

Review of Hunter River Salinity  
Trading Scheme

February 2014  
Submission

**NSW MINERALS COUNCIL**



## Preamble

### **The NSW Mining Industry**

The NSW Minerals Council is the leading industry association representing the state's minerals industry, providing a united voice for our members.

Mining has and will continue to be a key economic driver for the state. That's why the NSW Minerals Council works closely with government, industry groups and business and community leaders to foster a sustainable mining industry in NSW.

We support the development of a strong and diverse state economy and an effective regulatory framework in which the industry can operate profitably and make a meaningful contribution to the state and the people of NSW.

We encourage innovation and leading practice to improve the health and safety of our people and minimise our impacts on the environment. And we talk openly and honestly about mining to help improve the community's understanding of the industry's contribution and how it works.

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## Executive Summary

The *Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002* (the Scheme) has proven to be an effective means of meeting salinity objectives in the Hunter River whilst still allowing industry to discharge saline water.

While the Scheme has been successful, there are opportunities to improve the environmental effectiveness of the Scheme without adversely impacting river health. These include:

- Increasing discharge opportunities through means such as:
  - Allowing discharge under low flow conditions where the discharge water quality is the same or better than the ambient water quality, thereby diluting naturally saline catchments.
  - Redefining the lower limit of 'high' flow to allow discharge events to occur at lower flows.
  - Altering the Regulation to increase the definition of saline water to align with the long term average salinity of the Hunter River, or be consistent with recognised standards for the definition of saline water and freshwater.
  - Providing additional alerts for forthcoming / predicted discharge opportunities.
- Investigating opportunities to allow mines in the upper Goulburn River subcatchment to discharge higher volumes during wet weather periods that wouldn't limit opportunities for downstream dischargers in the Scheme.

The current salinity targets are within ranges suitable for livestock and crops. The health of macroinvertebrates in the Hunter River is also considered, on average, to be good. While salinity targets should not be altered at this stage, further investigations should be undertaken into hot spots of poor macroinvertebrate health. If they are found to be unrelated to salinity levels, the EPA should consider raising salinity targets without compromising the environment, agriculture or ecosystem services.

There are also opportunities to make the Scheme more cost effective by:

- Investigating alternative auction/sales processes to make bid prices for credits transparent.
- Making the price paid for traded credits available publicly.
- Providing notifications to credit owners when credits become available for trade.
- Installing functionality that prevents trades that are inconsistent with the Scheme rules.
- Reimbursing unspent surplus revenue to credit holders.

We have also considered whether the flood flow exemption should be removed to make the Scheme simpler and less costly for participants. However, we have found that moving to high flow rules may require participants to purchase more credits, further limiting credit availability and potentially decreasing discharge opportunities. Instead the EPA should consider removing the salinity targets during flood flow conditions.

## Introduction

The NSW Minerals Council (NSWMC) welcomes the opportunity to comment on the review of the *Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002* (the Scheme). The Scheme has proven to be an effective means of meeting salinity objectives in the Hunter River whilst allowing industry to discharge saline water.

There are a number of opportunities to improve the environmental and cost effectiveness of the Scheme without adversely impacting river health.

Each of the issues outlined in the EPA's discussion paper are discussed below, along with NSWMC's recommendations.

## Issue 1: Altering salinity targets

### Salt sensitivity of crops and livestock

Salinity levels in the Hunter River are typically in the range 400-800  $\mu\text{S}/\text{cm}$ , with occasional spikes above 1000  $\mu\text{S}/\text{cm}$ . The current salinity targets for the three river sectors are:

- Upper sector - 600  $\mu\text{S}/\text{cm}$  (high flows) and 900  $\mu\text{S}/\text{cm}$  (flood flows)
- Middle sector - 900  $\mu\text{S}/\text{cm}$
- Lower sector - 900  $\mu\text{S}/\text{cm}$

These salinity targets are well below the targets for livestock and many crops. The ANZECC Guidelines advise that no adverse effects are expected to animals when their drinking water is below the following levels<sup>1</sup>:

- Beef cattle - total dissolved solids (TDS) of 4,000 mg/L (~6,000  $\mu\text{S}/\text{cm}$ )
- Dairy cattle - TDS of 2500 mg/L (~3,700  $\mu\text{S}/\text{cm}$ )
- Sheep - TDS of 5000 mg/L (~7,500  $\mu\text{S}/\text{cm}$ )
- Horses - TDS of 4000 mg/L (~6,000  $\mu\text{S}/\text{cm}$ )
- Pigs - TDS of 4000 mg/L (~6,000  $\mu\text{S}/\text{cm}$ )
- Poultry - TDS of 2000 mg/L (~3,000  $\mu\text{S}/\text{cm}$ )

This shows that the current salinity targets are well below levels that are likely to impact livestock.

Moderately salt sensitive crops<sup>2</sup> can withstand irrigation water with salinity levels ranging from 1,100 - 1,900  $\mu\text{S}/\text{cm}$ <sup>3</sup> (for loam soils typical of the Hunter Valley). More tolerant crops such as wheat can withstand much higher salinity levels in irrigation water (~5,300  $\mu\text{S}/\text{cm}$  for loam soils). The current salinity targets are therefore below levels that are likely to impact the vast majority of crops.

### Areas of poor macroinvertebrate health

The Hunter Catchment Salinity Assessment has also shown that the health of macroinvertebrates is considered, on average, to be good. However there are a few specific areas with poorer health. The areas with poor macroinvertebrate health should be further investigated to determine the causes and whether it is linked to salinity levels in that area.

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<sup>1</sup> Australian and New Zealand Environment and Conservation Council 2000, *Australian and New Zealand guidelines for fresh and marine water quality - Volume 1: The guidelines*.

<sup>2</sup> Such as corn, grapefruit, orange, grape, avocado, pea, apple, potato, pepper, lettuce, onion, eggplant, bean and carrot.

<sup>3</sup> Ibid.

### **Rationalisation of salinity targets**

Following these studies, the EPA should consider whether salinity targets could be increased (particularly for the Upper Sector) without compromising the environment, agriculture or ecosystem services. The target levels should be balanced with ANZECC Guideline salinity trigger values of 350  $\mu\text{S}/\text{cm}$  that are indicative of slightly disturbed ecosystems for upland rivers in NSW. It should also be noted that, for people, water with EC below 1,500  $\mu\text{S}/\text{cm}$  is considered safe to drink, though water with EC above 800  $\mu\text{S}/\text{cm}$  begins to deteriorate taste.

### **Understanding the effects of different components of saline water discharge**

Experimental studies should also be undertaken to understand the effects of different components of saline water discharge (ie ionic composition, metals/metalloid contamination, etc.). The Upper Hunter Mining Dialogue's Joint Water Working Group<sup>4</sup> is very interested in understanding whether potential metal contamination in discharge water is impacting upon the water quality of the river. The Working Group is eager to collaborate with the EPA on these experimental studies.

### **Recommendations:**

- Undertake investigations into the cause of poor macroinvertebrate health in some areas.
- Consider whether there are opportunities to raise the salinity targets without compromising the environment, agriculture or ecosystem services.
- Undertake experimental studies of the environmental effects of different components of saline water discharge (particularly metals, metalloids and ions) in collaboration with the community and the industry through the Upper Hunter Mining Dialogue Joint Water Working Group.

## **Issue 2: Increasing discharge opportunities**

### **Providing additional lead in time to prepare for discharge events**

Opportunities to discharge are often limited by not having enough lead-in time to prepare for discharge events, due to the time taken to receive the River Register. This primarily affects mines in the Upper Sector in particular, as the wet weather event is often well in progress at the time of notification. The opportunity to conduct credit trading is also restricted by a limited lead-in time.

This could be improved with further work to predict Hunter River flows through the use of upper catchment hydrographic and rainfall data. A notification warning of the potential for a discharge event could also be issued to prepare licensees of a forthcoming River Register.

Temporary trading of credits could be better facilitated through some form of notification (email or SMS) to all licensees when credits are announced as available on the EPA's credit exchange website.

### **Redefining what constitutes 'saline' water**

The HRSTS Regulation currently defines 'saline' water as water with an EC of greater than 400  $\mu\text{S}/\text{cm}$ . This is quite conservative compared to mean Hunter River water quality (typically in the range 400-800  $\mu\text{S}/\text{cm}$ ) and creates the potential for technical or administrative non-compliances when water of superior quality (above 400  $\mu\text{S}/\text{cm}$  but below background levels) is deliberately or inadvertently discharged to the Hunter River. If the definition could be increased, it would allow mines to potentially discharge non-saline water at any time (including low flow periods) provided there are appropriate provisions within the licence holder's EPL. Therefore, the definition of saline water should be increased to align with the long term average salinity of the Hunter River, or be

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<sup>4</sup> A working group consisting of industry, community and landholder group representatives looking at ways to reduce the cumulative impacts of mining on water resources in the Upper Hunter region.

consistent with recognised standards for the definition of saline water versus freshwater.

### **Allowing discharge of non-saline water during low flow conditions**

The ability to discharge under low flow conditions where the discharge water quality is the same or better than the ambient water quality (yet still defined as 'saline') would be a common sense approach that could increase environmental flows.

### **Redefining the lower limit of a 'high' flow discharge event**

'High' flows are triggered at the following flow rates:

- Upper sector - 1,000 ML/d
- Middle sector - 1,800 ML/d
- Lower sector - 2,000 ML/d

There is usually a lag period, following a wet weather event, where flows are still relatively high and EC levels are well below salinity targets. Redefining the lower limit of 'high' flow would allow increased discharge opportunities right after a wet weather event when EC levels are low. Alternatively, the Scheme could be extended to operate under low flow conditions.

### **Removing salinity target restrictions during flood flows**

During flood flow events, the initial, pre-discharge salt load spikes are very temporary as this salt load is very rapidly flushed down the system, and into the ocean. This natural, temporary increased salinity is unlikely to impact aquatic species or irrigators. Irrigators are likely to be withdrawing pumps or ceasing pumping during flood flows.

Salinity target restrictions could therefore be removed during flood flows. This would increase discharge opportunities significantly and remove the administration burden and costs associated with calculating the TAD and operating the Managed Envelope of Residual Flows process (discussed in Issue 6). Removing these administrative tasks could also increase lead-in time. Note that individual EPLs would still limit the volume of discharged water - protecting tributaries.

### **Recommendations:**

- Provide more lead-in time through some form of wet weather forecasting early warning system and flow modelling.
- Provide an SMS alert for forthcoming River Registers.
- Improve facilitation of temporary trades for specific discharge events, such as via a notification to all licensees when credits become available.
- Undertake a risk assessment to determine the materiality of any impacts, in comparison to the benefits of increased discharge opportunities, from the following discharge options:
  - Altering the Regulation to increase the definition of saline water to align with the long term average salinity of the Hunter River, or be consistent with recognised standards for the definition of saline water versus freshwater.
  - Allowing discharge under low flow conditions where the discharge water quality is the same or better than the ambient water quality (though still defined as 'saline').
  - Redefining the lower limit of 'high' flow to allow discharge events to occur at lower flows.
  - Extend the Scheme to operate under low flow conditions.
  - Removing salinity target restrictions during flood flows.

## Issue 3: Other significant sources of salt within the Scheme area

A holistic approach to the management of salinity is required. Natural processes - particularly dryland salinity - appears to be the most significant contributor to salinity in the Hunter River (more than 75 % of lower Hunter River salt levels<sup>5</sup>). This is because much of the soil in the catchment is derived from marine-based sediments. Credit holders contribute around 10% of the salt load (with 13.5% to 19.8% in more recent wet periods).

The EPA should investigate the significance of other sources of salt to determine potential impacts to the Scheme. If the impacts are significant, the EPA should determine whether there are licensing or other management opportunities to reduce salt loads. These other sources are likely to include sewage treatment plants, coal seam gas (CSG) developments, discharges in the Goulburn River catchment, farm dams, dryland salinity and groundwater.

### Recommendations:

- The EPA should investigate the significance of other sources of saline water.

## Issue 4: Salt from the Goulburn River subcatchment

Discharges from the mines in the Goulburn River subcatchment, which lie near the border of the Hunter catchment, are pre-treated through a Reverse Osmosis (RO) process and then trickle discharged at concentrations varying from 500-900  $\mu\text{S}/\text{cm}$ . The background salinity levels in this catchment are highly variable, though generally quite salty - varying from around 800 - 5000  $\mu\text{S}/\text{cm}$  during low flows. At Peabody's Wilpinjong mine, saline water is pre-treated with RO to around 500  $\mu\text{S}/\text{cm}$ , before being diluted in ambient waters with an EC of around 1000-3000  $\mu\text{S}/\text{cm}$ . In effect, the Wilpinjong mine is improving salinity levels in its discharge creek (Wilpinjong Creek), but is constrained by having to discharge water at levels well below natural background levels. During low flows, upper Goulburn mines should be allowed to discharge water at EC levels below the background levels, therefore diluting existing salt concentrations in the ambient waters.

The hydrology of the upper Goulburn River subcatchment limits the ability for the Scheme to act as an effective system for allowing mines to discharge saline water, as it is not possible to give these mines adequate advanced warning of discharge opportunities. The high flows at the headwaters of the Goulburn River catchment are also relatively short in duration - which would mean fewer discharge opportunities in the Goulburn River subcatchment in comparison with lower sections of the Hunter catchment. This could also increase the risk of flood at a mine site, as the mines' water management plans were developed based on a trickle discharge regime. Finally, relying on a weather forecasting system to overcome a short notice period might be possible, but also presents a risk of water pollution if the wet weather event does not occur.

With the existing RO treatment processes, limitations to forecasting wet weather reliably, and potentially very limited discharge opportunities (due to the brevity of wet periods), the existing management processes are considered adequate. Nevertheless, there is an opportunity to utilise wet weather periods and allow mines to discharge higher volumes of higher EC water during high

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<sup>5</sup> Australian Coal Association Research Program (ACARP) (2004), *Management of Salinity Issues for Closure of Open Cut Coal Mines*, Administered by the Department of Infrastructure, Planning and Natural Resources.



flows. When a wet weather event occurs, mines should be allowed to discharge saline water (without limits, or up to a higher maximum concentration) whilst ensuring that a local downstream saline concentration target is met that is consistent with a specific sub-catchment EC value that would not impact discharge opportunities for other downstream licensees. For example, Wilpinjong Coal would be able to increase its discharge concentration from 500  $\mu\text{S}/\text{cm}$  to, say, 900-1500  $\mu\text{S}/\text{cm}$  during high flow events as Wilpinjong Creek has a typical high flow EC range between 1000  $\mu\text{S}/\text{cm}$  to 3000  $\mu\text{S}/\text{cm}$ .

NSWMC is supportive of the EPA increasing real-time monitoring of flow and salinity in this subcatchment, to better understand these issues in this expanding area. This information would allow an appropriate specific sub-catchment EC value to be determined.

**Recommendations:**

- Maintain existing saline water discharge practices for mines based in the Goulburn River subcatchment.
- Investigate opportunities to allow mines in the upper Goulburn River subcatchment to discharge higher volumes during wet weather periods that wouldn't limit opportunities for downstream dischargers in the Scheme.
- Consider diluting naturally saline catchments with less saline mine water.
- Increase real-time monitoring of flow and salinity in the upper Goulburn River subcatchment. With this increased monitoring, determine an appropriate sub-catchment EC target.

## Issue 5: Other pollutants present in saline water discharges

As discussed in Issue 1, NSWMC recommends that the EPA undertake experimental studies of the environmental effects of different components of saline water discharge (particularly metals, metalloids and other ions). Following this study, the EPA should be able to determine whether pollutants are being adequately diluted with fresh water. If dilution is insufficient, the EPA should then consider how best these other pollutants could be managed. The Upper Hunter Mining Dialogue Joint Water Working Group has discussed the risks of metal and metalloid pollution in the Hunter River and would therefore be an appropriate forum of both industry and community representatives to discuss these investigations with the EPA, and assist with the investigations where possible.

It should be noted that regardless of the above investigations, it is technically impractical for these other pollutants to be managed through the Scheme. This is because there is significant delay in receiving test results for metal, metalloid and ion concentrations (around 3-4 days, compared to EC, which can be tested real-time). Therefore the discharge event would have passed before water could be discharged from a mine.

It should be noted that if dilution is assessed as being insufficient, any excessive metal / metalloid / ion concentrations in the river would likely be very temporary. This is because they are being rapidly flushed down the system during high flow and therefore short term events, before being further diluted into the ocean. Extraction of water for irrigation purposes is unlikely to be occurring during these high flow events - reducing the risk of other pollutants making their way into agricultural systems.

Overall, NSWMC considers that the *Protection of the Environment Operations Act* is sufficiently broad to cover discharge of pollutants not explicitly covered by the Scheme and hence a change to

the HRSTS Regulation is not required for this issue.

**Recommendations:**

- Investigate dilution of metals, metalloids and ions following the completion of a study into environmental effects of different components of saline water discharge. Liaise with the Upper Hunter Mining Dialogue Joint Water Working Group during the investigations.

## Issue 6: Removing the flood flow exemption

The Managed Envelope of Residual Flows (MERF) process was developed so as to ensure equitable sharing and maximum utilisation of flood flow opportunities for discharging of saline waters while meeting river water quality goals set out under the Scheme. It was formulated to compliment the Scheme and to provide operational and administrative continuity and linkages between the Scheme and the MERF.

The MERF applies only to flood flows. The MERF process utilises the high flow salt credits as a basic entitlement for discharge sharing but is adjusted according to discharge demand and opportunity for each flood flow block. The total discharge for the block is determined by a flood Total Allowable Discharge (TAD) provided by State Water on the River Register. If the TAD is not exhausted (i.e. if discharge tonnage requests do not exceed the available TAD), then discharging participants will receive an additional allocation based on the participants' credit holdings in order to fully allocate the calculated residual TAD envelope. Allocations of residual TAD proceed iteratively until each participant's nominated tonnage is met or the residual TAD is used up.

To emphasise the above the MERF does require participants to hold salinity credits. Hence all licensees taking advantage of flood flow events do contribute to the running costs of the Scheme.

While the process adds a layer of complexity and minor additional cost to participants, replacing flood flow rules with high flow rules could lead to some undesirable effects, since:

- If under a flood flow event only some of the TAD is used, credit owners have a higher potential to discharge. This is because the MERF proportionally distributes the surplus TAD to those who have nominated to discharge (in accordance with credit holding), allowing additional discharge. If this were managed under High Flow rules, the remainder of the TAD can also be used but would require credit holders to actively seek those credits from facilities not wanting to discharge, which is cumbersome, costly and not always possible given the timing of some discharge events and also the willingness of participants to trade credits.  
These rules allow mines with very few credits, based in the Upper Sector in particular, to maximise the opportunity for discharge that flood flows create.
- Flood Flows are currently declared in the Upper Sector when flow exceeds 4000 ML/d. Based on a worked example<sup>6</sup>, enabling a licensee to discharge to its maximum potential at the threshold of flood flow would require a credit holding in the order of 60 credits. This is a significant holding and would potentially result in a significantly inflated credit auction outcome to reallocate credits amongst licensees. As noted above in theory this could be addressed through temporary trading but this is an inefficient means of obtaining required discharge allocation.

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<sup>6</sup> Flood TAD 4800 ML, discharge EC 5000 $\mu$ S/cm, EPL Tributary Limit 100 ML/d. To achieve maximum discharge under high flow rules would require approximately 64 credits.

We also note that in the event the EPA does decide to remove the flood flow exemption, the flood flow EC limit in the Upper Sector should remain at 900  $\mu\text{S}/\text{cm}$  in accordance with the current regulation, otherwise the Total Allowable Discharge (TAD) and discharge opportunities for mines in the Upper Sector are significantly reduced.

**Recommendations:**

- Maintain the existing flood flow exemption arrangements.
- Consider removing the sector and instantaneous salinity targets under flood flow conditions which in turn removes the need for the MERF. Discharge flow rates under flood flow would still be limited by EPL tributary protection limits.
- As an alternative to temporary trading consider a process similar to the MERF which automatically allocates unused credits to those accessing discharge blocks.
- Continue working with industry to identify issues with removal/amendment of flood flow rules or alternatives.

## Issue 7: Improving the auction process

The price of credits has increased exponentially and concerns have been expressed about the auction process. This is due to the sealed bid auction process, where bids in a final round of bidding are unknown.

A single-bid Vickrey auction process has been proposed for the 2014 auction to reduce the costs of the winning bidder. However this is an invisible bidding process that encourages high bids. The Vickrey process is also corruptible by allowing a bidder to bid an exorbitantly inflated figure to guarantee winning the bid. Therefore, the market price that results from a Vickrey process is not indicative of a freely traded market.

It is beyond the scope of this submission to determine the best process for allocating credits. Therefore the EPA should investigate with the Operations Committee a number of alternative processes for making the credit price and/or bid prices more transparent, which may include:

- A non-auction process, similar to water trading rules, which could encourage more temporary exchanges.
- A fixed credit price scheme, similar to a share price.
- Other auction processes.

Currently, anyone with an ABN can participate in the auction process. This makes the system vulnerable to manipulation. Therefore only legitimate dischargers should be allowed to purchase credits.

**Recommendations:**

- Investigate alternative auction/sales processes to make bid prices for credits transparent.
- Allow only legitimate dischargers (or potential future dischargers) to purchase credits.

## Issue 8: Improving the credit trading process

### Transparency of credit trading

A visible price signal would help traders make more informed decisions about the demand for, and therefore value of, credits. Information about sales would need to include some contextual information to better understand their true value, ie: the expiration date of those credits, who the trading partners are, whether they are temporary trades during a high flow, the transfer period of the trade, etc. Therefore NSWMC is supportive of making the price paid for traded credits publicly available.

### Trading between common corporate entities

The Discussion Paper notes that a visible credit price makes it easier to detect any anti-competitive behaviour in the market. However, trading within a common corporate entity at more than \$0 is inefficient, and therefore should not be viewed as 'anti-competitive'.

To resolve this issue, the credit exchange register could be set up to recognise and link common corporate entities. Trades within corporate entities would not be required to report trades, therefore avoiding the creation of artificial trade data.

### Notification of credit availability

Notification for the availability of credits for exchange is currently provided for via posting on a noticeboard. The process could be improved by ensuring that a notification is sent (via email and/or SMS) to other credit owners when this occurs, similar to the operation of a water broker.

### Trading in accordance with Scheme rules

NSWMC is also supportive of installing functionality that prevents trades that are inconsistent with the Scheme rules.

### Recommendations:

- Make the price paid for traded credits available publicly, provided appropriate contextual information is also made available.
- Link common corporate entities on the credit exchange register to allow free trade of credits between commonly owned mines.
- Provide notifications to credit owners when credits become available for trade.
- Install functionality that prevents trades that are inconsistent with the Scheme rules.

## Issue 9: Additional uses for revenue generated via auctions

Excess revenue that has been raised through the auction process should be used to fund the running costs of the Scheme, in lieu of invoicing credit holders to pay for it. If the auction funds exceed the budget required for running the Scheme over two years, there are a number of options to resolve this, including:

- Removing or changing the auction process to prevent inflation of credit prices.
- Refunding unspent funds to credit holders.
- Partial use of excess funds for projects that are agreed to by the Operations Committee<sup>7</sup>.

The Operations Committee should determine on a case by case basis whether excess funds

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<sup>7</sup> Note that the Operations Committee currently assesses the need for Scheme projects through the annual budgeting process as advised by the Committee members.

could be used for initiatives that benefit the ongoing operation of the Scheme. The excess funds should not be treated as a reserve fund for generic EPA / environmental projects. Relevant Scheme projects might include:

- Increasing real-time monitoring of flow and salinity in the upper Goulburn River subcatchment.
- Undertaking investigations into the source and cause of poor macroinvertebrate health in some areas.
- Undertaking experimental studies of the environmental effects of different components of saline water discharge (particularly metals, metalloids and ions).

**Recommendations:**

- Remove or change the auction process to prevent inflation of credit prices.
- Refund unspent revenue to credit holders.
- Partially use excess funds for projects that are agreed to by the Operations Committee.

## Issue 10: Increasing public transparency, access to information and representation

NSWMC is supportive of making it easier for the public to access a range of information on the Scheme.

The Operations Committee is well coordinated and its makeup is considered adequate.

Under the present arrangements, responsibility for operating the Scheme is delegated by the EPA to the NSW Office of Water, who in turn delegate responsibility to State Water. This service arrangement could potentially be more streamlined and rationalised.

**Recommendations:**

- Allow public access to a wide range of information relating to the Scheme.
- Maintain existing Operations Committee makeup and coordination.
- Consider streamlining the government service sub-contracting arrangements by the EPA.

## Summary of recommendations

1. Undertake investigations into the cause of poor macroinvertebrate health in some areas.
2. Consider whether there are opportunities to raise the salinity targets without compromising the environment, agriculture or ecosystem services.
3. Undertake experimental studies of the environmental effects of different components of saline water discharge (particularly metals, metalloids and ions) in collaboration with the community and the industry through the Upper Hunter Mining Dialogue Joint Water Working Group.
4. Provide more lead-in time through some form of wet weather forecasting early warning system and flow modelling.
5. Provide an SMS alert for forthcoming River Registers.
6. Improve facilitation of temporary trades for specific discharge events, such as via a notification to all licensees when credits become available.
7. Undertake a risk assessment to determine the materiality of any impacts, in comparison to the benefits of increased discharge opportunities, from the following discharge options:
  - a. Altering the Regulation to increase the definition of saline water to align with the long term average salinity of the Hunter River, or be consistent with recognised standards for the definition of saline water and freshwater.
  - b. Allowing discharge under low flow conditions where the discharge water quality is the same or better than the ambient water quality (though still defined as 'saline').
  - c. Redefining the lower limit of 'high' flow to allow discharge events to occur at lower flows.
  - d. Extend the Scheme to operate under low flow conditions.
  - e. Removing salinity target restrictions during flood flows.
8. Investigate the significance of other sources of saline water.
9. Maintain existing saline water discharge practices for mines based in the Goulburn River subcatchment.
10. Investigate opportunities to allow mines in the upper Goulburn River subcatchment to discharge higher volumes during wet weather periods that wouldn't limit opportunities for downstream dischargers in the Scheme.
11. Consider diluting naturally saline catchments with less saline mine water.
12. Increase real-time monitoring of flow and salinity in the upper Goulburn River subcatchment. With this increased monitoring, determine an appropriate sub-catchment EC target.
13. Investigate dilution of metals, metalloids and ions following the completion of a study into environmental effects of different components of saline water discharge. Liaise with the Upper Hunter Mining Dialogue Joint Water Working Group during the investigations.
14. Maintain the existing flood flow exemption arrangements.
15. Consider removing the sector and instantaneous salinity targets under flood flow conditions which in turn removes the need for the MERF. Discharge flow rates under flood flow would still be limited by EPL tributary protection limits.
16. As an alternative to temporary trading consider a process similar to the MERF which automatically allocates unused credits to those accessing discharge blocks.
17. Continue working with industry to identify issues with removal/amendment of flood flow rules or alternatives.
18. Investigate alternative auction/sales processes to make bid prices for credits transparent.
19. Allow only legitimate dischargers (or potential future dischargers) to purchase credits.
20. Make the price paid for traded credits available publicly, provided appropriate contextual information is also made available.
21. Link common corporate entities on the credit exchange register to allow free trade of credits between commonly owned mines.
22. Provide notifications to credit owners when credits become available for trade.

23. Install functionality that prevents trades that are inconsistent with the Scheme rules.
24. Remove or change the auction process to prevent inflation of credit prices.
25. Refund unspent revenue to credit holders.
26. Partially use excess funds for projects that are agreed to by the Operations Committee.
27. Allow public access to a wide range of information relating to the Scheme.
28. Maintain existing Operations Committee make-up and coordination.
29. Consider streamlining the government service sub-contracting arrangements by the EPA.