



# WATER

## Operations Report

### 2009 - 2010

**snowyhydro**  
*renewable energy*







# Foreword

This is the third annual *Water Operations Report* that has been prepared by Snowy Hydro. As with the previous two reports, this report will be widely distributed to our company's stakeholders and those local communities associated with the Snowy Scheme.

This *Water Operations Report* describes in high level summary how the Snowy Scheme operates, our water operations during the 2009-10 water year (1 May 2009 -30 April 2010) and how Snowy Hydro has again met its obligations under the *Snowy Water Licence*.

A highlight of this water year was the release of the Final Report of the five-year review of the *Snowy Water Licence* released by the NSW Office of Water. That assessment by the NSW Government confirmed that Snowy Hydro had met the stringent obligations imposed on the company under the *Snowy Water Licence* with respect to releasing environmental flows during the period since the Corporatisation of the Snowy Scheme in 2002.

That Report was followed by the making of several variations to the *Snowy Water Licence* by the NSW Office of Water. Snowy Hydro will continue to meet all its obligations under the varied *Snowy Water Licence*. Further information about this is on page 8.

Snowy Hydro makes available to the public a large amount of information regarding the water operations of the Snowy Scheme – principally through this *Water Operations Report* and further more detailed information on the company's website [www.snowyhydro.com.au](http://www.snowyhydro.com.au).

Snowy Hydro is committed to improving public understanding and appreciation of the many responsibilities and stringent obligations that the company has with regard to the water resources of the Snowy Scheme. Through reading this information, we trust that the community will be more informed of the facts and more circumspect of the ill-informed commentary that is made from time to time about water management of the Snowy Scheme.

On page 26 of this report you will find an independent audit report that provides verification of the data contained within this 2009-10 *Water Operations Report*. Further information including terminology, calculation of data and *Snowy Water Licence* obligations can be found by visiting [www.snowyhydro.com.au](http://www.snowyhydro.com.au)



David Harris  
Executive Officer, Water  
Snowy Hydro Limited



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# Key highlights

Snowy Hydro complied with the requirements of the *Snowy Water Licence* during the 2009-10 water year.

During the 2009-10 water year, Snowy Hydro complied with each water release target relating to:

- the Required Annual Release to the River Murray catchment
- the Required Annual Release to the Murrumbidgee River catchment
- environmental releases into the Snowy River from Jindabyne Dam
- environmental releases from Tantangara Dam
- environmental releases from Goodradigbee Aqueduct

Snowy Hydro takes pride in continuing to meet both its water and electricity obligations during this 12-year period of prolonged drought – which has included the lowest inflow year on record during 2006-07.

While inflows this year were higher than the previous water year, they are still well below average.

A number of consecutive years of above average inflows are now required to see storage levels restored to long term average levels.





# Purpose of this report

The main purpose of this *Water Operations Report* is to provide Snowy Hydro's stakeholders and the local communities associated with the Snowy Scheme with information on how the company performed in the 2009-10 water year against its *Snowy Water Licence* obligations.

Those obligations essentially relate to:

1. targeting water releases to the River Murray and Murrumbidgee River catchments, the annual volumes of which are determined according to formulae set out in the *Snowy Water Licence*
2. targeting water releases from Jindabyne Dam into the Snowy River for environmental purposes (Snowy River Increased Flows), and
3. facilitating potential additional natural flows over nominated Snowy Scheme aqueducts and targeting releases from Tantangara Dam, both for environmental purposes (Snowy Montane Rivers Increased Flows).

The Snowy Hydro water year commences on 1 May and concludes on 30 April each calendar year. Volumes in this report are quoted in gigalitres (GL). 1 gigalitre is equal to 1,000 megalitres (ML). 1 megalitre is equal to 1 million litres.

Since the commencement of the operation of the Snowy Scheme, water release volumes have been set as targets and any minor differences between the target and actual release volumes (excess or shortfall) are carried over to the next water year. This is done in the form of 'overs and unders' and is expressly permitted in the *Snowy Water Licence* in recognition of the difficulties inherent in achieving precise release volumes using infrastructure on the large scale of that comprising the Snowy Scheme.



# Overview of Snowy Hydro

Snowy Hydro operates under an independent board. The company's shares are owned by the New South Wales Government (58%), Victorian Government (29%) and the Commonwealth Government (13%).

Although the Snowy Scheme was designed to produce electricity, it was also created by the three Governments to mitigate the effects of drought on irrigated agriculture in NSW and Victoria – to improve the security of water supply to farmers along the River Murray and Murrumbidgee River.

The Snowy Scheme only became a reality when the Governments worked out a way to pay for the construction and maintenance of the Snowy Scheme, which was from the sale of the Snowy Scheme's electricity output.

The Snowy Scheme was built over a 25-year period from 1949 to 1974. It includes 16 major dams, eight power stations, 145km of interconnected tunnels and 80km of aqueducts.

The Snowy Mountains Hydro-electric Authority was responsible for the construction and maintenance of the Snowy Scheme under the direction of the Snowy Mountains Council.

From 1998, when the National Electricity Market (NEM) was formed, the electricity output from the Snowy Scheme was bid into the market with all other energy companies in an open, competitive marketplace. Snowy Hydro Trading Pty Ltd was formed to trade the electricity output of the Snowy Scheme in the NEM.

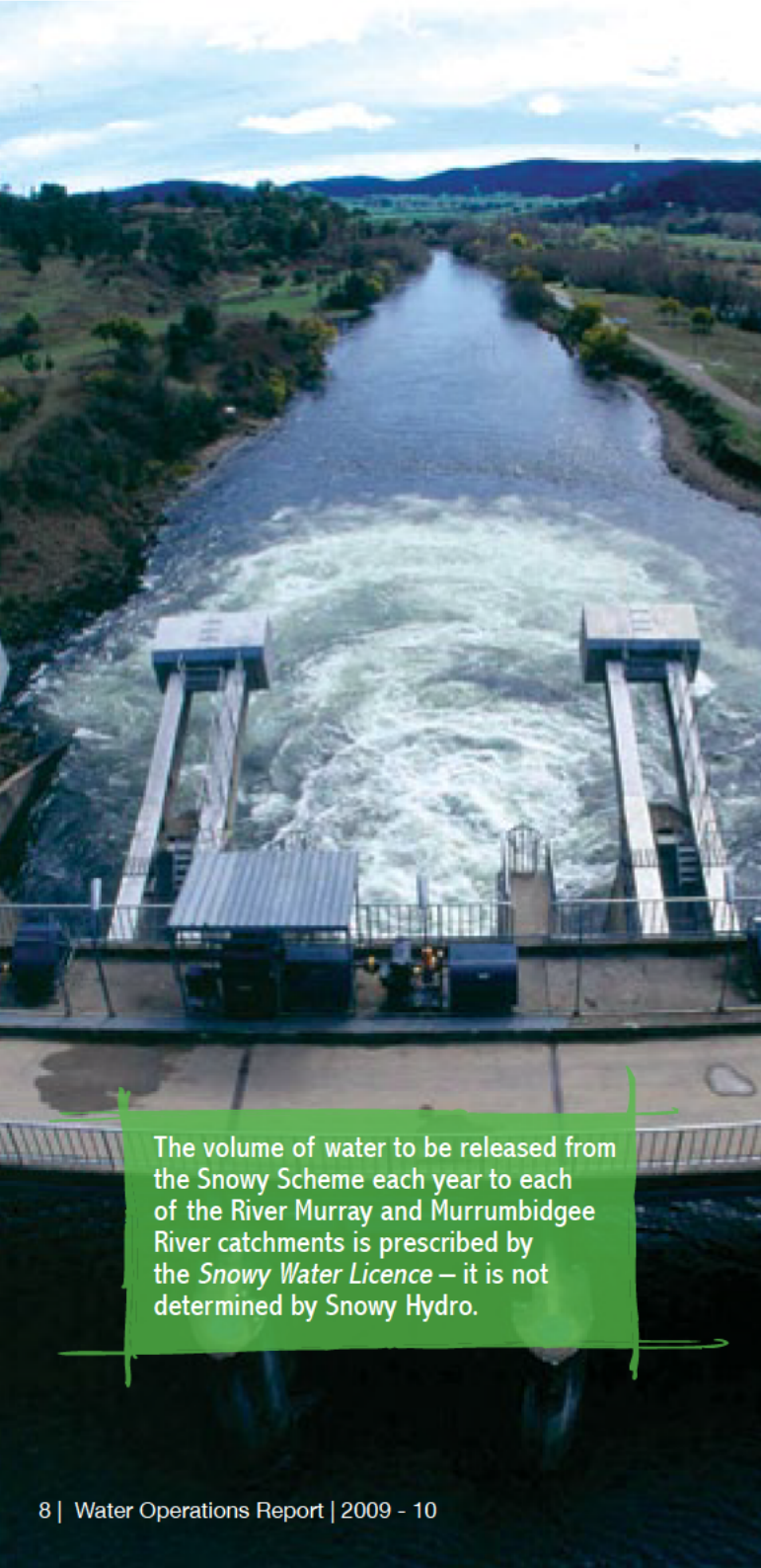
In 2002, the Snowy Mountains Council and the Snowy Mountains Hydro-electric Authority were abolished and the Snowy Scheme was corporatised to create Snowy Hydro Limited. Also, Snowy Hydro Trading became a non-operating subsidiary of Snowy Hydro.

Snowy Hydro today is a growing business providing a range of price risk hedging products and renewable energy products to participants in the competitive NEM.

Snowy Hydro operates the 3,800 megawatt (MW) Snowy Scheme and also owns and operates the 300MW Valley Power gas-fired power station and the 320MW Laverton North gas-fired power station, both located in Victoria.

Red Energy, an electricity and gas retailer, is a subsidiary of Snowy Hydro Limited. Red Energy currently operates in Victoria, New South Wales and South Australia and has over 250,000 electricity and gas retail customers.





The volume of water to be released from the Snowy Scheme each year to each of the River Murray and Murrumbidgee River catchments is prescribed by the *Snowy Water Licence* – it is not determined by Snowy Hydro.

# The Snowy Water Licence and our business

To ensure that the benefits of the Snowy Scheme could be maximised for both water security and electricity generation, a set of operating principles and water accounting rules was developed under the 1957 Snowy Agreement.

On corporatisation in 2002, the key elements of those operating principles and water accounting rules were codified and carried forward in the *Snowy Water Licence* issued by the New South Wales Government.

The *Snowy Water Licence* is not a freedom to act, as is the case with most licence arrangements. Rather, it is a bundle of a few rights and numerous, legally binding and enforceable obligations.

The many legally binding obligations imposed on Snowy Hydro under the *Snowy Water Licence* include obligations with regard to targeting water releases from the Snowy Scheme.

Snowy Hydro's rights to collect, divert, store and release water under the *Snowy Water Licence* in no way represent any form of ownership of the water. All of the water in the Snowy Scheme is owned by the interests who have an entitlement to releases from the Snowy Scheme. This includes the States of New South Wales and Victoria, water users licensed by those States and of course the environment.

In practical terms, to generate electricity Snowy Hydro must release water from the Snowy Scheme, and to release water from the Snowy Scheme, Snowy Hydro must generate electricity. In this way, water releases, electricity generation and their associated market impacts are inseparably linked.

The mandatory nature of the obligations imposed upon Snowy Hydro by the *Snowy Water Licence* means that, as a practical matter, Snowy Hydro operates the Snowy Scheme to first meet its water release obligations and then to maximise electricity market opportunities within the constraints imposed by the *Snowy Water Licence*.

Downstream water users have never been charged for the water regulation services provided to them each year by the Snowy Scheme.

Snowy Hydro has to fund both the debt and operating costs of the Snowy Scheme through its participation in the highly competitive National Electricity Market. Those electricity revenues pay for the increasing costs of maintaining and operating the Snowy Scheme, including the costs associated with making environmental flows.



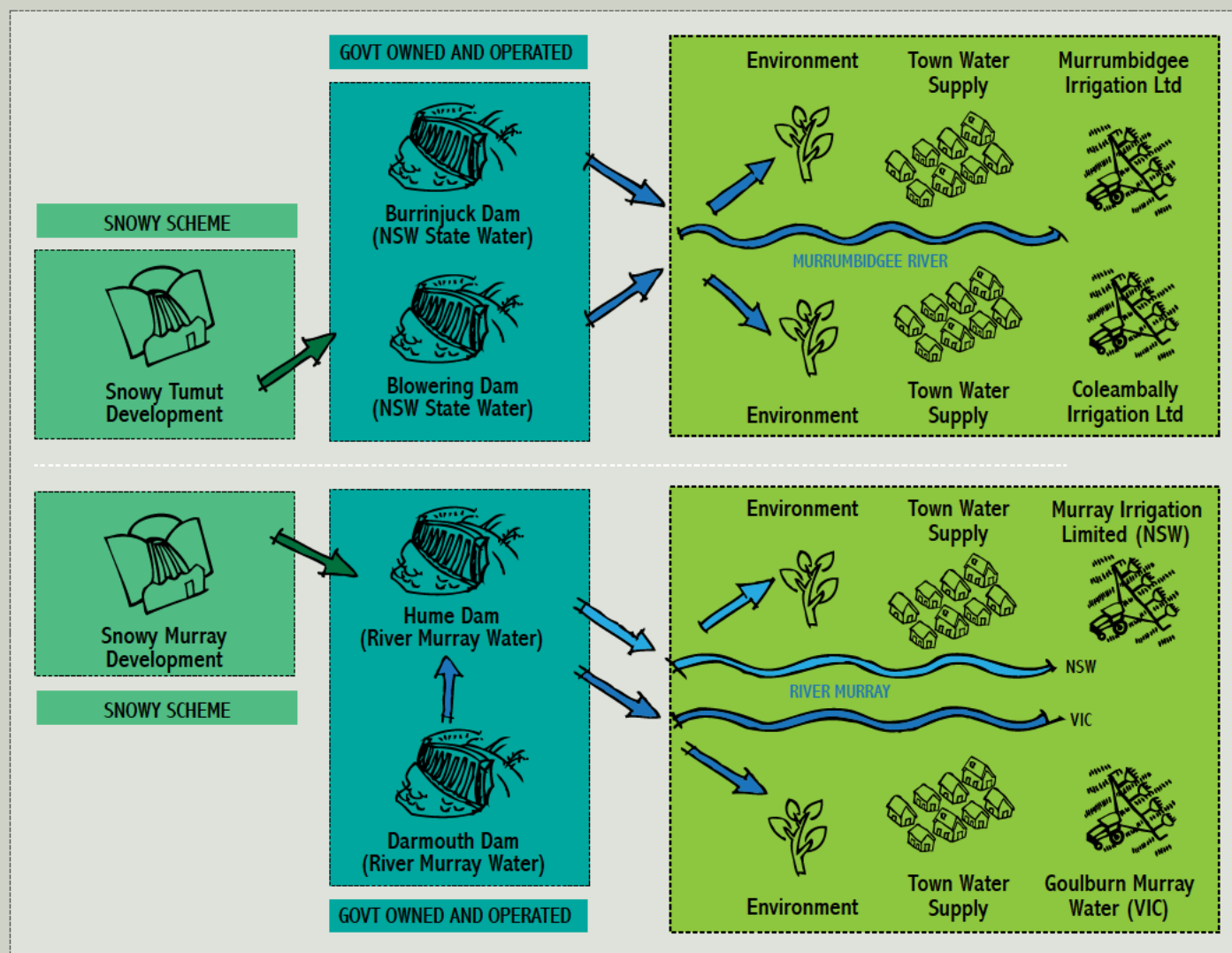
# Downstream from the Snowy Scheme

Snowy Scheme releases and the other River Murray and Murrumbidgee River catchment inflows are re-regulated by the Hume Dam on the River Murray and Blowering Dam on the Tumut River – neither of which are owned or controlled by Snowy Hydro.

Snowy Hydro has no influence over or involvement in the allocation or delivery of water to downstream water users.

Water releases for extractive and environmental uses along the upper River Murray are managed by the Murray - Darling Basin Authority, principally through releases from Dartmouth and Hume Dams (the Snowy Scheme does not make releases into Dartmouth Dam).

Water releases for extractive and environmental uses along the Murrumbidgee River are managed by the NSW State Water Corporation, principally through releases from Blowering and Burrinjuck Dams (again, the Snowy Scheme does not make releases into Burrinjuck Dam).





# Drought and water releases

Snowy Hydro's primary obligation under the *Snowy Water Licence* is to release a calculated volume of water annually to each of the River Murray and Murrumbidgee River catchments. Each of these volumes is calculated principally by reference to inflows.

In drought years, as we continue to experience, the volume of water to be released from the Snowy Scheme is reduced under the formulae set out in the *Snowy Water Licence*. This is known as the Dry Inflow Sequence Volume (DISV) reduction.

This reduction to the volume of water to be released from the Snowy Scheme has been applied since the 2006-07 water year, which was the lowest year on record for inflows into the Snowy Scheme. In 2006-07 only 683 GL flowed into the Snowy Scheme storages compared to long term average annual inflows of around 2,800GL.

Even during a prolonged drought sequence far worse than the Snowy Scheme was designed to cope with, Snowy Hydro is meeting both its electricity and water obligations.

Continuing below average inflows have again resulted in low storages, which will affect Snowy Hydro's ability to make long term average releases in 2010-11 and beyond.

In the absence of a number of consecutive years of above average inflows, the storages in the Snowy Scheme will not recover for some years yet, underscoring the importance of Snowy Hydro's investment into gas fired electricity generation. Without this foresight and investment, the financial implications on the business of this prolonged drought would have been severe.



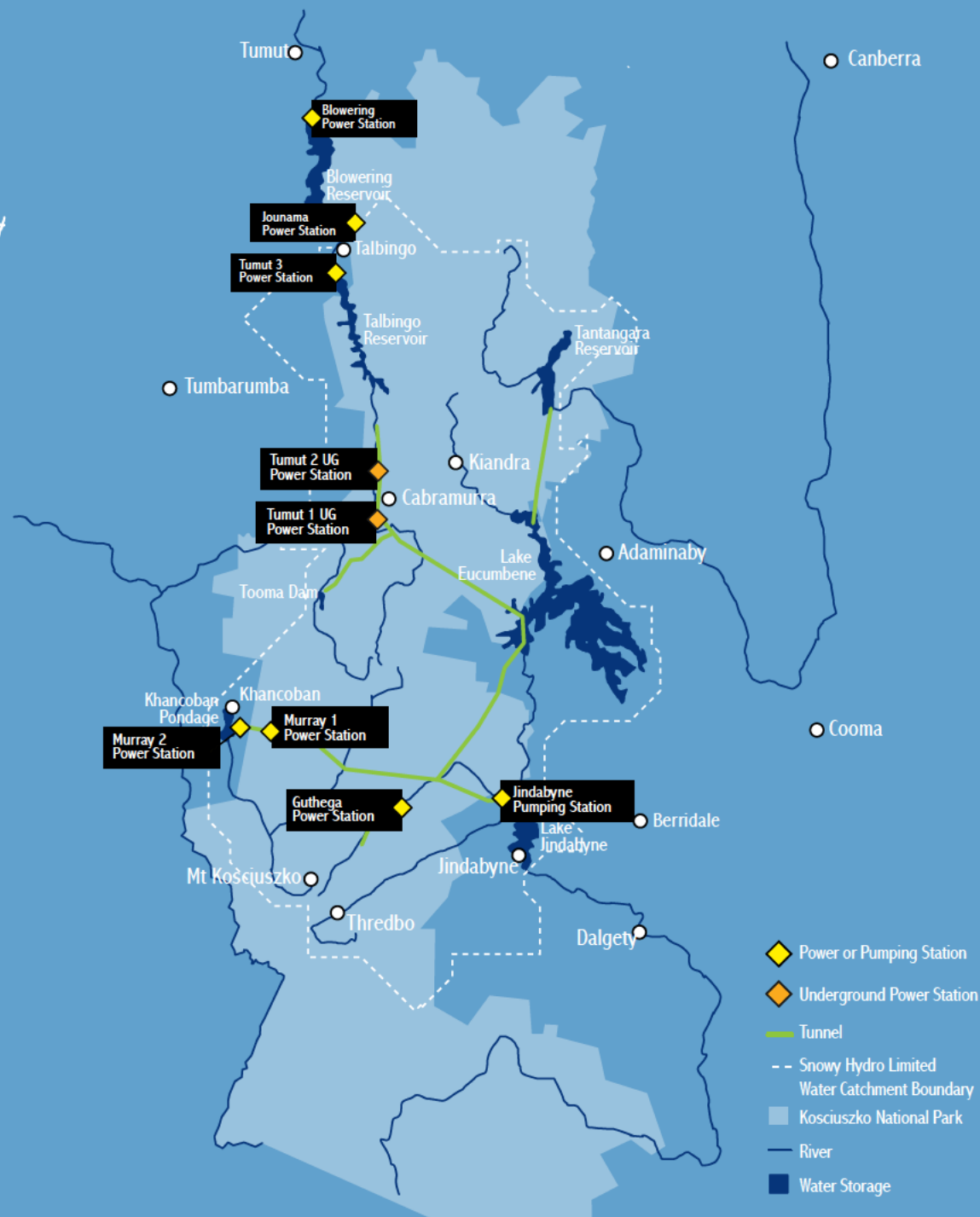
# How the Snowy Scheme works

Recognised as one of the greatest civil engineering wonders of the modern world, the Snowy Scheme has the added distinction of being one of the most complex, multipurpose, multi-reservoir hydro schemes ever built. The Snowy Scheme's features include:

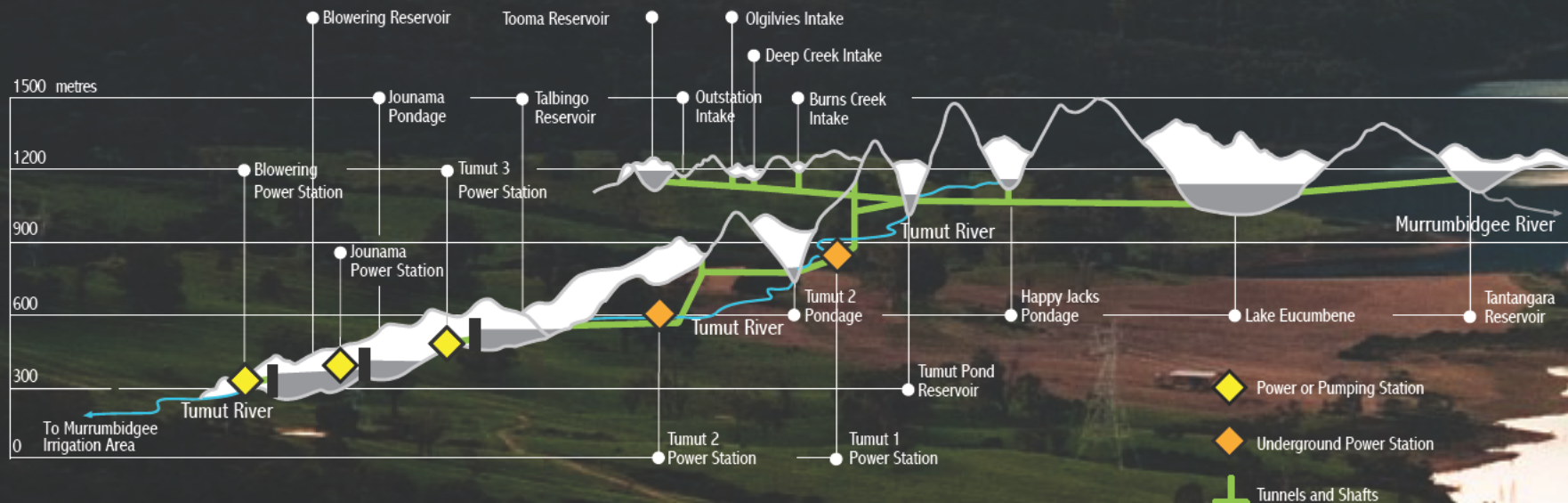
- eight power stations - Murray 1, Murray 2, Blowering, Guthega, Tumut 1 (located 366m below ground level), Tumut 2 (located 244m below ground level), Tumut 3 and the new Jounama Small Hydro Power Station
- one pumping station at Jindabyne and a pump storage facility at Tumut 3
- 16 major dams and a total storage capacity of 7,000 GL or almost 12 times the volume of Sydney Harbour
- 145km of inter-connected tunnels and pipelines and 80km of aqueducts
- 32 turbines with a generating capacity of 3,800MW.

The Snowy Scheme was designed to collect and store water, including water that would otherwise flow east of the Snowy Mountains to the coast, diverting it through trans-mountain tunnels and power stations and then releasing it west of the Snowy Mountains into the catchments of the River Murray and the Murrumbidgee River, where it can be used for town water supply, extractive and environmental uses.

The Snowy Scheme comprises two major developments: the northern Snowy-Tumut Development and the southern Snowy-Murray Development.







## Snowy-Tumut Development

The Snowy-Tumut Development consists of five power stations and 16 generating units. It collects the headwaters of the upper Murrumbidgee, Tooma and Eucumbene Rivers. Those waters are diverted through trans-mountain tunnels to Tumut Pond Dam where they join the waters of the Tumut River and flow through Tumut 1 and Tumut 2 underground power stations, discharging into Talbingo Reservoir. Water stored in Talbingo Reservoir then passes through the Tumut 3 Power Station and into Jounama Pondage.

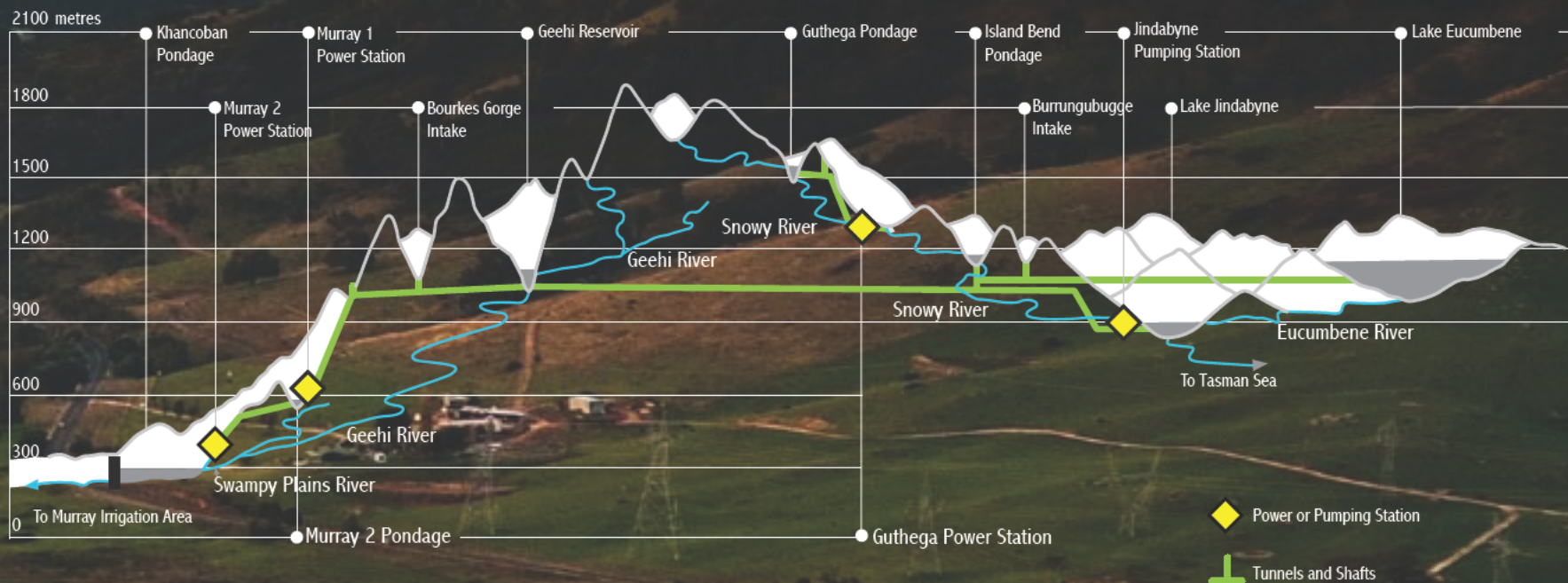
Three of the six generators at Tumut 3 Power Station have pumps that can be used to pump water from Jounama Pondage back up into Talbingo Reservoir, thereby 'recycling' water. Water is released from Jounama Dam into Blowering Reservoir through the new small hydro power station recently completed at Jounama Dam.

Blowering Power Station is located on Blowering Dam and is leased from NSW State Water Corporation. Water releases from Blowering Dam are controlled by State Water – a New South Wales State-owned corporation – to provide for town water supply, extractive and environmental use requirements.

Blowering Power Station is therefore a 'run of river' plant that operates as State Water releases water from Blowering Dam into the Tumut River, which joins the Murrumbidgee River near Gundagai.

On the Murrumbidgee River, as at Gundagai, the Snowy Scheme contributes inflows of around 25% during average inflow years but 60% during drought years.





## Snowy-Murray Development

The Snowy-Murray Development consists of three power stations with 16 generating units and one pumping station.

Water in the upper Snowy River is diverted at Guthega Dam through Guthega Power Station. Inflows into the relatively small Guthega Pondage are seasonal. During times of high inflows, water flowing into Island Bend Pondage is diverted to Lake Eucumbene for storage and subsequently transferred to the River Murray catchment. At times of low inflows, water from Island Bend Pondage is diverted to Geehi Reservoir through a trans-mountain tunnel, together with water which flows back from Lake Eucumbene.

The Jindabyne Pumping Station pumps water from Lake Jindabyne, normally using off-peak power, into Geehi Reservoir on the western side of the Great Dividing Range.

From Geehi Reservoir, with additional water from the Geehi River, the water passes through Murray 1 and Murray 2 power stations. Khancoban Dam regulates water released from Murray 2 Power Station down the Swampy Plain River which is a tributary of the upper River Murray.

Water from Lake Jindabyne cannot be pumped back to Lake Eucumbene.

On the River Murray, as at the Hume Dam, the Snowy Scheme contributes inflows of around 8% during average inflow years but 33% during drought years.



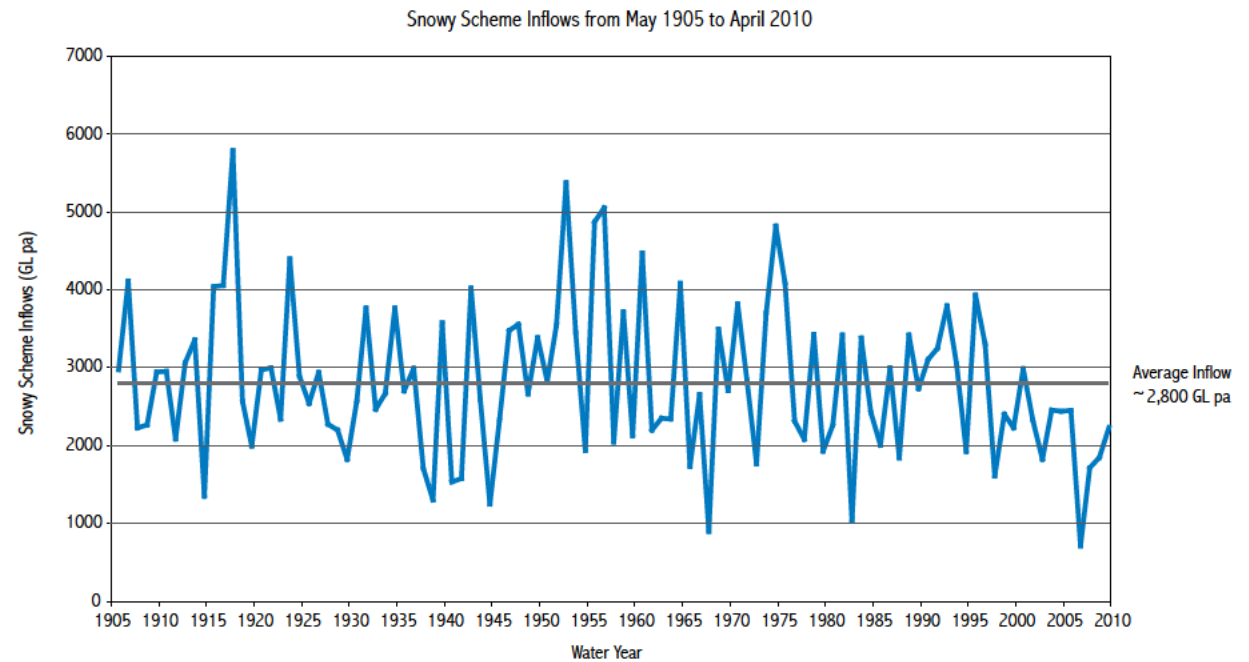
# Inflows

## Snowy Scheme inflows

The historical record of annual inflows into the Snowy Scheme is characterised by high variability with annual inflows ranging from less than 700GL to well over 5,500GL.

Of particular note is the now unprecedented dry inflow sequence that started in 1996-97 and which includes the lowest inflow year on record during 2006-07.

There has only been one year in the last 12 years that has seen slightly above average inflows. This is the primary reason why lake levels have dropped over the past decade and remain at low levels.



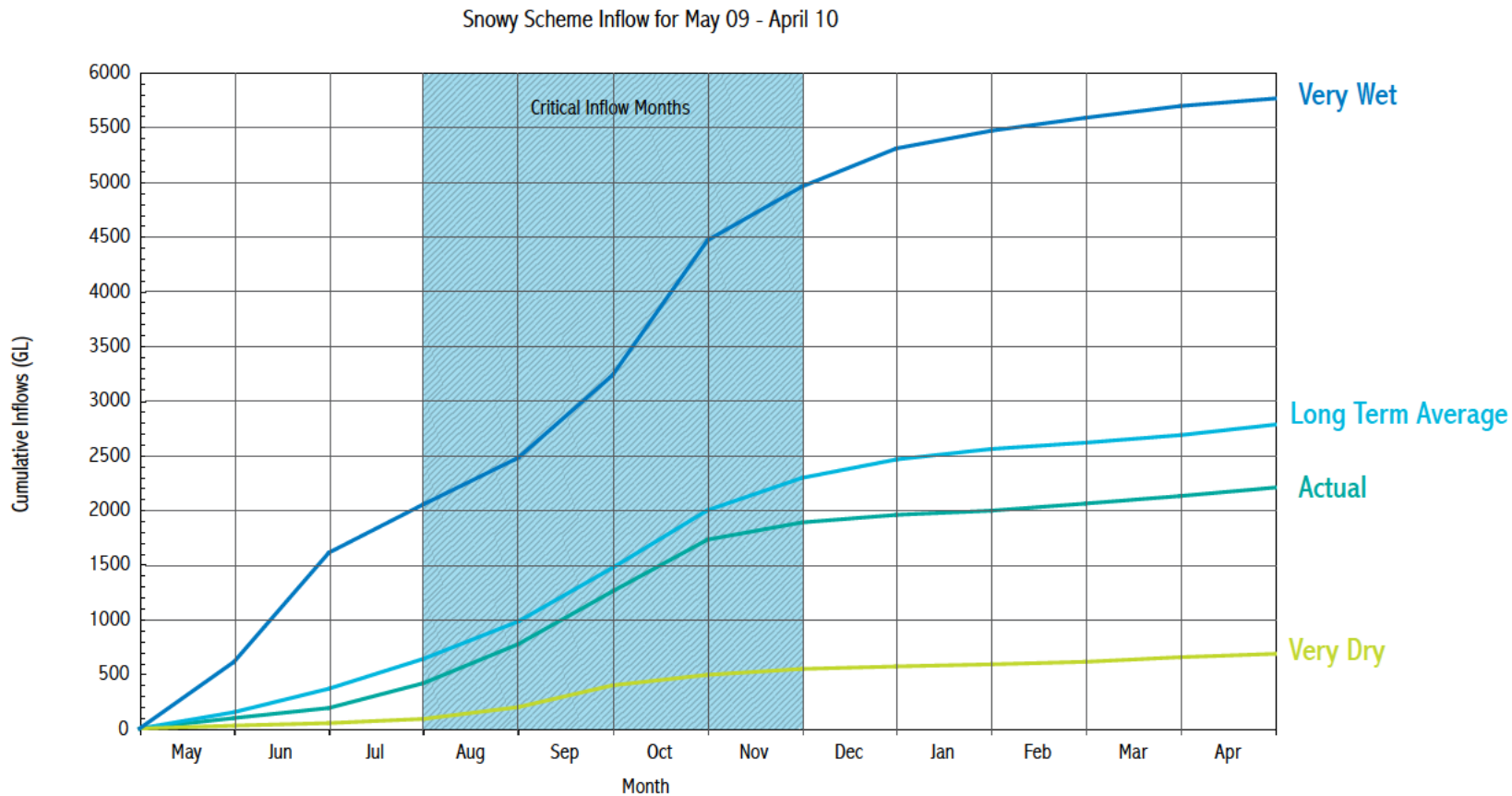


# Inflows

## Snowy Scheme inflows for 2009-2010

Drought conditions persisted during the 2009-10 water year. This negatively impacted on the Snowy Scheme with only 2,202GL of inflows. This is about 79% of the long term average annual inflow of 2,800GL.

While still below average, inflows for this water year were an improvement on the previous year.



# Western river releases

## River Murray Catchment

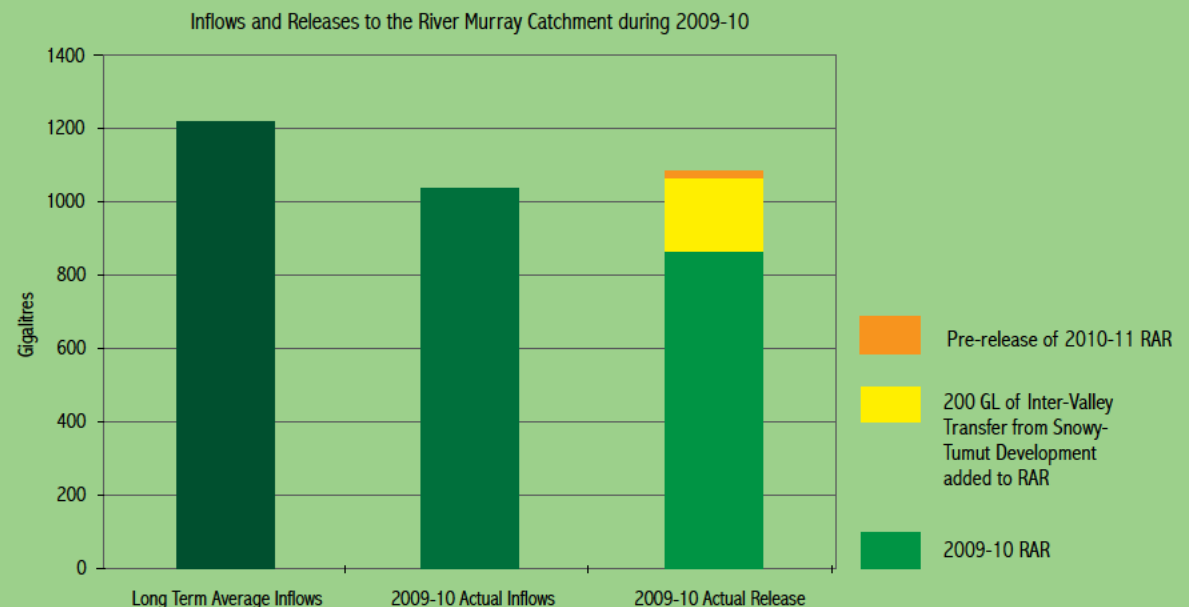
Snowy Hydro complied with its obligation to target the Required Annual Release (RAR) from the Snowy-Murray Development to the River Murray catchment during the 2009-10 water year.

The total actual release volume was 1,083GL.

This was made up of 1,067GL being the 2009-10 Required Annual Release calculated under the *Snowy Water Licence*, which included an additional 200GL of inter-valley transfer from the Snowy-Tumut Development. This total release volume also included 16GL of pre-release of the 2010-11 Required Annual Release as approved by the NSW Office of Water.

An inter-valley transfer is a transfer of water from one Development to another Development from which it is then released. Inter- valley transfers are a mechanism to transfer water between river valleys, for example to facilitate inter- valley and inter- State water trading. They can only be initiated by the NSW Office of Water. Snowy Hydro agreed to this inter- valley transfer at no cost to the Government or water users.

The calculated Required Annual Release volume for the Snowy-Murray Development is nominally set at 1,062GL. Due to the continuing drought, this nominal volume was reduced by the Dry Inflow Sequence Volume, the volume of water savings allocated to the Snowy-Murray Development to allow environmental releases to be made and a pre-release made in 2008-09.





# Western river releases

## Murrumbidgee River Catchment

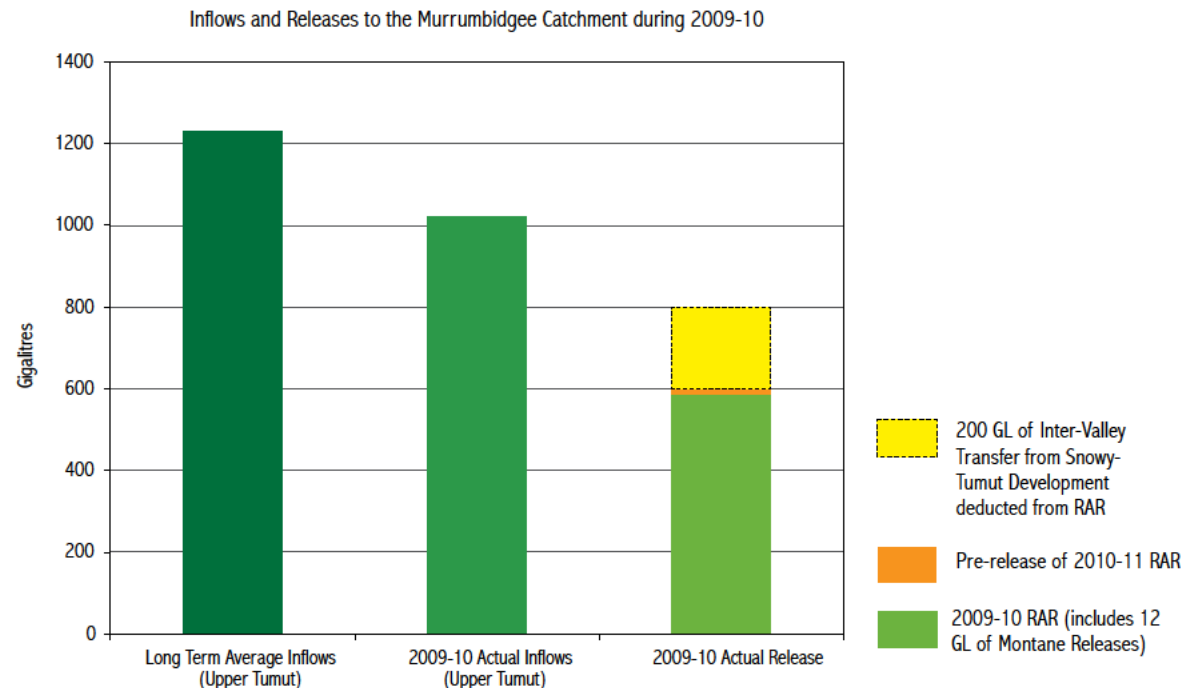
Snowy Hydro complied with its obligation to target the Required Annual Release from the Snowy-Tumut Development to the Murrumbidgee River catchment during the 2009-10 water year.

The total actual release volume was 600GL.

This was made up of 588GL being the 2009-10 Required Annual Release calculated under the *Snowy Water Licence* plus 12GL of pre-release of the 2010-11 Required Annual Release as approved by the NSW Office of Water. This total release volume includes 12GL of montane releases.

The Required Annual Release volume was reduced by the 200GL inter-valley transfer from the Snowy-Tumut Development as approved by the NSW Office of Water.

The calculated Required Annual Release volume for the Snowy-Tumut Development is nominally set at 1,026GL. Due to the continuing drought, this volume was reduced by the Dry Inflow Sequence Volume, the volume of water savings allocated to the Snowy-Tumut Development to allow environmental releases to be made and a pre-release made in 2008-09.



# Environmental releases

## Snowy River environmental flows

The key element of the Snowy River environmental flow arrangements is that the total volume of environmental flows each year must not be greater than the volume of the water savings achieved by the Governments to date.

Snowy Hydro is not responsible for securing water savings or for setting the release targets. Snowy Hydro is simply required to meet release targets notified to it by the NSW Office of Water under the *Snowy Water Licence*.

The table on the opposite page sets out the major steps and accountabilities in the process, from securing water savings on the western rivers through to the actual release of environmental flows.

MAJOR STEP	WHO IS RESPONSIBLE
Securing verified water savings from water savings projects on the River Murray or Murrumbidgee River (or purchase of water entitlements).	Water for Rivers <a href="http://www.waterforrivers.org.au">www.waterforrivers.org.au</a>
Transferring verified water savings into Environmental Entitlements.	NSW Dept of Water and Energy & VIC Dept of Sustainability and Environment <a href="http://www.dwe.nsw.gov.au">www.dwe.nsw.gov.au</a> & <a href="http://www.dse.vic.gov.au">www.dse.vic.gov.au</a>
Calculating annual allocations from the Environmental Entitlements each year (in arrears).	NSW Dept of Water and Energy & VIC Dept of Sustainability and Environment <a href="http://www.dwe.nsw.gov.au">www.dwe.nsw.gov.au</a> & <a href="http://www.dse.vic.gov.au">www.dse.vic.gov.au</a>
Apportioning the annual allocations between the Snowy River Increased Flows, River Murray Increased Flows and the Mowamba Borrow.	NSW Dept of Water and Energy <a href="http://www.dwe.nsw.gov.au">www.dwe.nsw.gov.au</a>
Determining and then notifying Snowy Hydro of annual, monthly and daily release volumes for Snowy River Increased Flows.	NSW Dept of Water and Energy <a href="http://www.dwe.nsw.gov.au">www.dwe.nsw.gov.au</a>
Providing infrastructure to enable Snowy River Increased Flows from Jindabyne Dam and modifying existing infrastructure to enable Snowy Montane Rivers Increased Flows.	Snowy Hydro <a href="http://www.snowyhydro.com.au">www.snowyhydro.com.au</a>
Targeting releases of Snowy River Increased Flows from Jindabyne Dam and those structures nominated for Snowy Montane Rivers Increased Flows.	Snowy Hydro <a href="http://www.snowyhydro.com.au">www.snowyhydro.com.au</a>





# Environmental releases

## Snowy River Increased Flows

Snowy Hydro complied with its obligation to target releases from Jindabyne Dam for environmental purposes during the 2009-10 water year.

The volume of Snowy River Increased Flows (SRIF) released from Jindabyne Dam during the 2009-10 water year was 38.7GL, which was 1GL in excess of the target volume of 37.7GL. That excess is well within the +/-10% annual tolerance allowed under the *Snowy Water Licence*.

The 2010-11 target will be adjusted to account for this additional release. In addition to the environmental releases, 8.5GL Base Passing Flow (BPF) was also released from Jindabyne Dam and 0.5GL riparian flow was released from the Mowamba Weir.

All monthly release targets were well within the +/-20% monthly tolerance allowed under the *Snowy Water Licence*.

All except three daily release targets were well within the +/-20% daily tolerance allowed under the *Snowy Water Licence*.

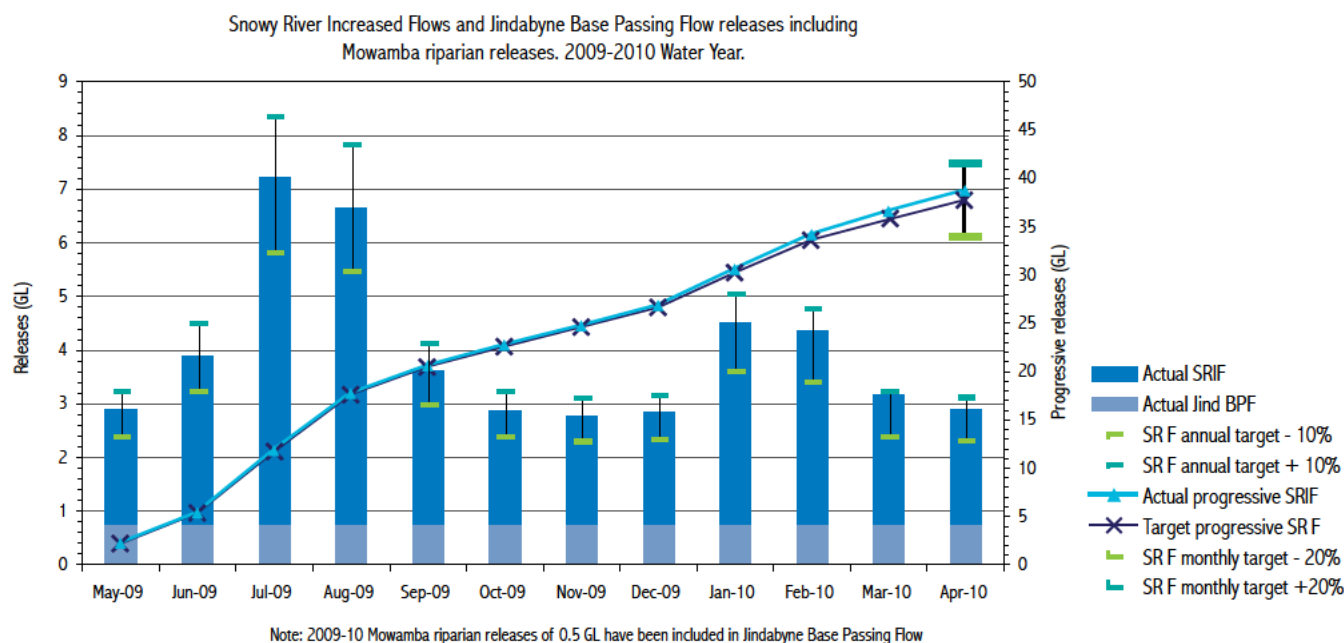
The first occasion was during the removal of the coffer dam required to complete construction of the new auxiliary spillway at Jindabyne Dam. For the duration of these works releases were made from the Mowamba Weir, which does not allow for suitable regulation of flows to meet specified daily targets. As a consequence the NSW Office of Water agreed to relax daily limits for the period of the coffer dam works.

The second two occurrences were during the peak flows in late January and February 2010. These releases were the first time that both the outlet valves and gauging station at which

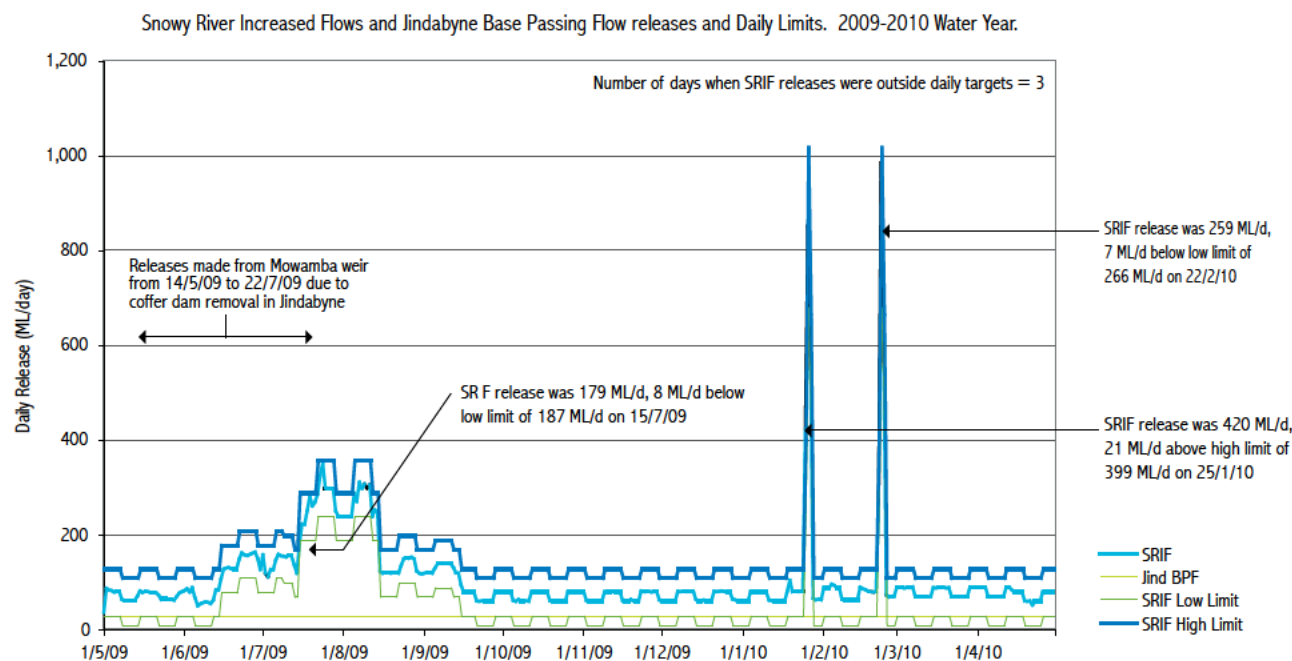
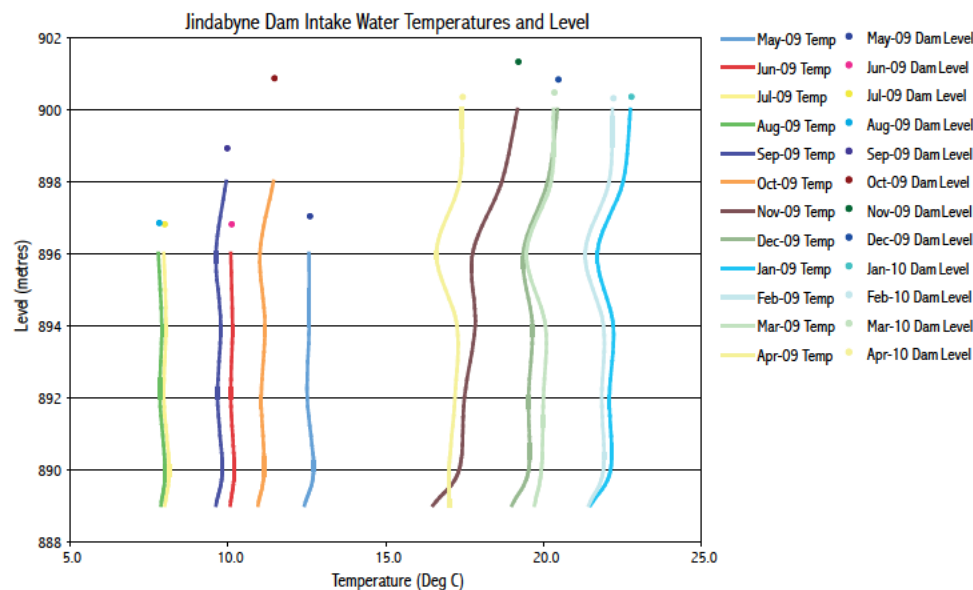
releases are measured have been operated for prolonged periods at these higher release rates. This made the precise targeting of flows operationally difficult and required manual adjustments of automated controls based on real time manual field measurements.

The NSW Office of Water was satisfied that reasonable endeavours were made by Snowy Hydro to meet these targets. Appropriate operational improvements have now been made for the same peak releases scheduled for early 2011.

The comparison of the annual, monthly and daily release targets for the Snowy River Increased Flow releases against the actual releases is shown in the following charts.







## Jindabyne

The *Snowy Water Licence* requires the outlet works at Jindabyne Dam to be capable of releasing water from above any thermocline in the reservoir. The thermocline is a thin but distinct layer in a large body of water in which temperature changes more rapidly with depth than it does in the layers above or below. Typically, as the summer progresses, the surface waters warm and the deeper waters remain cold. This causes a lack of mixing between the upper and lower layers, which often results in the lower layer having reduced oxygen levels. For these reasons the deeper waters within reservoirs are generally viewed as having undesirable water quality characteristics for releases, hence the requirement for the outlet works to be able to draw from the surface waters.

The new intake works at Jindabyne are located at the end of a channel excavated into the bank of Lake Jindabyne. In addition to the variable level shutters in the intake tower, the level of the base of the channel means that the deeper waters of the reservoir are inaccessible. This means that the thermocline is only likely to be above the level of the intake channel when the lake is at much higher levels.

Snowy Hydro undertakes temperature monitoring at the intake tower to detect the presence of a thermocline and adjusts the shutter height as necessary. As can be seen by the generally straight vertical plots in the chart opposite, there are no rapid changes of temperature at depth meaning no thermocline is present at the intake at any time during the year, thus all releases were made from above the thermocline.

# Environmental releases

## Snowy Montane Rivers Increased Flows

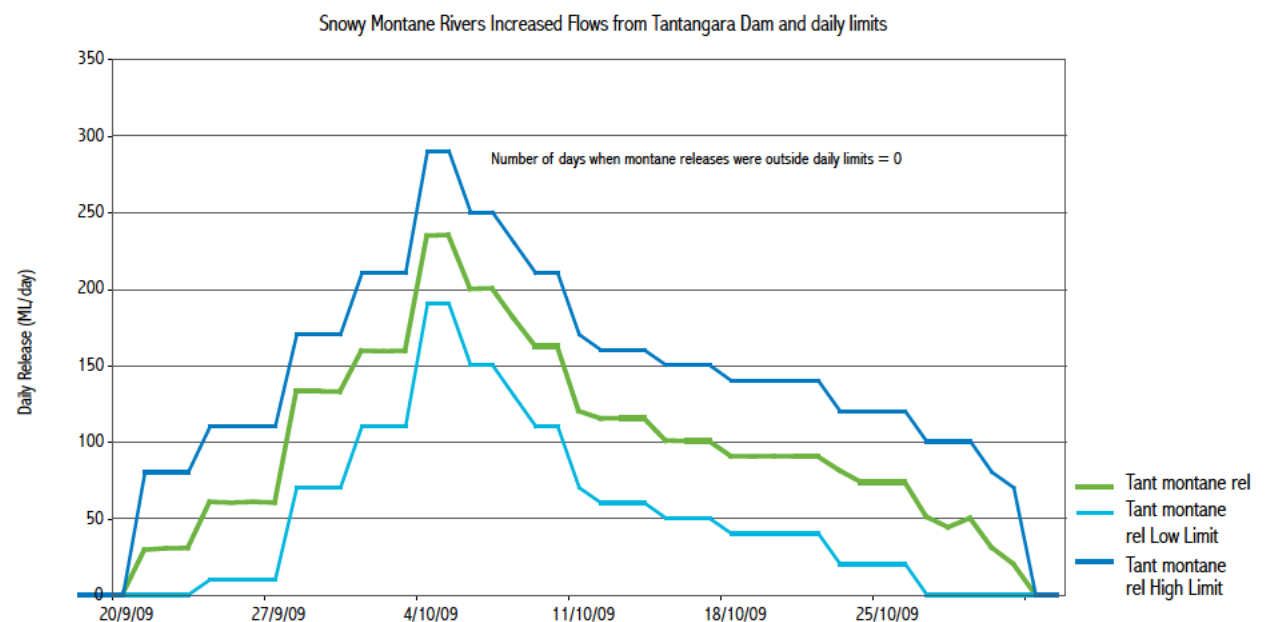
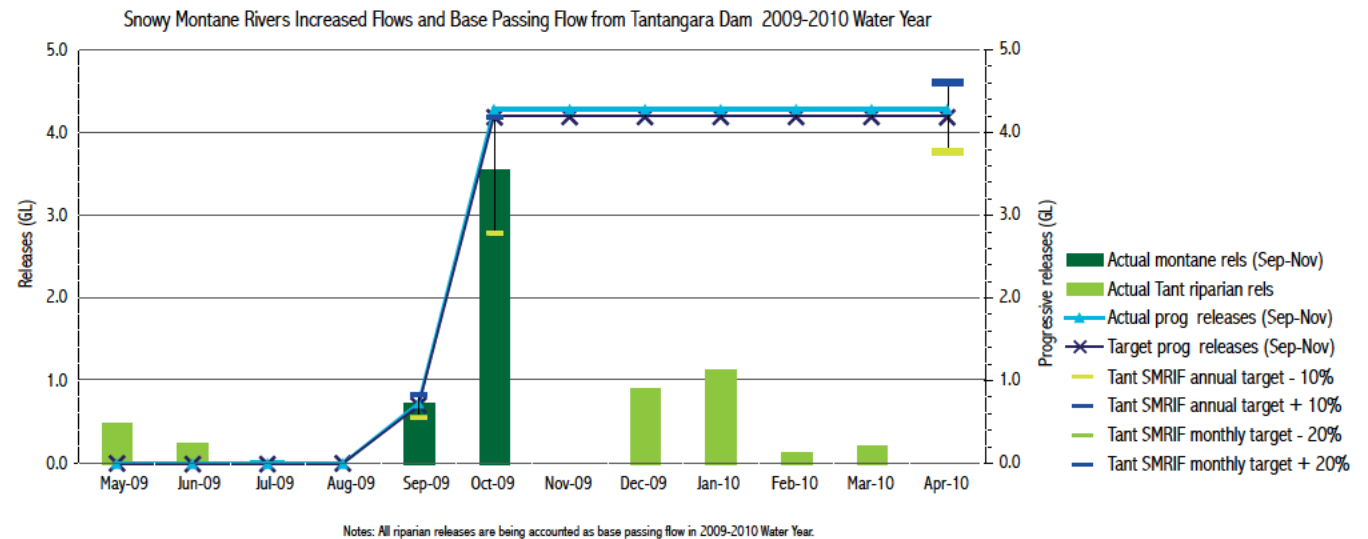
Snowy Hydro complied with its obligation to target Snowy Montane Rivers releases for environmental purposes during the 2009-2010 water year. Snowy Hydro was directed to make Snowy Montane Rivers Increased Flows (SMRIF) from Tantangara Dam and Goodradigbee Aqueduct.

The target volume for Snowy Montane Rivers Increased Flows totalled 16.2GL, with 4.2GL from Tantangara Dam to be released during the spring period and 12GL from Goodradigbee Aqueduct to be released over the whole water year.

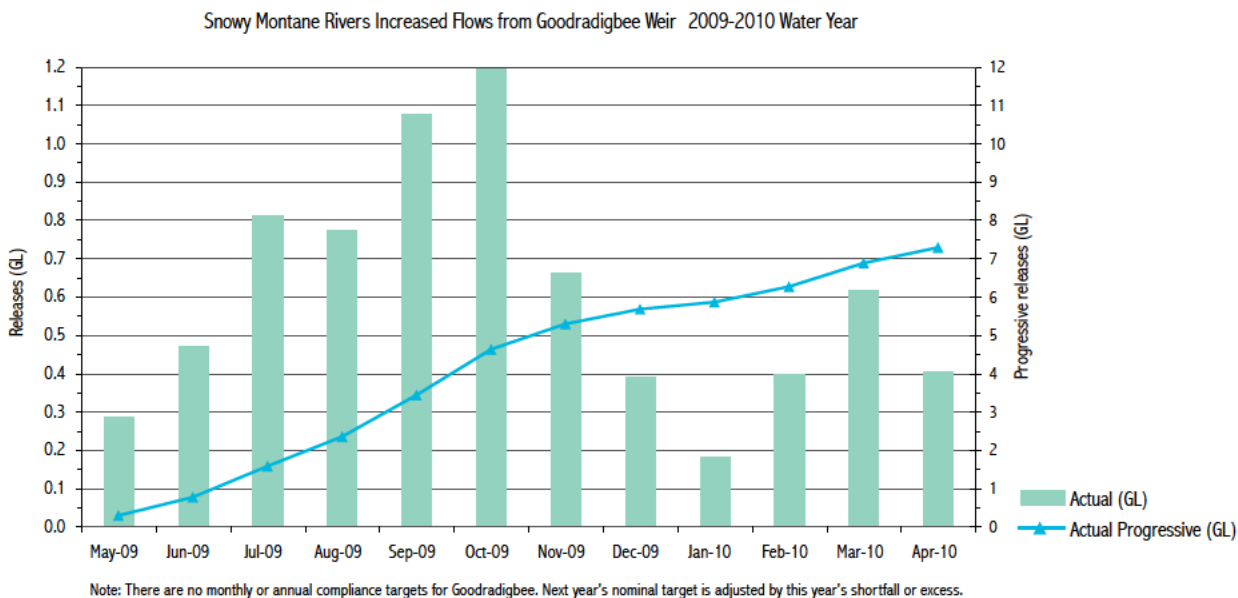
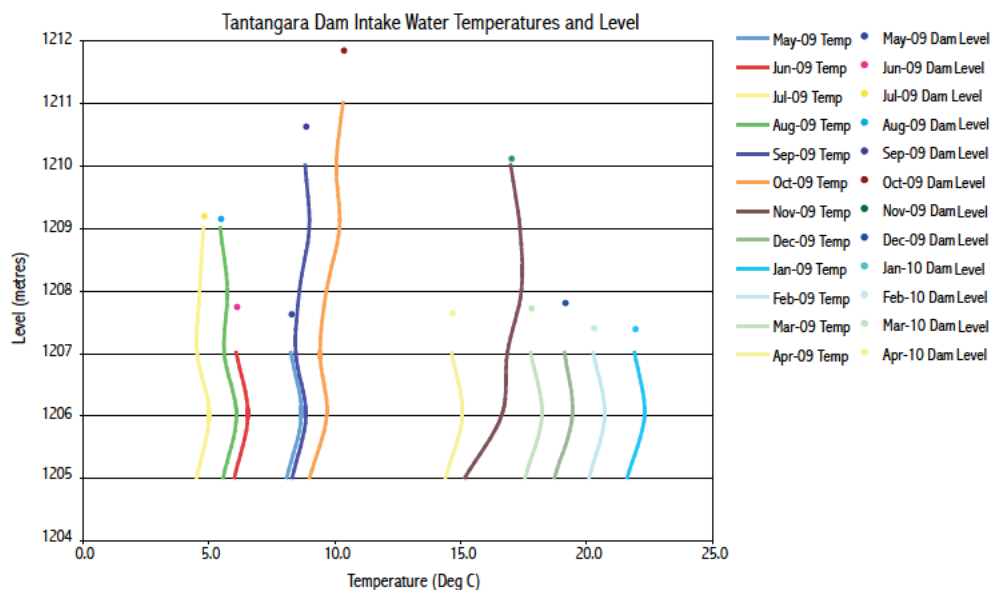
The total actual montane release volume was 11.6GL, which was 4.6GL below the target. This was made up of 4.3GL from Tantangara Dam released during the spring period and 7.3GL from Goodradigbee Aqueduct over the whole water year. The 2009-10 montane target will be adjusted to account for this deficit of 4.6GL, which was due to low inflows.

Riparian releases of 3.2GL were released from Tantangara Dam during the summer-autumn period to maintain the water supply for Cooma township during low inflow months and are accounted as Tantangara Base Passing Flows.

The comparison of the annual, monthly and daily release targets for the Snowy Montane Rivers Increased Flows against the actual from Tantangara Dam and monthly releases from Goodradigbee Aqueduct is set out in the graphs to the right.







## Tantangara

The *Snowy Water Licence* requires the outlet works at Tantangara dam to be capable of releasing water from above any thermocline in the reservoir. The thermocline is a thin but distinct layer in a large body of water in which temperature changes more rapidly with depth than it does in the layers above or below. Typically, as the summer progresses, the surface waters warm and the deeper waters remain cold. This causes a lack of mixing between the upper and lower layers, which often results in the lower layer having reduced oxygen levels. For these reasons the deeper waters within reservoirs are generally viewed as having undesirable water quality characteristics for releases, hence the requirement for the outlet works to be able to draw from the surface waters.

The new intake works at Tantangara dam are located on the upstream face of the dam wall. They comprise a series of “telescoping” shutters to create a variable level off-take.

Snowy Hydro undertakes temperature monitoring at the intake tower to detect the presence of a thermocline and adjusts the shutter height as necessary. As can be seen by the generally straight vertical plots in the chart opposite, there are no rapid changes of temperature at depth meaning no thermocline is present at the intake at any time during the year, thus all releases were made from above the thermocline.

# Storages

## Snowy Scheme storage for 2009-10

Snowy Scheme storage levels are referred to from time to time in different measurements, they being 'active storage' and 'gross storage'.

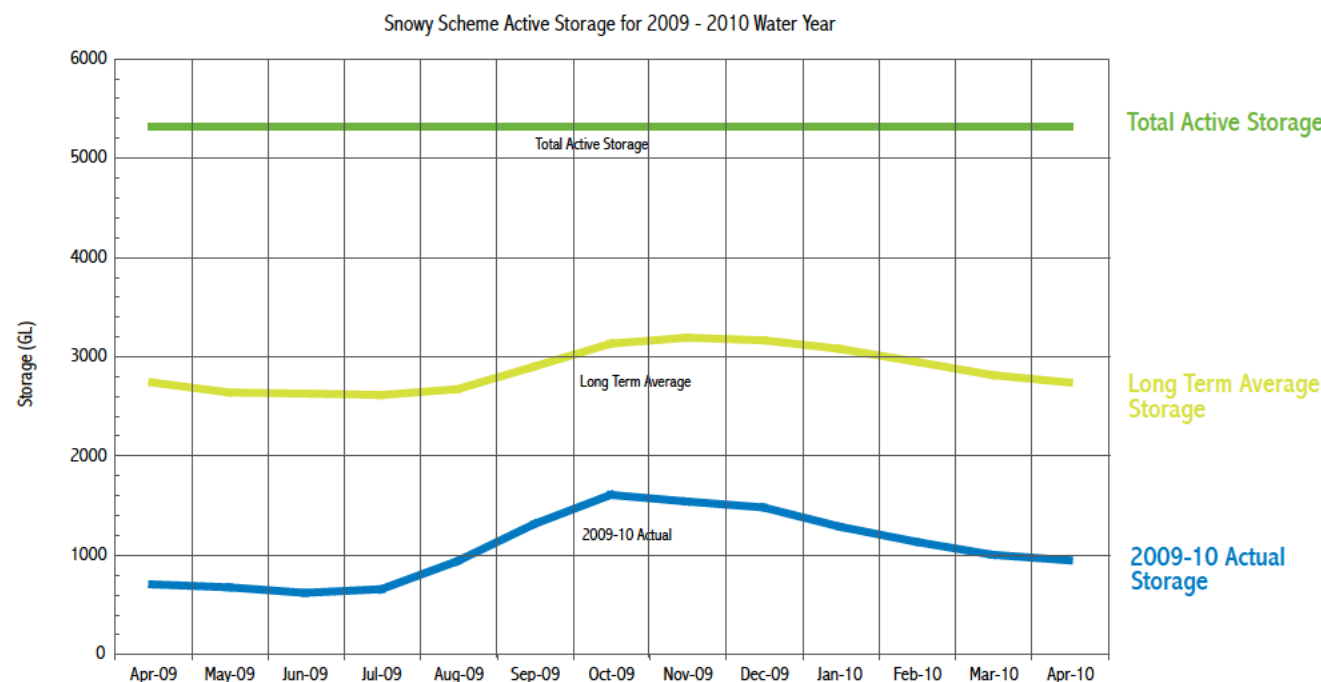
Active storage is the water that generally can be accessed by either pumping or through release via dams or through power stations.

Gross storage is the total amount of water behind the dam wall including the water that cannot ordinarily be accessed due to the design of the Snowy Scheme.

For the purposes of our business operations, active storage is used, whereas recreational users are generally more interested in and familiar with gross storage. For example, Lake Lindabyne could experience a 0% active storage level but the lake itself would be then at approximately 42% gross storage. This remaining water cannot be accessed via the pumping station due to the physical design limitations of the Snowy Scheme.

At the end of the 2008-09 water year, Snowy Scheme active storage was 694GL. This is equivalent to 13.1% of the Snowy Scheme active storage capacity.

During the 2009-10 water year, the Snowy Scheme active storage increased by 241GL, with active storage totalling 935GL at the end of the year, which is 17.6% of the active storage capacity.





## Lake levels

From time to time Snowy Hydro receives enquiries about whether the occasional large storm that hits the area or whether the snow-melt from a big winter season will fill the dams. This is not the case.

While this year has seen some recovery, inflows were still below average and for a full recovery from the drought sequence several consecutive years of above average flows are required.

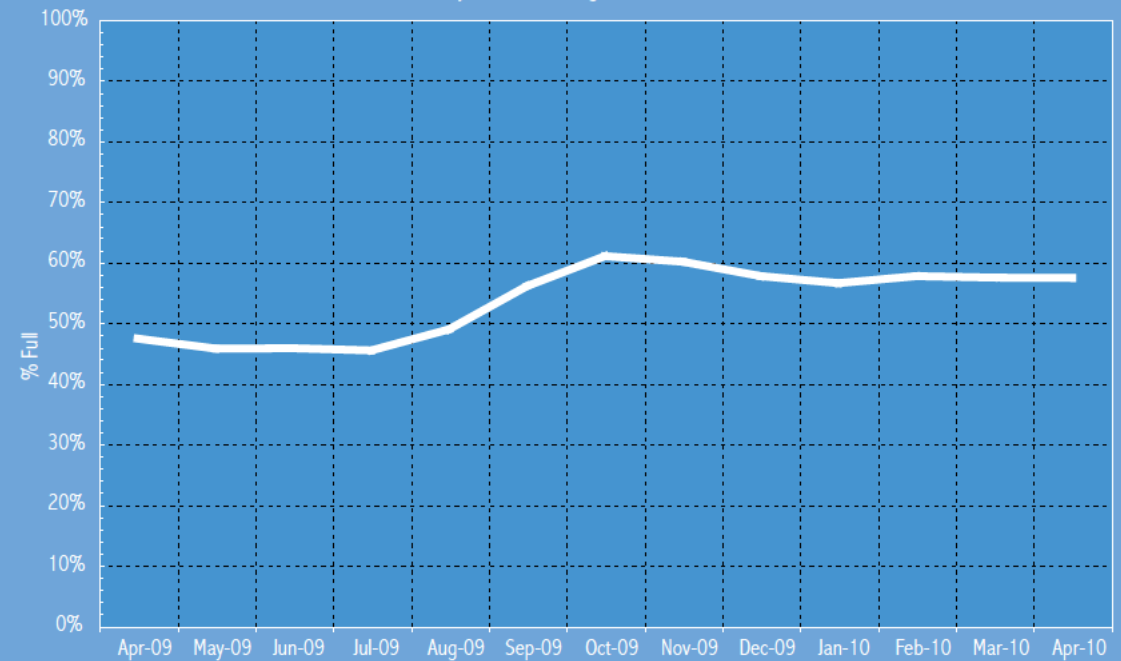
Lake Jindabyne is larger than Sydney Harbour and Lake Eucumbene is around nine times the size of Sydney Harbour. These are huge storages and one good snow year will not be enough to fill the lakes.

Snowy Hydro reports gross storage levels to local tourism operators and the local community on our website. Lake Levels for our three main storages of Jindabyne, Eucumbene and Tantangara are provided weekly and are available at [www.snowyhydro.com.au](http://www.snowyhydro.com.au).

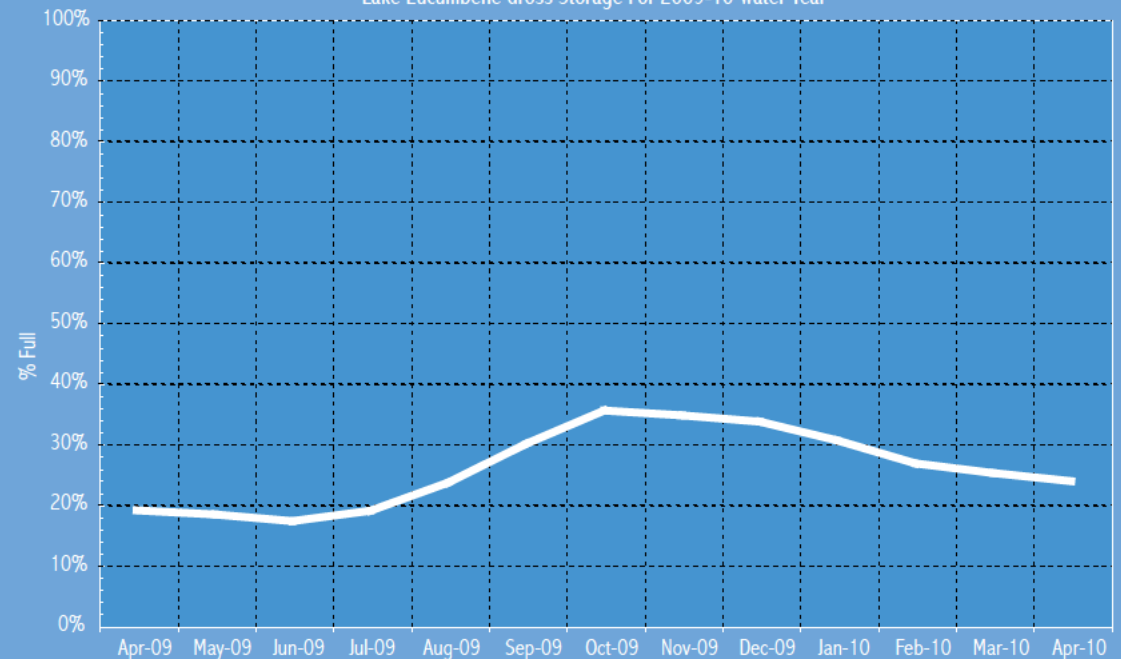
Our web site also includes a lake levels comparison calculator where it can be seen that lake levels since 2006-07 have marginally improved in line with small improvements in annual inflows.

**Due to the requirement to maintain the annual releases required under the *Snowy Water Licence*, a number of consecutive years of above average inflows are now required to see storage levels restored to long term average levels.**

Lake Jindabyne Gross Storage For 2009-10 Water Year



Lake Eucumbene Gross Storage For 2009-10 Water Year





Suite 2, Level 1  
7 Leeds Street  
Rhodes NSW 2138

## VERIFICATION STATEMENT

Snowy Hydro Limited commissioned NCS International to verify the data from its Water Operations Report for the 2009-2010 Water Year in respect of the volumes that it was required to target and the actual releases made to meet those targets.

### Responsibilities of the Verifier:

NCS International was not responsible for the preparation of any part of the report. The audit was carried out using recognised assessment techniques based on ISO19011 with the Water Operations Report as the core reference. The audit was office based and included interviews with staff.

### Scope:

Numerical values provided in the Water Operations Report were compared with the required target volumes from the approved Annual Water Operating Plan (2010-11 Water Year) and actual releases were compared with a sample of entries from the water accounting databases. Records of maintenance and calibration of equipment used in monitoring water flows were also reviewed.

The verification reviewed data for reasonableness and where practical checked the order of magnitude, but detailed calculations were not carried out.

### Verification Statement:

Based on the data review process applied during the audit, no discrepancies were identified in the Water Operations Report for the 2009-2010 Water Year and the report provides a fair representation of the required target volumes and Snowy Hydro Limited's water operations.

SL

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RABQSA Certification: 14632  
NCS International Pty Ltd  
23 August 2010

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