Proposal to Manage Salinity in the Hunter River Tidal Pool Water Sources through Available Water Determination Rules

Why we are considering this amendment

Full extraction of existing water entitlements during times of low freshwater inflows into the Hunter tidal pools would result in increased occurrence, frequency, and extent of salinity in the tidal pools, negatively impacting the quality and quantity of water available for water users and the riverine environment.

The *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2022* includes an amendment provision to revisit this issue to improve management of salinity in the Hunter tidal pools with consideration of the supporting data. The department is now proposing to amend the plan to include rules to minimise the risk of negative impacts of salinity on water users and the environment during times of low freshwater inflows.

The purpose of this fact sheet is to explain the proposed amendment, provide anticipated impacts and benefits of the amendment and briefly describe the process for amending a water sharing plan.

Available Water Determination Amendment Provision

An amendment provision in the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2022* allows for the establishment of Available Water Determinations (AWDs) rules in the tidal pool water sources to manage salinity during periods of low flows.

How Available Water Determinations Work

An available water determination (AWD) allocates water to licensed water users on an annual basis. An AWD is announced at the start of each water year on 1 July, crediting water to each licence holder's water allocation account in megalitres per unit shares (ML/share). For example, an AWD of 0.5 ML/share for an entitlement that is 50 shares is equivalent to 25 ML, an AWD of 1 ML/share for the same entitlement is equivalent to 50 ML. This is the volume of water that a licence holder can extract, or temporarily trade.

Further allocations can be provided during a water year when an AWD of less than 1 ML/share is provided on 1 July, if assessment indicates there have been sufficient inflows. Additional allocations are usually announced at the start of each quarter; 1 October, 1 January and 1 April. If sufficient inflows have not been received, further allocations will not be announced. When licence holders

receive an AWD equivalent to 1 ML/share of their entitlement further allocations will not be provided for the rest of the water year. There can be no reduction in an AWD in a water year once 1 ML/unit share allocation is announced.

A recent example of how this works is in the Hunter Regulated River Water Source, an AWD was announced on 1 July 2020 for Hunter Regulated River (General Security) licences holders of 0.3 ML/share. This was, increased by 0.23 ML/share on 14 Aug (giving total of 0.53 ML/share) and then increased to 1ML/share by 15 March 2021 following substantial inflows.

Proposal to apply an AWD to access licences in the Hunter tidal pool water sources in order to manage the upstream movement of saline water.

It is proposed to use AWDs to cap extractions from the Hunter tidal pools during prolonged periods of low inflow and thus limit the upstream movement of saline water.

The Hunter tidal pools fact sheet explains how water extraction from the tidal pools increases the frequency and distance of the movement of saltwater upstream during periods of low freshwater inflows into the tidal pools. Modelling results show that with full entitlement extracted the saltwater movement could be up to 10km further upstream in low inflow periods. Modelling results also show that when extraction is capped at 50% of entitlement during periods of low inflows the movement of the salt wedge is significantly reduced.

Water users have indicated that the vast majority of licence holders in the tidal pool water sources use less than 50% of their entitlement.

The department is proposing to use AWDs to cap extractions to 50% of entitlement during extended periods of low inflows as this should significantly reduce the risk of the movement of the salt wedge upstream during dry times and have minimal impact on licence holders and the broader Lower Hunter community.

Proposal

Announce an AWD of 0.5 ML/share every 1 July and raise to 1 ML/share when inflows exceed 60,000ML in the previous quarter.

This option:

1. Uses combined inflows at the Greta (#210064) and Gostwyck (#210079) gauges, located at the most downstream end of the Hunter and Paterson regulated river water sources, as the inflow measure.
2. Sets an AWD of 0.5ML/share at the start of every water year because an AWD that is announced at the start of the year, cannot be reduced for that water year. In order to capture

years of high winter inflows but subsequent dry, high salinity spring and summers such as this past 2023-2024 year and 2017-2018 the AWD needs to start low and be increased as inflows increase.

3. Requires that resource assessments be done to determine AWDs on a quarterly basis.

Analysis of Approach

The department assessed the frequency of 1 ML/share AWD announcements for quarters following 1 July based on an IQQM model over 130 years (inc. 2019-2020 drought). Based on this analysis, AWD's are likely to:

- Rise to 1 ML/share by 1 Oct in 80% of years.
- Rise to 1 ML/share by 1 January in 86% of years
- Rise to 1 ML/share by 1 April in 92% of years, and
- Stay at 0.5 ML/share all year in only the driest 8% of years.

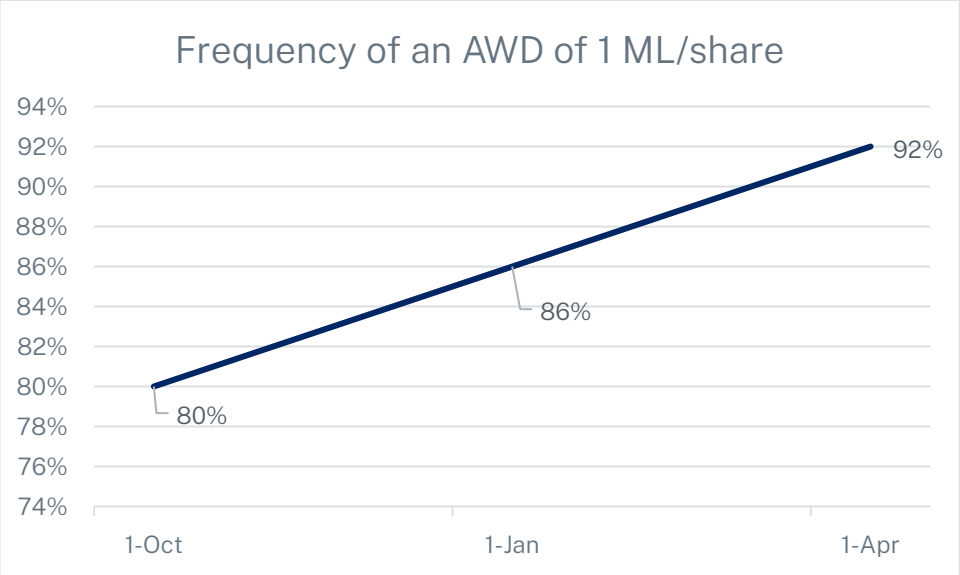

Figure 1 Frequency of an AWD of 1 ML/share

Results presented below in Table 1 show likely AWD's for the past 9 years based on Realtime data with salinity measured at Green Rocks gauging station.

It should be noted that this proposal does not manage every daily high salinity event. Daily salinities and inflows are highly variable and AWD announcements cannot be based on daily, instantaneous flows or EC readings.

Table 1 Analysis of 0.5ML/share AWD with AWD going to 1ML/share in the quarter following inflows of greater than 60,000ML/quarter

AWD 0.5 ML/share 1 July every year	2015-2016 EC Low all year	2016-2017 EC high Oct-Dec 2016 (max 16,000µs/cm)	2017-2018 EC High All summer	2018-2019 EC High All year	2019-2020 EC high until Feb floods	2020-2021 EC low all year	2021-2022 EC low all year	2022-2023 EC low all year	2023-2024 EC high (8,000 in Oct and Dec 2023)
AWD 1ML/share if Subsequent Quarter inflows > 60,000 ML	AWD raised to 1 ML/share on 1 October Inflows Jul – Oct 2015 =74,900ML	**AWD raised to 1 ML/share on 1 October** Inflows Jul – Oct 2016 > 250,000ML	AWD 0.5ML/share until 1 April when 100% AWD as inflows Jan-April=71,000 ML	AWD 0.5ML/share remains all year due to low inflows	AWD 0.5ML/share until 1 April when 1ML/share AWD as inflows Jan-April = 126,000ML	AWD raised to 1ML/share on 1 October Inflows Jul – Oct >185,000ML	AWD raised to 1ML/share on 1 October Inflows Jul – Oct >100,000 ML	AWD raised to 1ML/share on 1 October Inflows Jul – Oct >1,000,000 ML	AWD 0.5ML/share until present due to low inflows Spring and summer 2024

High Salinity – AWD in place – manages salinity

High salinity – AWD 1 ML/share does not effectively manage high salinity

Note for analysis purposes a 'low' EC is below approximately 5,000µs/cm and 'high' EC when average or maximums exceed 8,000µs/cm. Gauging station (#210432) was used as a reference point for salinity levels as it is the only salinity measuring location in the tidal pool below the confluence of the Paterson River, the Hunter River and Wallis Creek and below. UNSW modelling also shows that this is the location, if there is no extraction, of the boundary between brackish and saline water qualities. Salinity levels are not used in determining AWDs, but to guide analysis of management options.

Predicted impacts and benefits of the proposal

The predicted impacts and benefits on water licence holders and environmental values are described in Table 2 below:

Table 2 Summary of predicted impacts and benefits of the AWD amendment option for the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2022*.

Proposed amendment	Predicted impact on users and environmental values	Predicted benefits to water users and environmental values
Establish 0.5ML/share AWD at the start of every water year and increase to 1ML/share AWD following quarterly inflows of >60,000 ML/quarter	Reduced available water at the start of every water year. AWD increases to 1ML/share in 92% of years and AWD remains at 0.5ML/share in the driest 8% of years. There will be adequate volumes of water placed in water allocation accounts on 1 July for water users who use less than 50% of their entitlement. There may be a shortfall of water placed in water allocation accounts on 1 July for water users who use more than 50% of their entitlement. This shortfall will be made up by further AWD announcement in 92% of years. Water users may be able to purchase water to make up the shortfall.	Improved outcomes for Hunter River Estuary environmental processes during times of low flows. Reduced occurrence and frequency of upstream migration of tidal salt wedge in the Hunter and the Paterson rivers tidal pool water sources. Opportunity to prepare and adapt to potential climate change impacts. More equitable access to freshwater resources for water users located in the downstream sections of the Hunter tidal pool water sources, including those accessing water for Basic Landholder Rights purposes.

The process for changing water sharing plans.

As well as the approval of the Minister for Water, amending a plan requires the agreement of the NSW Minister for Environment (this is known as 'concurrence'). Consistent with section 9 of the *Water Management Act 2000* (the WM Act), when amending a water sharing plan the ministers must:

- take all reasonable steps to promote the water management principles of the WM Act and
- give priority to the principles relating to water sharing according to the order they are set out in under section 5 (3) of the WM Act.

The water sharing management principles under s5(3) of the WM Act are (in their order of priority):

1. Sharing water from a water source must protect the water source and its dependent ecosystems.
2. Sharing water from a water source must protect basic landholder rights.
3. Sharing or extraction of water under any other right must not prejudice the principles set out in points 1 and 2.

The NSW Department of Climate Change, Energy, the Environment and Water's Water group works with colleagues in the department's Biodiversity, Conservation and Science group to develop amendments before submitting the plan for the agreement and approval of the ministers.

More information

To read the water sharing plan amendment protocol, visit https://www.industry.nsw.gov.au/__data/assets/pdf_file/0004/509863/water-sharing-plan-amendment-protocol.pdf