Department of Primary Industries
Water

Water Sharing Plan for the Snowy Genoa Unregulated and Alluvial Water Sources

Background document

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Water Sharing Plan for the Snowy Genoa Unregulated and Alluvial Water Sources: Background document

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More information

Rural Water Planning

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Acknowledgments

Cover image: Snowy River at Dalgety during an environmental flow release (courtesy Dayle Green)

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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 unregulated[1] 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 *Water Sharing Plan for the Snowy Genoa Unregulated and Alluvial Water Sources 2016* (the Snowy Genoa water sharing plan). It includes information on the purpose of the plan and the policy framework that supports it, a description of the Snowy and Genoa catchments including land and water use, and the process of developing the various water sharing rules in the plan. This document is part of a range of material available specifically on the plan including:

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

General information on the macro planning process is available in the water sharing plans section of the 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 to aid commercial users in operating 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 10 year period
- clear trading and access rules which will help foster trading of water
- greater security with existing water licences converted to perpetual water access licences under the WMA 2000

Environmental considerations

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

Unregulated streams

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

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

Each water source in the Snowy Genoa 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 Snowy Genoa 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 (draft) *Water Sharing Plan for the South Coast Groundwater Sources.*

The Snowy Genoa water sharing plan also includes rules on the location of new works and extraction from existing works to protect high priority groundwater dependent ecosystems and other environmentally sensitive areas such as rivers or streams.

A water sharing plan for the Snowy and Genoa rivers

This water sharing plan formalises water sharing arrangements in the Snowy and Genoa rivers and provides a consistent approach to managing water across the plan area.

Objectives of the plan

The objectives of the Snowy Genoa water sharing plan are to:

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

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

c) protect basic landholder rights

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

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

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

g) contribute to the maintenance of water quality

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

i) adaptively manage these water sources

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

Scope of the plan

The Snowy Genoa water sharing plan covers two discrete water resources: unregulated rivers and alluvial groundwater. Since there are no regulated[2] 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 "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 Snowy Genoa water sharing plan applies to the catchments of the Snowy River and Genoa River in NSW. The water sharing plan defines 25 water sources which are divided into three EMUs:

- The Alpine Rivers EMU (upstream of Jindabyne Dam),
- The Lower NSW Snowy River EMU (downstream of Jindabyne Dam), and

[2] Whilst there are large dams on the Snowy River these dams do not release water to supply downstream water users. The Snowy River is therefore considered an unregulated river.

- The Genoa River EMU

In the Alpine River EMU two water sources have been subdivided into management zones. Lake Eucumbene is managed as a separate zone to the surrounding tributaries that enter the lake, and similarly Lake Jindabyne is managed as a separate zone to the surrounding tributaries. In the Lower NSW Snowy River EMU the Delegate River Water Source has been divided into Little Plains Management Zone and Quidong Management Zone.

The location and extent of these water management units are shown on the map in Appendix 1 and are listed in Appendix 2.

Policy and planning framework

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

- *Water Management Act 2000*
- *Access Licence Dealing Principles Order 2004*
- National Water Initiative
- Natural Resource Commission statewide targets
- Catchment Action Plans
- 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* (hereafter referred to as 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 Dealing Principles specify that dealings must consider:

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

The Dealing Principles specify rules for different types of dealings (such as conversion to a new category, subdivision, consolidation, assignment of rights or allocation, changing water sources, amending extraction components and interstate dealings). They specify the requirements that must be met for a dealing to be permitted, and the conditions under which 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 statewide targets for natural resource management which have been embedded in the NSW State Plan. The Standard is designed to apply to natural resource management at all scales including at the state, regional, catchment and local level.

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

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

Catchment Action Plan

Catchment Action Plans are statutory, non-regulatory plans that were previously prepared by the state's catchment management authorities under the *Catchment Management Authorities Act 2003* (now repealed). In January 2014 the NSW Government established Local Land Services and transferred the functions of catchment management authorities into this new organisation. South East Local Land Services will be responsible for continuing the delivery of natural resource management programs on the south coast.

The South East Catchment Action Plan (South East LLS 2014) brings together the goals and targets of the previous catchment action plans prepared by the former CMAs in the region. It sets the framework for the sustainable use and care of the natural resources of the south coast and Snowy region.

Under the Goal of "*Diverse, healthy, connected and productive natural environments*" the CAP specifies two priority actions relating to the management of surface water, wetland and groundwater assets:

- Implement practices that maintain and improve the condition of priority surface water, wetland and groundwater assets
- Facilitate the equitable sharing of water between people and the environment

The implementation of water sharing plans on the south coast is one of the key activities to be implemented in supporting land and water managers to maintain or improve the condition of surface water, wetland and groundwater assets (South East LLS 2014).

Water planning policies and considerations

A number of policies and guidelines have been developed since commencement of the WMA 2000. These policies have arisen in response to specific water management issues that need to be considered during the development of water sharing plans. These policies directly influence the planning process and the formulation of water sharing rules.

Protecting pools, lagoons and lakes

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

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

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

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

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

Managing surface water and groundwater connectivity

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

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

Protecting basic landholder rights

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

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

The requirements of harvestable rights have been inherently considered in the water sharing process, as access rules are based on river flows that result after harvestable rights extractions have occurred. There are currently no extractions for native title rights, however the plan allows for these rights should they be activated during the plan's ten year term.

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

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

Protecting town water supply access

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

Protecting Aboriginal values

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

Water sharing plans recognise the importance of rivers and groundwater to Aboriginal culture. The plans will allow Aboriginal communities to apply for water access licences for cultural purposes such as manufacturing traditional artefacts, hunting, fishing, gathering, recreation and for cultural and ceremonial purposes. Aboriginal cultural licences can also be used for drinking, food preparation, washing and watering domestic gardens. These cultural licences are limited to 10 ML/yr per application. Opportunity for granting licences for Aboriginal cultural purposes throughout the Snowy Genoa 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 DPI Water website www.water.nsw.gov.au

Protecting estuary health

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

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

Water interception activities

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

Water sharing plans cannot restrict the volume of water collected under harvestable rights[3] but can place restrictions on instream dams – dams that are located on streams of third order or higher. Under statewide 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 statewide policy in relation to this issue.

[3] 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 DPI Water website, with input parameters being property location and property size.

Description of the plan area

The Snowy and Genoa catchments

The area covered by the Snowy Genoa water sharing plan (Appendix 1) comprises the Snowy River catchment and the adjoining Genoa River catchment within NSW. The plan covers an area of around 10,077 km^2 and includes the townships of Jindabyne, Berridale, Bombala, Dalgety and Delegate, and the resort villages of Perisher and Thredbo.

The Snowy River rises on the slopes of Mount Kosciuszko in the Snowy Mountains and flows south into Victoria entering the sea at Marlo. The main tributaries of the upper Snowy River are the Eucumbene and Thredbo Rivers, which join the river near Jindabyne. Below Jindabyne Dam the Snowy River flows for 352 km to its outlet into the Tasman Sea at Marlo. Tributaries that enter the river downstream of Jindabyne Dam include the Mowamba, Jacobs, Pinch, Maclaughlin, Bombala and Delegate Rivers in NSW, and the Deddick, Buchan, Rodger and Brodribb Rivers in Victoria.

The Genoa River begins near Bombala and flows for 95 km to Mallacoota Inlet in southeast Victoria. The water sharing plan includes the upper reaches of the Wallagarauh River, a major tributary which joins with the Genoa River in the upper reaches of Mallacoota Inlet.

Water management

There are four major dams in the upper catchment of the Snowy River: Eucumbene, Guthega, Island Bend, and Jindabyne. Eucumbene is the largest dam with a storage volume of 6,735,300 ML. The furthest downstream is Jindabyne Dam which can store 689,790 ML of water.

The dams form part of the Snowy Mountains Hydro-electric Scheme which was completed in 1974 and is operated by Snowy Hydro Limited. The scheme comprises 16 major dams, seven major power stations, a pumping station, 145 km of trans-mountain tunnels and 80 km of aqueducts. Water from the storages is diverted to the power stations for electricity generation and then released to the Murray and Murrumbidgee valleys for irrigation use.

For many years the Snowy Mountains Scheme diverted approximately 99% of the mean annual flow from the Snowy River at Jindabyne or 96% as measured at Dalgety. In December 2000 the NSW, Victorian and Commonwealth Governments signed an agreement to increase environmental flows in the Snowy River by up to 28% of average natural flow. Limited environmental releases to the Snowy River commenced in 2002. In 2011 the release of larger flushing flows from Jindabyne Dam began, commencing the long process of environmental recovery for the river.

All of the rivers and creeks in the Snowy and Genoa catchments are considered to be unregulated (the storages are not used to supply the needs of water users on the river). Water users rely on natural river flows, although small dams and weirs may be present.

Aboriginal history

The highlands of south-eastern Australia show evidence of Aboriginal occupation from as far back as 21,000 years ago (Flood 1996). Aboriginal sites have been found within the valleys of the Snowy Mountains and along the upper Snowy River including camp sites and workshops for making stone tools, small stone artefact scatters and prehistoric burial sites (Australian Government 2013). River valleys such as the Snowy and Thredbo rivers provided an important year-round source of food and served as key summer access corridors to the high country (DEC 2006).

At least five Aboriginal groups claim a current connection to the waterways of the Snowy Mountains, including the Snowy River (Connolly and Williams 2014):

- The Bidwell Maap people traditionally lived along the rivers and estuaries of Gippsland and southern NSW. Running water (djuran) was a central part of their culture which provided them with food and medical treatment.
- The Maneroo-Ngarigo people occupied the mountains and rivers of the eastern flowing catchments in southern NSW. Water is an integral part of their cultural connection to the landscape. The Maneroo-Ngarigo people identify the River Blackfish as an important cultural asset in the Snowy River.
- The Wolgalu people traditionally lived in the high country along the upper reaches of the Murrumbidgee and Tumut rivers, and the Eucumbene River. They relied on the aquatic resources of the montane rivers such as freshwater crayfish, mussels and Silver Perch. For the Wolgalu people the upper Murrumbidgee is the birthplace of the Waawi, the Water Spirit, which takes care of the waterways.
- The Southern Monero/Yuin/Bolga people lived along the coastal lakes and waterways of south east Victoria including the Bemm River, Cann River, Genoa River and Snowy River. According to their culture the 'Waterhole Big Lizard' lived in the Wallagaraugh and Genoa rivers and would release water during dry times and store excess water during high flows to release in the future.
- The Wiradjuri people traditionally occupied the country west of the Great Dividing Range but maintained a close connection to the Snowy Mountains through their stories and knowledge relating to the spring snow melt, or Billa Bidgee Kaap (big water season). The mountain waterways provided their main food source and the snow melt played an important role in promoting the growth of watercress on flooded river banks and creating breeding grounds for swamp corroboree frogs.

Traditionally these communities would access the Snowy Mountains waterways for a variety of purposes including trade and ceremonial activities. Often the end of the snow melt signified the timing for these communities to travel to the mountains. During the summer months Wiradjuri men and other traditional neighbours travelled to the upper Snowy Mountains for traditional men's business and to feast on the Bogong moth.

The lifestyle of the Aboriginal people was catastrophically disrupted when European settlers arrived in the Alps in the 1820s. The nomadic lifestyle of Aboriginal people conflicted with the European notion of land ownership. From this time on, there were reports of diminishing access to water, fish and native animals (HO and DUAP 1996). Infectious diseases devastated many Aboriginal populations and cultural traditions were disrupted. The last known Bogong moth hunt occurred in 1865 (Flood 1980).

Early European settlement and land use

The first European settler arrived in the Monaro region in 1827 taking up a parcel of land northeast of Berridale (HO and DUAP 1996). By 1830 William Woodhouse had established the property of Inchbyra on the Snowy River and by the end of the 1830s nearly the whole of the Monaro region had been taken up by squatters (HO and DUAP 1996). The early properties supported both cattle and sheep grazing.

From the mid-1860s the alpine meadows began to be used as a valuable summer grazing resource. The tradition of moving stock to the high alpine areas for the summer months emerged from the land reforms of the 1860s which saw many large runs subdivided into smaller lots, making them more susceptible to drought conditions. The first recorded instance of this was during the 1865 drought when a property owner from Cooma moved his stock up

into the mountains for the summer (HO and DUAP 1996). It became a common practice which persisted until 1969 when grazing was banned from the Kosciuszko National Park.

Alpine grazing was unregulated until 1889 when the government introduced 'snow leases' through the Crown Lands Amendment Act. By 1921 there were 61 snow leases covering around 100,000 hectares and by 1943 this area had tripled. Between 1945 and 1956 up to 168,000 sheep and 13,000 cattle were moved into the high country each year (HO and DUAP 1996). Some 60 stockmen's huts survive throughout the Australian Alps as a reminder of the area's grazing history.

Early cropping was predominantly wheat which was used to supply the region with flour. By the early 1880s there were 11 mills operating in the Monaro region including at Jindabyne, Cooma and Bombala (HO and DUAP 1996). The importance of wheat began to decline from the 1890s once the railway opened up bringing with it less expensive wheat from the Murrumbidgee region. By 1920 most of the flour mills had ceased operating.

The towns of the Snowy Mountains grew in response to the needs of the settlers and graziers in the region. Bombala was the largest town in the region in the 1850s with a population of around 300 people. The village of Cooma was gazetted in 1849 and grew gradually through the 1850s and 60s. Its role as the main service centre for the region was secured in 1889 when the rail line from Goulburn was completed (HO and DUAP 1996).

The presence of gold in the granitic rocks of the Snowy and Eucumbene rivers was discovered in 1852 by geologist WB Clarke (HO and DUAP 1996) but it was not until November1859 that a major deposit of gold was found at Kiandra. By April 1860 there were 10,000 miners working the goldfields and a small town had developed to service the miners. The rush was short lived however and the largest nuggets had all been found within a year.

Mining continued on and off at Kiandra through the late 1800s and other small scale diggings emerged on the Thredbo River, Mowamba River, Pinch River and Jacobs River (Kaufman 2002). Between 1900 and 1903 dredging for gold was carried out in the Gungarlin, Snowy and Eucumbene rivers (HO and DUAP 1996). By 1920 virtually all gold diggings in the Snowy Mountains had ceased (Kaufman 2002). From the 1870s copper was mined near Eucumbene and Bombala but this industry was also short lived with the last mine closing in 1914 (HO and DUAP 1996).

Skiing first occurred at Kiandra in 1861 when miners fashioned rudimentary skis from planks of wood (HO and DUAP 1996). The Kiandra Snow Shoe Club was founded in 1870 and became one of the earliest ski clubs outside Europe. The first ski-tow was built at Charlottes Pass in the 1930s however large scale development of ski resorts did not occur until the 1950s when road access to the mountains improved (HO and DUAP 1996).

Critical power shortages during World War 2 turned the attention of the Australian Government to the hydo-electric potential of the Snowy Mountains. Between 1942-1944 a committee of Commonwealth and State representatives examined the development of water resources in the region and in July 1949 the Commonwealth Parliament passed the *Snowy Mountains Hydro-electric Power Act 1949*, establishing the Snowy Mountains Hydro-electric Authority.

Construction started on the Snowy Mountains Hydro-electric Scheme in October 1949 and was completed in 1974 at a total historical cost of $820 million (Snowy Hydro 2014a The History). Over 100,000 men and women from 30 countries worked on the Scheme. During construction seven regional townships and over 100 temporary camps were established throughout the Snowy Mountains (Snowy Hydro 2014b The People).

Current land use and community profile

Grazing remains the major land use today, with 39% of the Snowy River catchment used for sheep and cattle grazing. Significant areas of prime grazing land are found within the Snowy River Shire which are identified as Class 4 agricultural land (suitable for grazing but not for cultivation). Large areas of the catchment are also managed for conservation. Around 35% of the Snowy River catchment in NSW lies within the boundaries of Kosciuszko National Park which encompasses 673,542 ha in total and is the largest national park in NSW. Forestry activities in the eastern part of the catchment around Bombala account for 21% of land use

The Snowy River catchment falls within three local government areas - Cooma-Monaro Shire, Snowy River Shire and Bombala Shire – however the latter two comprise the majority of the plan area. Settlement is sparse with just 7,917 people in Snowy River Shire and 2,424 people in Bombala Shire in 2012 (ABS 2014a and 2014b).

In the Snowy River Shire 22% of the population are employed in the provision of accommodation and food services, predominantly in the towns of Jindabyne and Berridale. In Bombala Shire agriculture and forestry are the largest employment sectors with 30% of the population working in these areas. Other major employment categories for both local government areas are retail, public administration, education and health care.

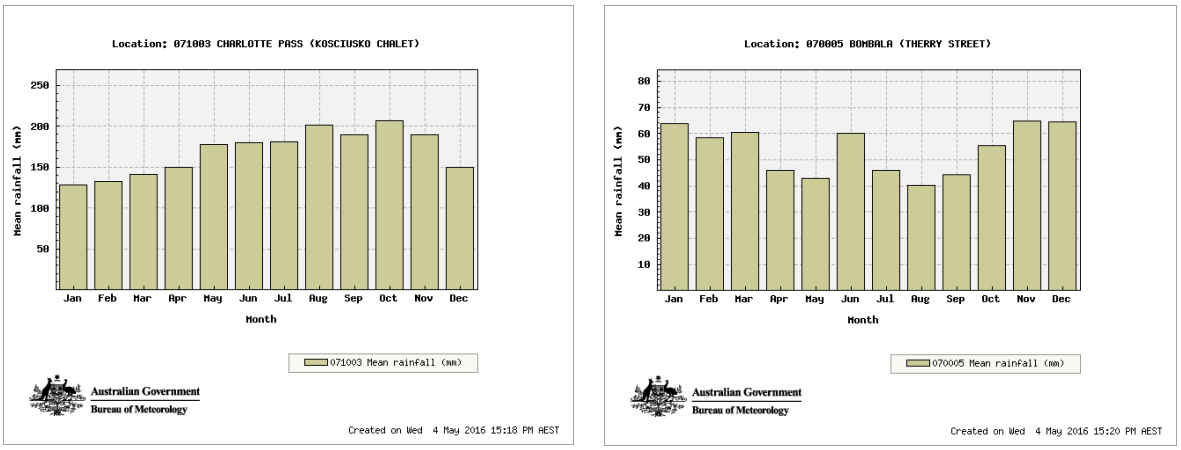
The Genoa River falls within Bega Shire and there are no major settlements within the NSW part of the catchment. Forestry and conservation are the major land uses with only a small area cleared for grazing in the Nungatta Creek area (a tributary of the Genoa River).

Climate

The Snowy Genoa catchment is generally characterised by a sub-alpine climate with an alpine climate in the mountains along the Great Dividing Range. The general distribution of rainfall is controlled largely by orographic effects resulting in a strong rainfall gradient across the upper Snowy catchment. Average annual rainfall ranges from more than 2,000 mm for the alpine areas in the west of the catchment to less than 500 mm along the rain shadow affected tablelands between Jindabyne and Bombala. Rainfall across the Genoa catchment is less variable with average annual rainfall ranging from 900-1200 mm.

In the alpine areas rainfall has a winter-spring dominance with much of the winter falls occurring as snow. Mean monthly rainfall at Charlotte Pass varies from 128 mm in January to 206 mm in October (Figure 1). At Bombala the highest rainfall is received during the summer and early autumn months. Mean monthly rainfall varies from 46 mm in July to 65 mm in November (Figure 1).

Figure 1: Mean monthly rainfall at Charlotte Pass and Bombala



Temperatures in the Snowy Genoa catchment are cool to cold because of the elevation of the mountains. The alpine areas of the catchment experience the coldest temperatures in Australia with below zero temperatures possible at any time of the year. Temperatures at Charlotte Pass generally range from -6°C to 2°C in July, and 5-18°C in January (BOM 2014). At Bombala temperatures range from -1°C to 11°C in July, and 10-25°C in January (BOM 2014).

Ecological values

The plan area supports eight nationally important wetland areas that are listed in the Directory of Important Wetlands in Australia (Department of Environment 2010) These are all alpine and sub-alpine swamps and lakes (Table 1).

Table 1: Nationally significant wetlands in the Snowy Genoa catchment

Wetland	Description	Significant values
Packers Swamp	Sub-alpine bog that forms part of the headwaters of the Bombala River.	Example of an ecosystem that is poorly represented in NSW. The swamp is well preserved and provides habitat for the threatened Powerful Owl.
Nunnock Swamp	Sub-alpine bog that forms the headwaters of Dragon Swamp Creek.	An alpine bog in good condition that supports nationally vulnerable *Eucalyptus parvula* (restricted largely to the Nunnock Swamp area). Also supports threatened fauna including Koala, Masked Owl and Powerful Owl.
Snowgum Flat	Sub-alpine bog south of Thredbo.	Forms headwaters to both the Ingeegoodbee River and the Pinch River. Good example of upland peatland swamp conserved within National Park. Potential habitat for endangered Corroboree Frog.
Rennex Gap	Sub-alpine bog west of Jindabyne.	One of the more easterly occurrences of open grassed valleys with an inverted timberline. Comprises a mosaic of subalpine communities including *Carex gaudichaudiana* which is found only in the Kosciuszko sub-alpine zone.
Monaro Lakes	Includes 215 lakes in the Monaro region extending from 28 km north of Cooma to 15 km south of Bombala.	Representative example of freshwater lakes in the southern highlands. Provide potential habitat for a range of threatened fauna and wetland habitat for migratory waders.
Kosciuszko	Includes alpine fens, bogs and lakes within Kosciuszko NP including Blue Lake, Hedley Tarn, Club Lake, Lake Albina and Lake Cootapatamba.	The only alpine wetlands in NSW. Blue Lake catchment supports threatened plant and animal species including Mountain Pygmy-possum and Broad-toothed Rat. Blue Lake and Club Lake provide habitat for the alpine fish *Galaxias findalyi* which occurs only in these two lakes on the Australian mainland.
Blue Lake	Glacial lake north of Charlotte Pass in Kosciuszko NP.	The largest, deepest and most important of the five glacial lakes (above). Blue Lake is dimictic (having thermal stratification break down and the lake completely mixes twice each year) and is the only dimictic lake on the Australian mainland. Anemone Buttercup (nationally vulnerable) occurs within the Blue Lake area as well as vulnerable fauna including Mountain Pygmy-possum and Broad-toothed Rat. Provides habitat for *Galaxias findalyi* which occurs only in two lakes on the Australian mainland.
Jacksons Bog	Upland peatland south of Delegate	Extensive peat swamp in relatively natural condition occupying about 7 km of a valley that drains into Boggy Creek and then to the Snowy River.

One of these wetland sites, the glacial Blue Lake in Kosciuszko National Park, is also a Ramsar listed site which meets three of the nine Ramsar criteria:

- The lake is a rare example of a near-natural alpine wetland within the South-East Coast Drainage Division. Blue Lake is one of only four cirque lakes found on the Australian mainland, and Blue Lake is the deepest of these alpine lakes.
- The site is known to support one nationally listed species, the vulnerable anemone buttercup and may also support the nationally endangered mountain pygmy possum.
- In addition to supporting nationally threatened species, the site supports other populations of plant and animal species important for maintaining the biological diversity of this biogeographic region.

There are some 215 natural freshwater lakes across the Monaro region (not all of these are within the plan area). The lakes range from permanent to ephemeral and provide habitat for waterbirds including four species protected under international migratory bird agreements (Great Egret, Cattle Egret, Lathams Snipe and Painted Snipe).

The montane rivers and lakes of the upper Snowy catchment also support unique macroinvertebrate and fish communities including *Galaxias findalyi* which occurs only in two lakes on the Australian mainland (Blue Lake and Club Lake within Kosciusko National Park). Throughout the entire Snowy catchment 19 fish species have been recorded (Fisheries Scientific Committee 2011).

Threatened species

The ecological values and threatened species known or expected to occur in each of the Snowy Genoa water sources are identified in Appendix 3. These species have been considered as part of the macro-classification approach in determining water sources with high environmental values. They include nine threatened frog species, ten threatened bird species and two species of bats.

The Snowy River supports a known population of Australian Grayling, an endangered fish that is listed as vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. Australian Grayling occurs in coastal streams and lagoons from the Shoalhaven River south to the Otway Ranges in 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). Australian Grayling have been recorded in the Victorian reaches of the Snowy River including the Buchan, Brodribb and Suggan Buggan rivers (Williams and Russell 2009).

River Blackfish were once abundant in the Snowy River catchment throughout the mid and upper reaches. This population has suffered a serious decline and is now found only along about 50 km of waterways of the Delegate River and some of its tributaries (Fisheries Scientific Committee 2008). River Blackfish in the Snowy River catchment are listed as an endangered population under the *Threatened Species Conservation Act 1995*.

Snowy River endangered ecological community

In 2011 the entire ‘Aquatic Ecological Community in the catchment of the Snowy River in NSW’ was listed as an endangered ecological community under the *Fisheries Management Act 1994*. The area covered by the listing includes approximately 2,300 km of lotic streams and includes all rivers, creeks and streams of the Snowy River catchment within NSW but excludes the waters of the impounded man-made lakes (Fisheries Scientific Committee

2011). The Fisheries Scientific Committee identified a number of threats to the continued survival of the Aquatic Ecological Community in the catchment of the Snowy River including:

- significant hydrologic changes to the natural flow regime
- the presence of instream barriers
- landuse practices such as clearing of riparian vegetation
- removal of snags which provide instream habitat
- deterioration of water quality
- accelerated sedimentation which has filled deep holes and smothered gravel bed and aquatic plants
- the presence of at least eight introduced fish species in the catchment

Groundwater

Groundwater aquifers in the Snowy Genoa catchment are primarily found in the fractured rock of the Lachlan Fold Belt which underlies the entire plan area. The aquifers of the Lachlan Fold Belt Snowy Genoa Water Source will be managed through a separate water sharing plan.

Alluvial aquifers are found along the major river valleys of the Snowy Genoa catchment including the Snowy River and Genoa River. There are currently 17 licensed bores in the plan area that access water from alluvial aquifers for stock and domestic purposes (basic landholder rights). At the commencement of the plan there were no aquifer access licences within the plan area.

River flows

DPI Water maintains 10 active gauges within the Snowy Genoa catchment that monitor streamflows on a daily basis (Table 2). Historical records are also available for some discontinued gauges throughout the catchment. In addition there are a number of gauges in the upper catchment that are maintained by Snowy Hydro and the Office of Environment and Heritage for their own purposes. Seven gauges are being used as flow reference points to define the water sharing rules within the plan (six maintained by DPI Water and one maintained by Snowy Hydro).

The Snowy Mountains Scheme has had a significant effect on discharge along the entire length of the Snowy River. Annual flows at Dalgety declined 96% following construction of the Scheme, while annual flows in the lower reaches of the river declined by 63-65%. In comparison, annual flows in unaffected streams such as the Delegate, Deddick and Buchan rivers declined by 20-27% due to lower rainfall during the post scheme period (Morton *et al* 2009).

In addition to reducing streamflow volumes the operation of the Scheme has affected many other aspects of the flow regime (Morton *et al* 2009):

- Peak seasonal flows in most reaches have changed from spring to winter due to the diversion of snowmelt
- The frequency of large floods (>20,000 ML/d) which occurred annually at Dalgety has been reduced to 1 in 20 years
- Mean daily summer baseflows have declined 95% at Dalgety and between 69-71% in the middle and lower reaches of the river

The release of large flushing flows from Jindabyne Dam is restoring some seasonality and diversity in the range of flows experienced in the upper reaches of the Snowy River. This is

demonstrated by the plot of daily and annual streamflows at Dalgety which shows a clear increase in variability and flow volumes since 2011 (Figure 2).

The Genoa River and its main tributary the Wallagaraugh River exhibit a natural unregulated flow regime typical of catchments on the south coast. They are permanent streams which cease flowing less than 1% of the time. Average annual flow at the current gauge on the Wallagaraugh River is 86,332 ML (Table 2).

Annual streamflows were the lowest on record in 2009 with less than 3,000 ML passing the Wallagaraugh River gauge. The highest annual flows occurred in 1978 when an annual flow of 389,453 ML was recorded (Figure 3). Significant flood events have occurred in the Genoa catchment in 1974, 1978, 1985, 1989 and 1992. In each of these events peak daily flows in the Wallagaraugh River were in excess of 200,000 ML/d (Figure 3).

Table 2: River gauges in the Snowy Genoa catchment

Gauge	Location	Catchment area (km^2)	Mean Annual Flow (ML)	Commenced
Flow Reference Points				
222004	Little Plains River at Wellesley (Rowes)	621	92,119	1941
222008	Delegate River at Quidong	1,127	149,213	1951
222017	Maclaughlin River at the Hut	313	19,683	1978
222019	Bombala River at Bombala	552	47,888	1995
222026	Snowy River at Dalgety Weir	3,050	76,168	1997
222541	Crackenback River at Paddys Corner (Snowy Hydro)	253	166,805	1985
Other gauges operated by DPI Water				
221002	Wallagaraugh River at Princes Hwy	479	86,332	1971
221010	Imlay Creek at Imlay Road Bridge	70	13,080	1981
222007	Wullwye Creek at Wullwye	520	21,600	1949
222013	Snowy River at Burnt Hut Crossing	7,081	290,878	1975
222016	Pinch River at Barry Way	155	48,178	1975
222023	Snowy River at Willis	9,200	339,500	1999
222027	Mowamba at Lynwood	3,050	32,485	2002

Figure 2: Daily and annual flows in the Snowy River at Dalgety since 1997

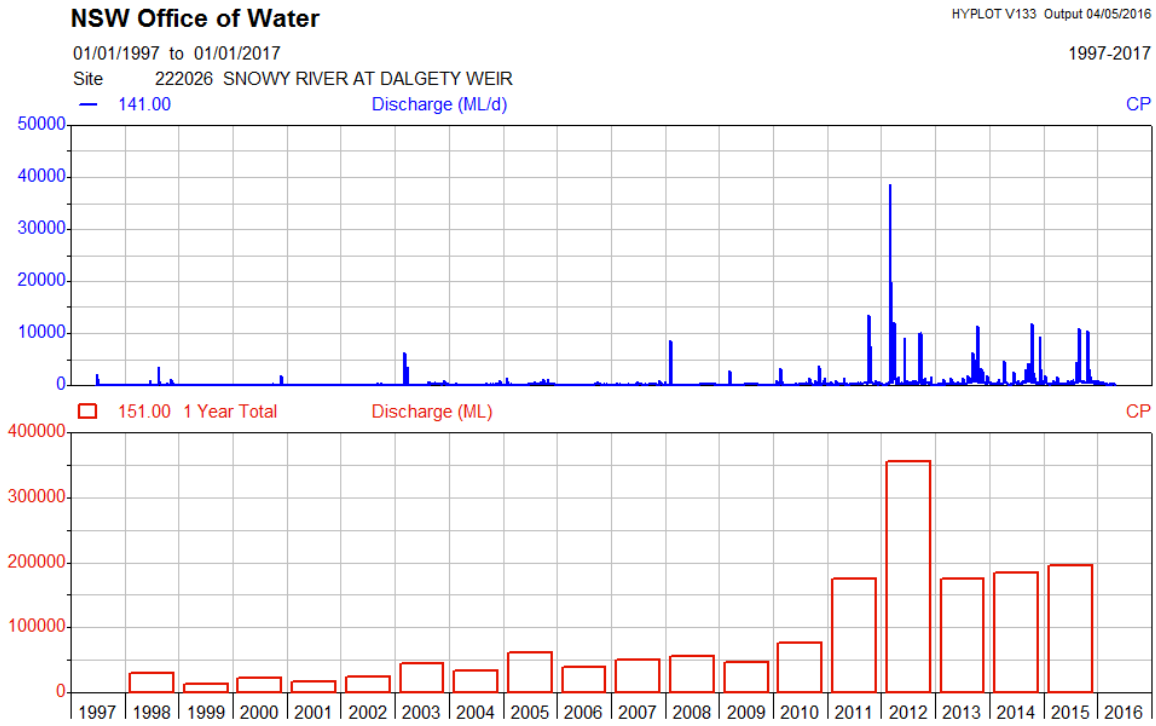
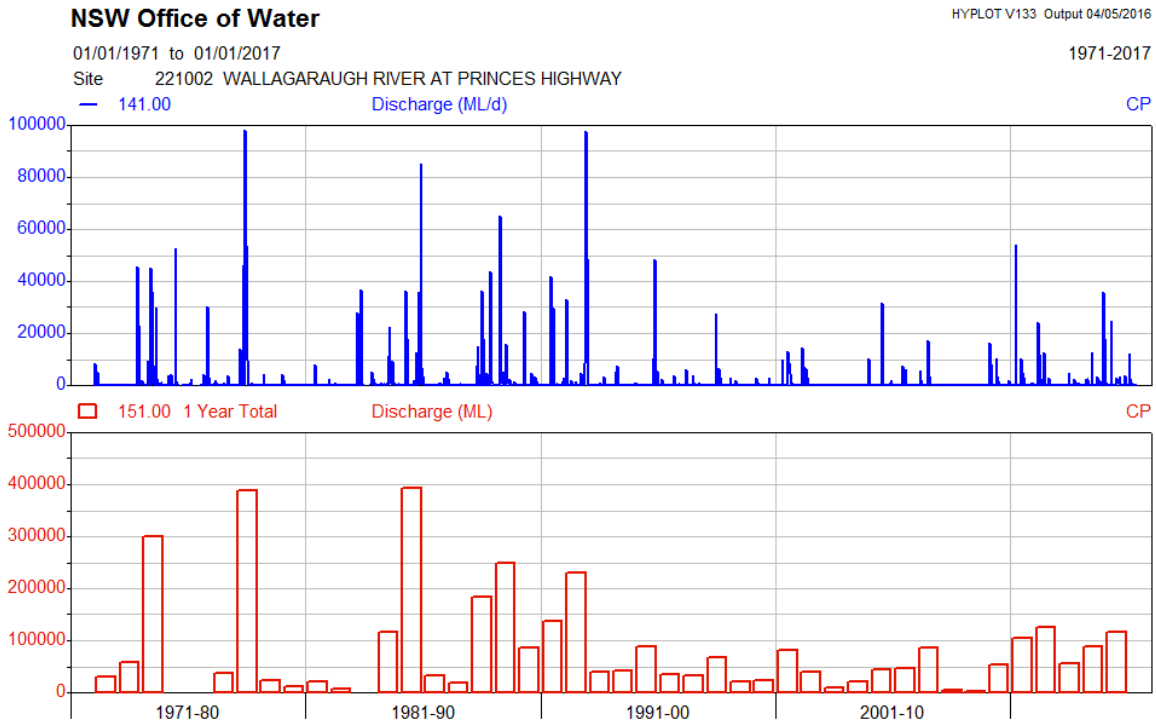


Figure 3: Daily and annual stream flows in the Wallagaraugh River at Princes Highway



Entitlement and water use

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

At the commencement of the water sharing plan, there were approximately 148 water licences in the Snowy Genoa water sharing plan area, totalling 6,688.6 ML/yr of entitlement (Table 3). All of these licences are unregulated surface water licences, there being no alluvial groundwater licences within the plan area.

The Snowy Genoa water sharing plan assumes full development of all entitlement in setting the extraction limits that form part of the water sharing rules. For the Alpine Rivers EMU the sum of the peak demands for all water sources has been estimated as 50.9 ML/d and in the Snowy River EMU peak demand is estimated at 54.9 ML/d for all water sources. The Genoa River water source does not contain any surface water licences at the time of the plan commencement. A minimal peak daily demand of 0.3 ML is estimated to meet BLR requirements.

Water extraction in the unregulated water sources

Four water sources within the plan area are classified as being of high economic significance to local communities due to their dependence on commercial water extraction. These are Perisher Creek, Upper Snowy River (Munyang Reach), Lake Jindabyne and the Thredbo River.

Water sharing arrangements are in place in some water sources mostly through existing licence conditions that restrict access when flows fall below a critical level at a defined gauge. Some licences in the alpine water sources (particularly those used for resorts and snow making) have restrictions on water access that vary according to seasons.

Of the total surface water entitlement covered by the plan, 37% is for irrigation, 35% for town water supply, 26% for industrial and snow making, and the remainder is for stock, domestic and other purposes.

Entitlement is almost evenly split between the alpine water sources of the upper catchment and the water sources of the Snowy River below Jindabyne Dam (52% occurring in the Alpine Rivers EMU). In the alpine water sources the majority of the entitlement is associated with Lake Jindabyne, the Thredbo River and the Upper Snowy (Munyang Reach) water sources where the major purposes of extraction are town water supply and snow-making.

Below Jindabyne Dam licensed extraction is concentrated along the Lower NSW Snowy River near Dalgety, and in the Bombala River and Delegate River water sources. The major uses are for irrigation and town water supply.

Long-term records of water use are not available in the Snowy Genoa catchment as there is not yet broad scale metering in unregulated catchments on the south coast.

Water extraction in the alluvium

There are 17 licensed bores extracting water from alluvial aquifers for basic landholder rights (stock and domestic use). There are no other licensed users extracting water from alluvial aquifers at the start of the plan.

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

Extraction Management Unit	Water source	Surface water entitlement (ML)	Number of surface water licences
Alpine Rivers	Upper Snowy River	67	4
	Upper Snowy River (Munyang Reach)	805	3
	Perisher Creek	311	6
	Island Bend	0	0
	Burrungubugge River	0	0
	Gungarlin River	0	0
	Lake Eucumbene	186.5	21
	Eucumbene River	79	3
	Lake Jindabyne	1154	12
	Thredbo River	780	18
	Wollondibby Creek	0	0
	Cobbin Creek	0	0
	Mowamba River	93	11
	Total	**3,468.5**	**78**
Snowy River	Lower NSW Snowy River	603	20
	Kara Creek	0	0
	Wullwye Creek	31.5	2
	Bobundra Creek	5.5	2
	Maclaughlin River	307.5	6
	Bombala River	1150	21
	Delegate River	1045.5	17
	Tombong Creek to Little River	77.1	2
	Matong Creek to Stoney Creek	0	0
	Reedy Creek	0	0
	Pinch River	0	0
	Total	**3,220.1**	**70**
Genoa River	Genoa River	**0**	**0**
	TOTAL all water sources	**6,688.6**	**148**

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

Local water utility requirements

There are numerous town water supply schemes within the Snowy Genoa plan area (Table 4). As noted above more than a third of the total entitlement within the water sharing plan is to meet local water utility requirements. The largest schemes are operated by Bombala Shire Council and Snowy River Shire Council to supply towns and villages within their local government areas. Cooma Shire Council extracts water from the Maclaughlin River for the town of Nimmitabel. In the upper catchment the ski resorts and Office of Environment and Heritage hold local water utility licences to supply the ski villages and the National Park.

Table 4: Local water utilities in the plan area

Water source	Entitlement (ML)	Town supplied	Scheme owner
Bombala River	580	Bombala	Bombala Council
Delegate River	120	Delegate	Bombala Council
Lake Eucumbene	102	Adaminaby	Snowy River Shire Council
Lake Jindabyne	78	Kalkite	Snowy River Shire Council
Lake Jindabyne	577	Jindabyne	Snowy River Shire Council
Lake Jindabyne	467	Berridale and East Jindabyne	Snowy River Shire Council
Lower NSW Snowy River	45	Dalgety	Snowy River Shire Council
Maclaughlin River	45	Nimmitabel	Cooma Shire Council
Perisher Creek	7	Perisher	Perisher Blue Pty Ltd
Perisher Creek	160	NPWS office	Office of Environment and Heritage
Thredbo River	41	Thredbo	Kosciusko Thredbo P/L
Upper Snowy River	26	Charlotte Pass Village	Charlotte Pass Village P/L
Upper Snowy River	25	NPWS	Office of Environment and Heritage
Upper Snowy (Munyang Reach)	45	Smiggins	Office of Environment and Heritage

Snowy River Shire water supply schemes

Snowy River Shire Council is responsible for the water supply functions within the settlements of Jindabyne, Adaminaby, Berridale, Dalgety, East Jindabyne, Eucumbene Cove and Kalkite. Snowy River Shire Council's Demand Management Plan (HydroScience 2012a) provides further information on each of these schemes:

- The Jindabyne Water Supply Scheme comprises two intakes in Lake Jindabyne. Raw water is chlorinated and fluoridated prior to distribution. The current design capacity of the system is 8 ML/d. The Council operates 12 service reservoirs in Jindabyne with a total capacity of 6.55 ML.
- Adaminaby water supply is sourced from a pumping station on Lake Eucumbene where it is chlorinated and fluoridated before distribution. There are two water reservoirs with a total capacity of 1.45 ML.

- Berridale water supply is sourced from Lake Jindabyne from a pumping station at East Jindabyne. Water extracted from this point supplies both Berridale and East Jindabyne. Water is transferred to Berridale via an 18.5 km delivery main.
- Dalgety's town water is sourced from the Snowy River downstream of the confluence with Wullwye Creek. Water treatment facilities include a pumping station, chlorination and micro-filtration plant.
- Eucumbene Cove water supply is drawn from a take-off point inside the Eucumbene Dam outlet tunnel where water is extracted from deep within the dam. Eucumbene Cove Water Supply Scheme does not have a water extraction licence. The scheme services approximately 40 properties.
- Kalkite water supply is sourced from Lake Jindabyne. A chlorination unit to treat the water was installed in 2003. The design capacity of the system is 1.8 ML/d.

Demand management studies completed in 2012 (HydroScience 2012a) indicated that Jindabyne's current entitlement of 577 ML would not be sufficient to meet annual demand within a few years. However this modelling did not take into account the high number of non-residential accommodations in the area. Implementing shower retrofits in non-residential accommodations is likely to have a significant impact on reducing Jindabyne's water demand. Revised modelling in November 2012 has shown that Council has sufficient water to meet Jindabyne's annual demand until 2033 if demand management measures are implemented (HydroScience 2014). All other water supply schemes in Snowy River Shire have adequate supplies to meet expected growth over the next 30 years (HydroScience 2012a).

Bombala Shire water supply scheme

Bombala Shire Council holds water utility licences to supply the towns of Bombala and Delegate.

Bombala's water supply is sourced from a weir on the Coolumbooka River in the Delegate River water source. From there it is pumped to the Bombala water treatment plant where it is treated before distribution (HydroScience 2012b). The secure yield of the existing Coolumbooka Weir system has been estimated as 330 ML/year for the climate experienced over the last 120 years or so. For a 1°C climate warming it is estimated the secure yield is reduced by about 5% to 313 ML/year (NSW Urban Water Services Pty Ltd 2014). This is adequate to supply the demand experienced between 2000 and 2009 but not for the demand between 1997 and 1999 based on Bombala Council usage data.

The Delegate drinking water supply is sourced from the Delegate River. Water is extracted from a pump station on the Delegate River where it is chlorinated prior to reticulation (HydroScience 2012b). The entitlement held for Town Water supply to Delegate is 120 ML. This is greater than the demand for water use between 2000-01 and 2003-04 but not for demands experienced between 1997-98 and 98-99 based on Bombala Council usage data.

In the Bombala Council area use of reticulated water was lower from 2002–03 suggesting water use declined in direct response to the introduction of water conservation measures. (ACT Government 2004).

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 Snowy Genoa water sharing plan was guided by three panels:

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

The role of each of these panels is discussed below.

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

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

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 Snowy Genoa water sharing plan including the risks and values classification, refining the indicative rules, and the specific outcomes of panel deliberations, targeted consultation and public exhibition.

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

State Interagency Panel

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

The State Interagency Panel is chaired by the NSW Department of Primary Industries (DPI), Water and comprises representatives from DPI Water, The Office of Environment and Heritage (OEH), The South East Local Land Services (LLS) (formerly Southern Rivers Catchment Management Authority), and agriculture, fisheries and aquaculture specialists from DPI. 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 Interagency Regional Panel.

Interagency Regional Panel

The South Coast Interagency Regional Panel (the Regional Panel) comprises representatives from DPI Water, OEH, DPI Agriculture and the South East LSS as an observer. Appendix 4 lists the names of panel representatives and their areas of expertise, and also lists relevant colleagues who the panel had access to for specific technical and scientific information.

The key responsibilities of the Regional Panel were to:

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

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

Water source classification method

In developing water sharing plans for unregulated rivers, DPI Water classifies each water source based on the risks and values of water extraction. Specifically the classification process involves assessing:

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

For the Snowy Genoa 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 5.

For the Snowy Genoa water sources the Regional Panel revised some of the indicative classifications based on local knowledge and feedback from stakeholder consultation. This resulted in the following revisions:

- For the Lake Jindabyne Water Source hydrologic stress was revised from high to low. The macro-classification could not be applied as the gauge on the dam is inappropriate to use. Due to the large size of the lake and relatively small volume of entitlement the Panel considered that hydrologic stress is likely to be low.

- For the Cobbin Creek Water Source dependence on extraction was revised from medium to low. The catchment boundary used for the macro-classification was based on the former stressed rivers classification which included the upper Snowy River. As there are no licences on Cobbin Creek the Panel considered that dependence on extraction must both be low.
- For the Mowamba River Water Source the hydrologic stress was revised from low to high due to the diversions from the river for the Snowy Hydro Scheme.
- For the Maclaughlin River Water Source the hydrologic stress changed from medium to high and the risk to instream values changed from low to medium due to low flow volumes.
- For Thredbo River, Perisher Creek and Upper Snowy River (Munyang Reach) Water Sources community dependence on extraction was revised from low to high due to the economic significance of the ski fields.
- For the Upper Snowy River Water Source the community dependence on extraction was revised from low to medium due to the economic significance of the ski fields and the its size relative to other ski fields in the area.
- For the Eucumbene River Water Source the hydrologic stress was changed from medium to high due to the regulation of flow from Lake Eucumbene.

The final water source classifications (Appendix 6) were used to generate indicative access and trade rules which provided the basis for the development of draft water sharing rules.

Consultation

The draft rules formulated by the Regional Panel underwent targeted consultation with specific interest groups[4] 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 Snowy Genoa draft water sharing plan began in June 2013 and continued through the development of the water sharing plan until public exhibition in February – April, 2015. In particular, stakeholders were encouraged to provide:

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

Discussions were held with the following organisations during the targeted consultation process:

- Snowy Hydro Limited

[4] 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.

- Ski resorts
- OEH (NPWS licence holders)
- Snowy River Alliance (community organisation)
- South East Local Land Services
- Commonwealth Department of Agriculture
- Victorian Department of Environment, Land, Water and Planning
- Victorian Environmental Water Holder

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 Snowy Genoa water sharing plan was held from 19 February to 2 April, 2015 with the plan documents available for viewing at 3 locations in the Snowy Mountains region (Jindabyne, Dalgety and Bombala). Licence holders were sent letters advising of the public exhibition period. Public meetings were held at Bombala and Jindabyne on 10 March, 2015. The objectives of the meetings were:

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

Twelve written submissions were received from stakeholders including landholders, water users, environmental groups, State and Commonwealth Government and Local Council. The main issues raised in the submissions related to the cease-to-pump rules, environmental releases, town water supply and the suitability of flow reference points.

The Regional Panel considered all of the issues raised in written submissions. A summary of the issues that resulted in a change to the water sharing plan are presented in Appendix 7.

The water sharing rules

The Snowy Genoa 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 Basic Landholder Rights (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 and available water determinations (AWDs) for each water source
- rules for granting access licences
- rules for water allocation accounts
- flow classes and daily access rules for managing licensed extraction from unregulated rivers and alluvial aquifers
- rules for water supply work approvals
- access licence dealing rules, which control the trade of water within or into 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 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 (LTAAELs).

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

Requirements for water

The water sharing plan defines all of the licensed and unlicensed requirements for water within the Snowy Genoa 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 local rainfall patterns, stock requirements, the number of riparian properties and the average number of occupants per property.

At the start of the Snowy Genoa water sharing plan:

- BLR were estimated at 1319.2 ML per year
- domestic and stock access licences accounted for 122.5 ML of entitlement per year
- local water utility access licences accounted for 2,318 ML of entitlement per year
- unregulated river access licences accounted for 4255.1 unit shares (a unit share is equivalent to 1 ML in years where 100% of entitlement is allowed to be extracted)
- aquifer access licences accounted for 0 unit shares.

Managing extractions

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

The LTAAEL for the Alpine Rivers EMU comprises:

- the share components of all access licences in this EMU (3475.5 ML), plus
- the annual water requirements pursuant to domestic and stock rights and native title rights in this EMU (227.8 ML)

The LTAAEL for the Lower NSW Snowy River EMU comprises:

- the share components of all access licences in this EMU (3220.1 ML), plus
- the annual water requirements pursuant to domestic and stock rights and native title rights in this EMU (1045.7 ML)

The LTAAEL for the Genoa River EMU comprises:

- the share components of all access licences in this EMU (0 ML), plus
- the annual water requirements pursuant to domestic and stock rights and native title rights in this EMU (45.7 ML)

The LTAAELs for these EMUs incorporate an allowance to increase entitlement following conversion of low flow entitlement to high flow entitlement.

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 each of the three EMUs in the plan, 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 Snowy Genoa 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 Snowy Genoa 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 other categories of access licence in some water sources. These are Aboriginal community development, Aboriginal cultural and high flow only access licences.

Aboriginal community development access licences

The NSW Government is committed to providing Aboriginal people with opportunities to become involved in water related businesses. Therefore water sharing plans allow the granting of water extraction licences specifically for Aboriginal commercial activities in certain circumstances. However, the situations where these licences can be granted must recognise the need to protect our water sources from more and more extraction.

The current DPI Water policy requires that Aboriginal Community Development licences (ACDLs) may only access high flows (greater than 50th percentile flows). The South Coast Regional Panel recommended that no new licences be granted in water sources with high conservation value, or in areas that could not support high flow licences.

On this basis, the Snowy Genoa River water sharing plan has made provision for the granting of ACDLs from:

- Lake Jindabyne water source (Lake Jindabyne Management Zone only); and
- Lake Eucumbene water source (Lake Eucumbene Management Zone only).

In both of these water sources ACDLs may only be granted from within the lake storage (not the rivers and tributaries). New licences may be granted up to a total entitlement of 500 ML in each water source. All other water sources were considered to be unsuitable for granting additional licences due to high environmental values, inadequate stream gauging and low flow volumes.

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

Aboriginal cultural access licences

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

High-flow-only access licences

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

DPI Water guidelines recommend that high flow conversions 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 a no highly sensitive estuary or other identified high flow sensitive feature such as a wetland within the EMU
- there is no significant extraction already occurring in high flow periods
- the conversion would not significantly impact on tidal pool users or town water supplies.

The Regional Panel considered these factors in relation to the Snowy Genoa plan area and recommended that high flow conversions be made available in:

- Bombala River water source; and
- Maclaughlin River water source

For both of these water sources the water sharing plan includes an incentive to allow those licences that are converted to high-flow-only access to be granted additional volumes of water. The plan states that for every unit of unregulated river access licence entitlement surrendered, 2.5 units of unregulated river (high flow) access licence entitlement will be granted. The high flow access commences at the 30th percentile (the flow that is exceeded on 30% of days).

Water allocation accounts

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

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

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

Flow classes and daily access rules

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

- the availability of infrastructure (for example river gauges)
- the availability of management systems (for example the ability to manage the rules)

- any existing management rules (for example existing licence conditions or Water Users Association rostering rules which distribute low flow access amongst licensed users)
- whether flow regimes within different areas of a water source required different management rules.

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.

Although there are no estuaries within the plan area, consideration was given to the ecological values and significance of the Snowy River estuary 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.

For the Snowy Genoa water sharing plan two major issues that the Panel needed to consider was the lack of suitable gauges in the alpine rivers for setting access rules, and the protection of environmental flows. Further discussion of these issues is provided in the following sections.

Flow gauging in the Alpine Rivers Extraction Management Unit

Many of the gauges in the Alpine Rivers EMU are either discontinued or are owned by Snowy Hydro or OEH. The Panel agreed that the cease-to-pump for most water sources in the Alpine Rivers EMU be set at visible flow at the pump site as the gauges and the flow data are not available to the public, the data that is collected at these gauges is for a different purpose and of limited quantity in some cases, extraction is limited in most of the water sources, and compliance is possible with a visible flow rule.

An exception to this is the Thredbo River Water Source where the IRP agreed that the access rule be tied to the flow at the Thredbo River at Paddy's Corner gauge (Gauging station 222541). This gauge is owned and operated by Snowy Hydro Limited. This decision was made as the river is the only major river in the alpine area that is not significantly altered, the river has high environmental values and DPI Water is supplied with daily flow data from Snowy Hydro Limited. DPI Water is investigating ways to provide information to licence holders in the Thredbo River Water Source about their ability to access based on the Thredbo River at Paddy's Corner gauge.

Protecting environmental flows

The Snowy Water Initiative was formally established in 2002 to achieve significant improvements in river health by releasing environmental water into the Snowy, upper Murrumbidgee, and upper Murray river systems. The initiative was an agreement between the Australian, New South Wales and Victorian Governments.

The agreement includes the following water recovery targets for the Snowy, Murray and Snowy Montane Rivers Increased Flows programs.

- Snowy River – 212 gigalitres (GL), or 21 per cent of the average natural flow
- Murray River – 70 GL
- Snowy Montane Rivers – up to the equivalent of up to 150 gigawatt hours of forgone electricity generation, which equates to up to 117.8 GL.

Of these the Snowy River and many of the Montane Rivers are within the Snowy Genoa catchment. The Water Sharing Plan for the Snowy Genoa Unregulated and Alluvial Water Sources must recognise the agreement and protect the increased flows as far as possible.

In the Alpine River EMU the increased flows are typically broken into flows above Island Bend and flows below Island Bend. Increased flows below Island Bend have commenced. These are protected from extraction as they are below where any extraction currently takes place and trading rules prohibit the ability for extraction to occur in these areas for the life of the water sharing plan. The final release arrangements for the upper Snowy River above Island Bend are still being developed. The water sharing plan has not established rules to protect these flows but may be amended in the future to do so when the release arrangements are finalised.

For the lower NSW Snowy River the Panel was initially in favour of protecting the Snowy River increased flows by using the daily release targets from Jindabyne Dam to develop access rules. However, on any day releases may vary from the target release by up to 20% or 50 ML (whichever is the greatest). This is further complicated by the variation in travel time and the variable attenuation of the flow between Jindabyne Dam and Dalgety gauge.

Given the difficulties in using the daily release targets to protect the increased flows from extraction the panel agreed to set the cease-to-pump for the Lower NSW Snowy River based on long term average flows expected from the current Stage 4 release pattern.

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 and cease-to-pump rules adopted by the Regional Panel are summarised in Table 5.

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 Snowy Genoa 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.

The Maclaughlin River and the Bombala River are the only water sources for which a full range of flow classes have been defined. These are the only water sources for which high flow licences are permitted (hence the need to define a higher flow class). They are also both easily managed by a flow reference point.

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

Water source	Flow classes	Access rules	Flow reference point
Thredbo River	Very low flow (≤68 ML/d) A Class (>68 ML/d)	Licence holders are not permitted to take water when flow ≤68ML/d.	Crackenback River at Paddy's Corner 222541
Lower NSW Snowy River	Very low flow (≤119 ML/d) A Class (>119 ML/d)	Licence holders are not permitted to take water when flow ≤119 ML/d.	Snowy River at Dalgety Weir 222026
Maclaughlin River	Very low flow (≤0.6 ML/d) A Class (0.6 – 23 ML/d) B Class (≥23 ML/d)	Licence holders are not permitted to take water when flow ≤0.6 ML/d. High flow licence holders are not permitted to take water unless the flow is ≥23 ML/d.	Maclaughlin River at The Hut 222017
Delegate River (Little Plains Management Zone)	Very low flow (≤53 ML/d on a rising river; ≤38 on a falling river) A Class (>53 ML/d on a rising river; >38 on a falling river)	Licence holders are not permitted to take water when flow ≤38 ML/d on a falling river. Pumping may resume when flow>53 ML/d on a rising river.	Little Plains River at Wellesley (Rowes) 222004
Delegate River (Quidong Management Zone)	Very low flow (≤99 ML/d on a rising river; ≤69 on a falling river) A Class (>99 ML/d on a rising river; >69 on a falling river)	Licence holders are not permitted to take water when flow ≤69 ML/d on a falling river. Pumping may resume when flow>99 ML/d on a rising river.	Delegate River at Quidong 222008
Bombala River	Very low flow (≤2.8 ML/d on a rising river; ≤0.2 ML/d on a falling river) A Class (2.8 – 36 ML/d on a rising river or 0.2 – 36 ML/d on a falling river) B Class (>36 ML/d)	Licence holders are not permitted to take water when flow ≤0.2 ML/d on a falling river. Pumping may resume when flow>2.8 ML/d on a rising river. High flow licence holders are not permitted to take water unless the flow is >36 ML/d at the flow reference point.	Bombala River at Bombala Town 222019
All other water sources not listed above	No access classes defined	Licence holders are not permitted to take water when there is no visible flow at the pump site, or where water is being taken from a pool, when the volume of water in that pool is less than the full capacity of the pool.	Pump site or the outflow of the pool from which water is taken

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. They include the taking of water for:

- domestic supply
- town water supply, until major augmentation of the scheme infrastructure occurs
- fruit washing
- cleaning of dairy plant and processing equipment for the purpose of hygiene
- poultry washing and misting
- cleaning of enclosures used for intensive animal production for the purposes of hygiene.

Licences with access to very low flows are listed in Schedule 2 of the water sharing plan. At the start of the plan there were only town water supply licences that require access to very low flows, however the plan provides for the addition of other licences to Schedule 2 if required in the future.

Total daily extraction limits

One of the plan's main objectives is to share water between users during low flows, particularly where there are potentially competing demands for water from irrigators, local water utilities, the environment and other water users. This objective may be 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. TDELs 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 in the Snowy Genoa water sources, the South Coast Regional Panel agreed that it was not necessary to introduce TDELs in the Snowy Genoa water sharing plan. This is because none of the water sources within the plan have particularly high peak daily demands relative to the available flow.

Alluvial licences

For management purposes, the Snowy Genoa 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 6 of the plan to allow them to become familiar with the cease-to-pump concept and adjust their management practices.

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

Water supply works approvals

Construction of dams

Consistent with statewide policy, the Snowy Genoa water sharing plan prohibits the construction of instream dams in the following water sources which have been assessed to have high instream values:

- Upper Snowy River Water Source
- Thredbo River Water Source
- Lower NSW Snowy River Water Source
- Delegate River Water Source
- Bombala River Water Source
- Tombong Creek to Little River Water Source
- Matong Creek to Stony Creek Water Source
- Pinch River Water Source
- Genoa River Water Source.

Town water supply licence holders may apply for an exemption from this rule. The application must show that they are augmenting their current supply and will be subject to assessment.

Construction of bores in alluvial aquifers

The Snowy Genoa water sharing plan sets the distances that new bores may be permitted to be constructed from streams, other bores, Groundwater Dependent Ecosystems (GDE's) and cultural sites. These distance rules were set based on statewide recommendations.

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

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

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

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

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

The water sharing plan specifies rules for new bores located near high priority GDEs and culturally significant groundwater dependent sites. The water sharing plan states that no new works will be approved within

- 100 metres of any high priority GDE for any purpose
- 400 metres of any high priority GDE unless the bore is for BLR or is licensed to extract less than 20 ML/year
- 800 metres of any high priority GDE unless the bore is for BLR or is licensed to extract less than 100 ML/year
- 40 metres of the high bank of any river

Access dealing rules

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

The water sharing plan allows trade into nine water sources and prohibits trade into 16 water sources (Table 6). Many of the alpine water sources do not have suitable gauges which could be used to place a limit on growth in extraction. Therefore for those water sources where trade is permitted the plan does not impose a volumetric limit on trade however any applications for trade will be subject to standard assessment procedures by DPI Water.

Trading within each water source is permitted subject to approval. The only exception is the Bombala River Water Source where trading is not permitted into the Coolumbooka River Trading Zone to protect the Bombala town water supply.

Alluvial groundwater licences are subject to the same dealing rules as surface water licences. That is they:

- are not permitted to be traded into areas with high instream values or high hydrological stress
- may be traded between alluvial aquifers, subject to assessment
- 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.

Table 6: Summary of water dealing rules

Water source	Dealing rule	Justification
Upper Snowy River	Trade into water source not permitted except for onto Guthega Pondage	High instream value; Within National Park.
Upper Snowy River (Munyang Reach)	Trade into water source permitted subject to assessment	Medium instream value and low hydrologic stress; Potential snowmaking demand
Perisher Creek	Trade into water source permitted subject to assessment	Medium instream value and low hydrologic stress; Potential snowmaking demand.
Upper Snowy River (Island Bend Reach)	Trade into water source not permitted	Future environmental flows will occur in the river; no suitable gauge
Burrungubugge River	Trade into water source not permitted	No suitable gauge; Within National Park; low demand.

Gungarlin River	Trade into water source not permitted	No suitable gauge; Within National Park; low demand.
Lake Jindabyne	Trade into water source permitted subject to assessment	Medium instream value and low hydrologic stress
Eucumbene River	Trade into water source not permitted	High hydrologic stress due to regulation of flow from Lake Eucumbene
Lake Eucumbene	Trade into water source permitted subject to assessment	Medium instream value and low hydrologic stress
Thredbo River	Trade into water source not permitted	High instream value; Within National Park
Wollondibby Creek	Trade into water source permitted subject to assessment	Low instream value, no current entitlement
Cobbin Creek	Trade into water source not permitted	High hydrologic stress due to diversions to Lake Jindabyne.
Lower NSW Snowy River	Trade into water source not permitted	High instream value
Mowamba River	Trade into water source not permitted	High hydrologic stress due to diversions to Lake Jindabyne
Kara Creek	Trade into water source permitted subject to assessment	Low instream value and low hydrologic stress
Wullwye Creek	Trade into water source permitted subject to assessment	Low instream value and medium hydrologic stress
Bobundara Creek	Trade into water source permitted subject to assessment	Medium instream value and low hydrologic stress
Maclaughlin River	Trade into water source permitted subject to assessment, total entitlement cannot exceed that which exists at the start of the plan (307.5 ML/yr)	Medium instream value and high hydrologic stress
Delegate River	Trade into water source not permitted. Trade between management zones is permitted	High instream value
Bombala River	Trade into water source not permitted. Trade into Coolumbooka Management Zone not permitted.	High instream value and medium hydrologic stress; Protection of town water supply in Coolumbooka River.
Tombong Creek to Little River	Trade into water source not permitted	High instream value and no suitable gauge
Matong Creek to Stoney Creek	Trade into water source not permitted	High instream value and no suitable gauge
Reedy Creek	Trade into water source not permitted	No current entitlement and no suitable gauge
Pinch River	Trade into water source not permitted	High instream value
Genoa River	Trade into water source not permitted	High instream value

Adaptive management

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

Adaptive management is a requirement of both the WMA 2000 and the NWI, and has been allowed for during the life of the Snowy Genoa 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 Snowy Genoa water sharing plan are discussed below. Following this is a discussion about monitoring, evaluation and reporting which are key activities for the adaptive management of water sharing plans.

Amendment provisions

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

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

Specific to the Snowy Genoa catchment the final plan allows for amendment of the access rules to protect Snowy River and Snowy Montane River increased flow releases in the following water sources:

- Upper Snowy River (Munyang Reach)
- Upper Snowy River (Island Bend Reach)
- Perisher Creek
- Gungarlin River
- Lower NSW Snowy River

It also allows for the establishment of flow classes and amendment of the dealing rules in the Mowamba River or Cobbin Creek water sources if the current diversions to Lake Jindabyne cease or are reduced.

Monitoring, evaluation and reporting

DPI Water has developed a Monitoring, Evaluation and Reporting Framework in collaboration with key stakeholders. The framework conforms to NSW and Commonwealth government guidelines for monitoring, evaluation and reporting, and demonstrates an adaptive management approach to water planning required under the principles of the WMA 2000. The evaluation framework aims to inform the community of the outcomes of water sharing plans, and to collate the results of various legislatively required evaluations and relevant knowledge to inform the review of the water sharing plans. The framework will assess the inputs, outputs and outcomes of the water sharing plans and their operations. The assessment will consider:

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

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

- assessment of performance indicators (using an Environmental Flows Monitoring and Modelling program)
- an audit of plans 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 Act 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 for Water Sharing and comprises representatives from DPI Water, OEH, DPI Agriculture and Local Land Services. Representatives from the NSW Natural Resources Commission and DPI 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 to:

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

Plan review

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

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

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

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

Glossary

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

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

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. The value of a unit of share component (in terms of the average water allocations) that result from a conversion may vary from one water source to another or from one licence category to another.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Pools: Lentic water bodies (standing water), including anything falling within the definition of a "lake" found in the Dictionary of the 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

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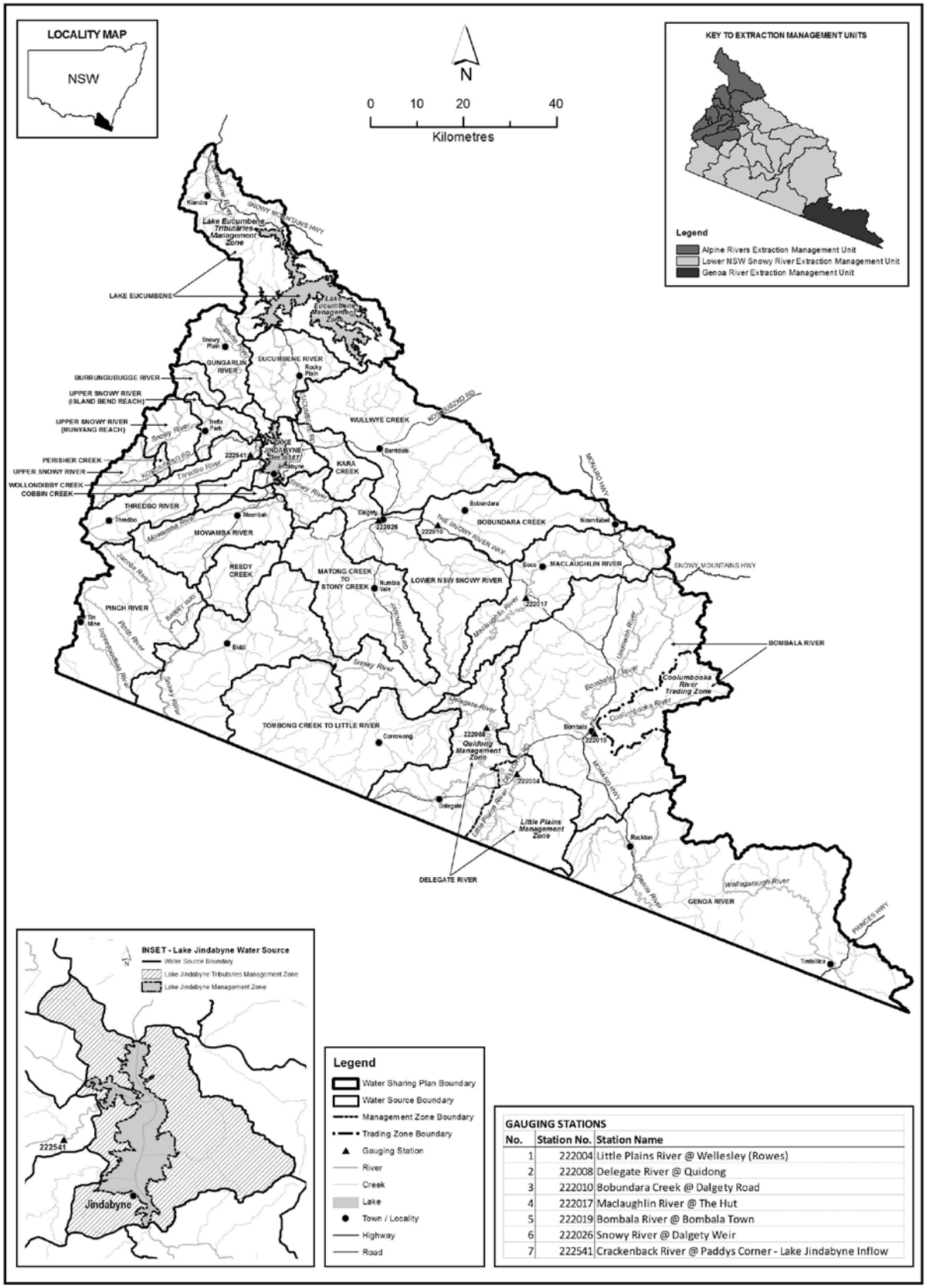
Appendices

Appendix 1

Water sharing plan map



Appendix 2

Water management units

Table 7: Water management units established by the Snowy Genoa water sharing plan

Extraction Management Unit	Water Source	Management Zone
Alpine Rivers	Upper Snowy River	
	Upper Snowy River (Munyang Reach)	
	Perisher Creek	
	Upper Snowy River (Island Bend Reach)	
	Burrungubugge River	
	Gungarlin River	
	Lake Eucumbene	Upper Eucumbene River
		Lake Eucumbene
	Eucumbene River	
	Lake Jindabyne	Lake Jindabyne Tributaries
		Lake Jindabyne
	Thredbo River	
	Wollondibby Creek	
	Cobbin Creek	
	Mowamba River	
Snowy River	Lower NSW Snowy River	
	Kara Creek	
	Wullwye Creek	
	Bobundra Creek	
	Maclaughlin River	
	Bombala River	
	Delegate River	Quidong
		Little Plains
	Tombong Creek to Little River	
	Matong Creek to Stoney Creek	
	Reedy Creek	
	Pinch River	
Genoa River	Genoa River	

Appendix 3

Identified threatened species

The macro water sharing plan process is concerned with protecting instream water values that relate to extraction. Therefore, only threatened species that are likely to be sensitive to extraction have been considered when assessing the water source values.

Some threatened species are highly sensitive to low flow extraction, whilst other threatened species, such as plants that occur in the riparian zone, are less sensitive. Threatened species considered to be highly sensitive to low flows are given a higher priority for protection.

Table 8 shows threatened species that are known (K) or expected (E) to occur in each water source.

Table 8: Threatened species that are known or expected to occur in the Snowy Genoa catchment

	Alpine Rivers													Snowy River											Genoa River
	Upper Snowy River	Upper Snowy (Island Bend Reach)	Perisher Creek	Upper Snowy (Munyang Reach)	Burrungubugge River	Gungarlin River	Lake Jindabyne	Eucumbene River	Lake Eucumbene	Thredbo River	Wollondibby Creek	Cobbin Creek	Mowamba River	Lower NSW Snowy River	Kara Creek	Wullwye Creek	Bobundara Creek	Maclaughlin River	Delegate River	Bombala River	Tombong Creek to Little River	Matong Creek to Stoney Creek	Reedy Creek	Pinch River	Genoa River
Fish																									
Australian Grayling														E					K	E	E	E	E	E	K
Frogs																									
Alpine Tree Frog	K	K	K	K	K	K	K	K	K	K	K	E	K	E	K	K	K	K	K	K	E	E	K	E	E
Booroolong Frog	K		K	K	K	K	K	K	K	K			K											K	
Giant Burrowing Frog		K		K			K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
Green & Golden Bell Frog		K		K			K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K

	Alpine Rivers													Snowy River											Genoa River
	Upper Snowy River	Upper Snowy (Island Bend Reach)	Perisher Creek	Upper Snowy (Munyang Reach)	Burrungubugge River	Gungarlin River	Lake Jindabyne	Eucumbene River	Lake Eucumbene	Thredbo River	Wollondibby Creek	Cobbin Creek	Mowamba River	Lower NSW Snowy River	Kara Creek	Wullwye Creek	Bobundara Creek	Maclaughlin River	Delegate River	Bombala River	Tombong Creek to Little River	Matong Creek to Stoney Creek	Reedy Creek	Pinch River	Genoa River
Littlejohn's Tree Frog														K				K	K	K	K	K		K	K
Southern Bell Frog		K		K			K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K		K
Spotted Tree Frog	K	K	K	K	K	K	K	K	K	K			K											K	
Stuttering Barred Frog														K							K	K		K	K
Yellow-spotted Bell Frog		K		K			K	K	K		K	K	K	K	K	K	K	K	K	K	K		K		
Macroinvertebrates																									
Giant dragonfly																									K
Birds																									
Australasian Bittern		K		K		K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
Black Bittern													K								K	K		K	K
Black-tailed Godwit																					K				
Blue-billed Duck		K		K			K	K	K	K	K	K	K	K	K	K	K	K	K	K		K	K		
Freckled Duck		K		K			K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K		
Painted Snipe	K	K	K	K	K	K	K	K	K	K			K											K	K
Regent Honeyeater		K		K			K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
Little tern																									K

	Alpine Rivers													Snowy River											Genoa River
	Upper Snowy River	Upper Snowy (Island Bend Reach)	Perisher Creek	Upper Snowy (Munyang Reach)	Burrungubugge River	Gungarlin River	Lake Jindabyne	Eucumbene River	Lake Eucumbene	Thredbo River	Wollondibby Creek	Cobbin Creek	Mowamba River	Lower NSW Snowy River	Kara Creek	Wullwye Creek	Bobundara Creek	Maclaughlin River	Delegate River	Bombala River	Tombong Creek to Little River	Matong Creek to Stoney Creek	Reedy Creek	Pinch River	Genoa River
Osprey																									K
Sanderling																									K
Other fauna																									
Greater Broad-nosed Bat	E	K	K	E	E	E	E	E	E	E			E	K	K			K	K	K	K	K	K	K	K
Large-footed Myotis	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
Endangered ecological communities																									
Snowy River aquatic ecological community	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	
Threatened populations																									
South East Corner Bioregions																									K
Freshwater wetlands on coastal floodplains																									K
River Blackfish in the Snowy River																			K	K					
Declared locations																									
Ramsar	K																								

	Alpine Rivers													Snowy River												Genoa River
	Upper Snowy River	Upper Snowy (Island Bend Reach)	Perisher Creek	Upper Snowy (Munyang Reach)	Burrungubugge River	Gungarlin River	Lake Jindabyne	Eucumbene River	Lake Eucumbene	Thredbo River	Wollondibby Creek	Cobbin Creek	Mowamba River	Lower NSW Snowy River	Kara Creek	Wullwye Creek	Bobundara Creek	Maclaughlin River	Delegate River	Bombala River	Tombong Creek to Little River	Matong Creek to Stoney Creek	Reedy Creek	Pinch River	Genoa River
Other Nationally Important Wetlands	K									K			K	K		K			K	K						
Declared Wilderness Area					K	K				K			K	K							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 4

Interagency Regional Panel and support staff

Table 9: South Coast Regional Panel-membership and expertise

Name	Agency	Role	Expertise
Tracey Brownbill (Kristanne Mahoney alternate)	NSW DPI, Water	Agency representative	Natural resource management, water reforms and water management
Anne Muir	NSW DPI, Agriculture	Agency representative	DPI regional input to water reforms, agriculture, catchment management and land use planning
John O'Connor	NSW DPI, and South East LLS	Agency representative	Catchment management, local knowledge, agricultural issues
Daniel Wiececk	OEH	Agency representative	OEH regional input to water reforms, conservation issues
Brett Miners	South East Local Land Services	Observer	Catchment management, local knowledge, river rehabilitation
Chris Presland	South East Local Land Services	Observer	Catchment management, local knowledge, river rehabilitation

Table 10: Support staff membership and expertise

Name	Agency	Role	Expertise
Danielle Doughty	DPI Water	Water sharing plan coordination	Water planning and policy
Simon Williams		Environmental water	Environmental flow requirements for freshwater biota
Chayna Moldrich		Plan writing	Water planning and policy
Brendan Fletcher		Plan writing	Water planning and policy
Hitesh Patel		Hydrologic modelling	River modelling
Bob Britten		Water Regulation	Licensing
Kelly Lynch		Rural Water Planning	Water planning and policy
Adam Wiggins		Hydrometrics	Gauge data and information

Appendix 5

Reference information used by Interagency Reference Panel

DPI Water data sets

- Licensing Administrator System/ Water Licensing System – 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.
- 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.
- River Condition Index – Data held by DPI Water
- Threatened species (fish) – Data supplied by NSW DPI.
- 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 Fisheries (NSW DPI) modelled data sets (Fish Community Index, Fish Community Vulnerability).
- NSW Fisheries (NSW DPI) freshwater and saltwater recreational fishing database.
- Office of Environment and Heritage – Endangered and Threatened Ecological Communities and other declared locations.

Appendix 6

Final classification summary

Table 11: Value matrix used to determine indicative dealing rules

	Low hydrologic stress or hydrologic risk	Medium hydrologic stress or hydrologic risk	High hydrologic stress or hydrologic risk
High Instream Values	**a** Upper Snowy River Thredbo River Lower NSW Snowy River Delegate River Tombong Creek to Little River Matong Creek to Stoney Creek Pinch River Genoa River	**b** Bombala River	**c**
Medium Instream Values	**d** Upper Snowy River (Munyang Reach) Perisher Creek Upper Snowy River (Island Bend Reach) Burrungubugge River Gungarlin River Lake Eucumbene Bobundara River Reedy Creek Lake Jindabyne*	**e**	**f** Maclaughlin River* Mowamba River* Eucumbene River *
Low Instream Values	**g** Wollondibby Creek Kara Creek	**h** Wullwye Creek	**I** Cobbin Creek

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

Table 12: Risk matrix used to determine indicative access rules

	Low dependence on extraction	Medium dependence on extraction	High dependence on extraction
High Risk to Instream Values	**A**	**B**	**C**
Medium Risk to Instream Values	**D** Bombala River Maclaughlin River*	**E**	**F**
Low Risk to Instream Values	**G** Cobbin Creek * Upper Snowy River (Island Bend Reach) Burrungubuggee River Gungarlin River Lake Jindabyne Eucumbene River Lake Eucumbene Wollondibby River Mowamba River Kara Creek Wullwye Creek Bobundara Creek Delegate River Tombong Creek to Little River Matong Creek to Stoney Creek Reedy Creek Pinch River Genoa River	**H** Upper Snowy River Lower NSW Snowy River	**I** Thredbo River * Perisher Creek * Upper Snowy River (Munyang Reach) *

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

Appendix 7

Summary of submissions received on the draft plan

Issue	Concerns raised	Outcomes and decisions
Prohibition of Dams on third order or higher streams.	Bombala Council raised concerns about their ability to supply town water if this rule was applied.	Allow town water supply licence holders to apply for an exemption from rule 46 (1) which prohibits the creation or alteration of dams on third order or higher streams. The application should show that they are augmenting their current supply and will be subject to assessment.
Name of the Lower Snowy River Water Source	Confusion with the name Lower Snowy River considering there are lower sections of the Snowy River in Victoria	Change the name of the Lower Snowy River Water Source to the Lower NSW Snowy River Water Source.
Recognition of the legal instruments that influence the Snowy River.	The draft plan did not adequately recognise the various legal instruments that affect the Snowy River.	These instruments have been named and referred to in the plan.
Cease to Pump for the Lower NSW Snowy River	Environmental release patters have changed since 2013. The cease to pump in the draft plan was based on releases prior to 2013.	The Cease to Pump has been changed to 119 ML/day from 97 ML/day. This is the same proportion of access (access is possible 90% of the time) but is based on the new environmental release regime.