth forests require more water than natural forests. Forestry activities in Deua catchment should be terminated.</p> <p>Repeal of Section 26D of the Water Act 1912 which classified riparian land as 'protected land'</p> <p>Difficulty in obtaining information on water licences through GIPA Act</p>	<p>The impact of forestry activities on catchment hydrology is outside the scope of the water sharing plan. This issue is being considered at a statewide level.</p> <p>Stakeholder was referred to relevant staff at Southern Rivers CMA.</p> <p>Water planning staff have discussed these issues with the Manager, Governance and Information Requests.</p>