

Review of the Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002

Report and recommendations

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Executive summary

This is the EPA's report on the review of the Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002 (the Regulation). It follows public consultation on a [Discussion Paper](#) (EPA 2013c), which sought feedback on the Regulation and scheme as part of the review.

This report includes a number of recommendations to improve the Regulation. This includes a recommendation to raise the current flood flow thresholds from 4,000 to 5,000 ML/day in the upper sector; from 6,000 to 15,000 ML/day in the middle sector; and from 10,000 to 25,000 ML/day in the lower sector, and a range of other more minor amendments. A full list of recommended regulatory amendments can be found in section 4.1.

It is also accompanied by a draft Amendment Regulation, which has been prepared to implement the recommended improvements to the Regulation outlined in this report. The draft Amendment Regulation is currently being exhibited for public comment (see below). The EPA will consider all submissions before finalising the Amendment Regulation.

Also included in this report are a number of identified and supported non-legislative improvements to the general operation of the scheme (a list is provided in section 4.2). This report also identifies further investigations and studies that may be further considered and prioritised by the EPA in consultation with the scheme Operations Committee following the completion of this review (a full list is provided in section 4.3).

Public submissions made on the review of the Regulation can be found on the EPA's website: [Review of the Protection of the Environment Operations \(Hunter River Salinity Trading Scheme\) Regulation 2002](#). A summary of the issues raised in submissions is provided in Appendix A of this report.

Have your say on the draft regulation

You are invited to provide a submission or comment on the draft Amendment Regulation. The draft Amendment Regulation is available at: [Review of the Protection of the Environment Operations \(Hunter River Salinity Trading Scheme\) Regulation 2002](#)

Please provide your comments to the EPA by:

- email HRSTS.Review@epa.nsw.gov.au
- phone 131 555
- post your submission to:

POEO (HRSTS) Regulation Review
Reform and Compliance Branch
Environment Protection Authority
PO Box A290
Sydney South NSW 1232

Submissions close at 5pm on **19 February 2016**.

Definitions and abbreviations

EC	Electrical conductivity – a measure of the ability of water to pass an electrical current, measured in microsiemens per centimetre ($\mu\text{S}/\text{cm}$). It is a way of measuring salinity (see section 2.1.1, Box 1).
EPA	NSW Environment Protection Authority
HRSTS	Hunter River Salinity Trading Scheme
MERF	Managed Envelope of Residual Flows
$\mu\text{S}/\text{cm}$	Microsiemens per centimetre, which is the electrical conductivity (EC) of water
OEH	Office of Environment and Heritage
Operations Committee	Stakeholder representative committee established under the Regulation to advise the EPA on the operation of the scheme
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
The Minister	The Minister for the Environment
The Regulation	Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002
The scheme	Hunter River Salinity Trading Scheme
TAD	Total allowable discharge
TDS	Total dissolved solids

1 Introduction

1.1 Background

The Hunter River Salinity Trading Scheme (the scheme) operates within the Hunter River catchment, New South Wales (NSW), to minimise the impact of saline water discharges from industry on Hunter River water users and the environment. The scheme does this by only allowing industry participants to discharge saline water when there is a high flow of fresh water in the Hunter River, and it uses a system of tradeable salinity credits to limit the amount of salt that can be discharged at any one time.

The scheme was established under the [Protection of the Environment Operations \(Hunter River Salinity Trading Scheme\) Regulation 2002](#) (the Regulation) on 1 December 2002, following a successful pilot. The NSW Environment Protection Authority (EPA) administers the scheme.

Appendix A of the [Discussion Paper](#) for the review provides a history and overview of how the scheme operates including a map of the Hunter Valley catchment showing the scheme sectors and location of participants (EPA 2013c, p. 23, 33).

The Regulation requires the Minister for the Environment to undertake a review of the Regulation after it has been in force for ten years. The EPA commenced this review on behalf of the Minister in 2013. This report provides an overview of this review process and the results.

1.2 Purpose, objectives and scope of the Regulation review

The purpose of the review was to:

- undertake the statutory ten year review of the Regulation
- improve the Regulation to make it a more effective and efficient tool for managing discharges of saline water into the Hunter River catchment under the scheme.

The objectives of the review were to:

1. review the Regulation and the components of the scheme set out in the Regulation
2. examine the effectiveness of the scheme in managing the impact of saline water discharges in the Hunter River catchment
3. examine the efficiency, equity and ease of use of the scheme for its participants and for the EPA.

As flagged in the Discussion Paper (EPA 2013c), the review did not revisit the fundamental basis of the scheme. This was considered at the time the Regulation was first developed and is outlined in the [Regulatory Impact Statement](#) (EPA 2001).

This review started with the premise that the scheme (as established by the Regulation) is the overall preferred mechanism for controlling saline water discharges in the Hunter River catchment and the review focussed on how the Regulation and the general operation of the scheme could be improved.

1.3 The review process

1.3.1 Completed stages

In 2013, the EPA commenced the review of the Regulation by commissioning the Office of Environment and Heritage (OEH) to carry out the [Hunter Catchment Salinity Assessment](#) (EPA 2013a). The Assessment was a desktop study to evaluate the effectiveness of the scheme, based on available water quality and ecological health data (see also Appendix B of the Discussion Paper (2013c) for an overview of the Assessment).

Based on the results of the Salinity Assessment (EPA 2013a) and consultation with the scheme Operations Committee (see Box 1-1 below), the EPA prepared a Discussion Paper (EPA 2013c), which was released for public consultation between November 2013 and February 2014 (see section 2 for more information on the consultation process).

Since the close of the consultation period, the EPA has considered the issues raised in submissions and carried out further investigations and analysis into flood flows (see section 3.3.1).

Box 1-1: What is the Operations Committee?

The scheme Operations Committee is established under the Regulation to advise the EPA on the operation of the scheme. The committee is appointed by the EPA and is made up of representatives of:

- licence holders (industry)
- Local Land Service
- irrigators
- environmental interests
- the Department of Primary Industries (DPI) - Water.

See Appendix A of the Discussion Paper for more information including a list of sitting committee members during the review of the Regulation (EPA 2013c p. 30)¹.

1.3.2 Current stage

The EPA has now finalised its recommendations for the review, which are presented in this report. A draft Amendment Regulation has also been publically exhibited, which contains the proposed changes to the Regulation (see section 1.5).

1.3.3 Final stage

The revised regulation will be finalised based on the feedback received during the consultation period (closes on **19 February 2016**). The EPA anticipates that the final Amendment Regulation will be made in early-mid 2016².

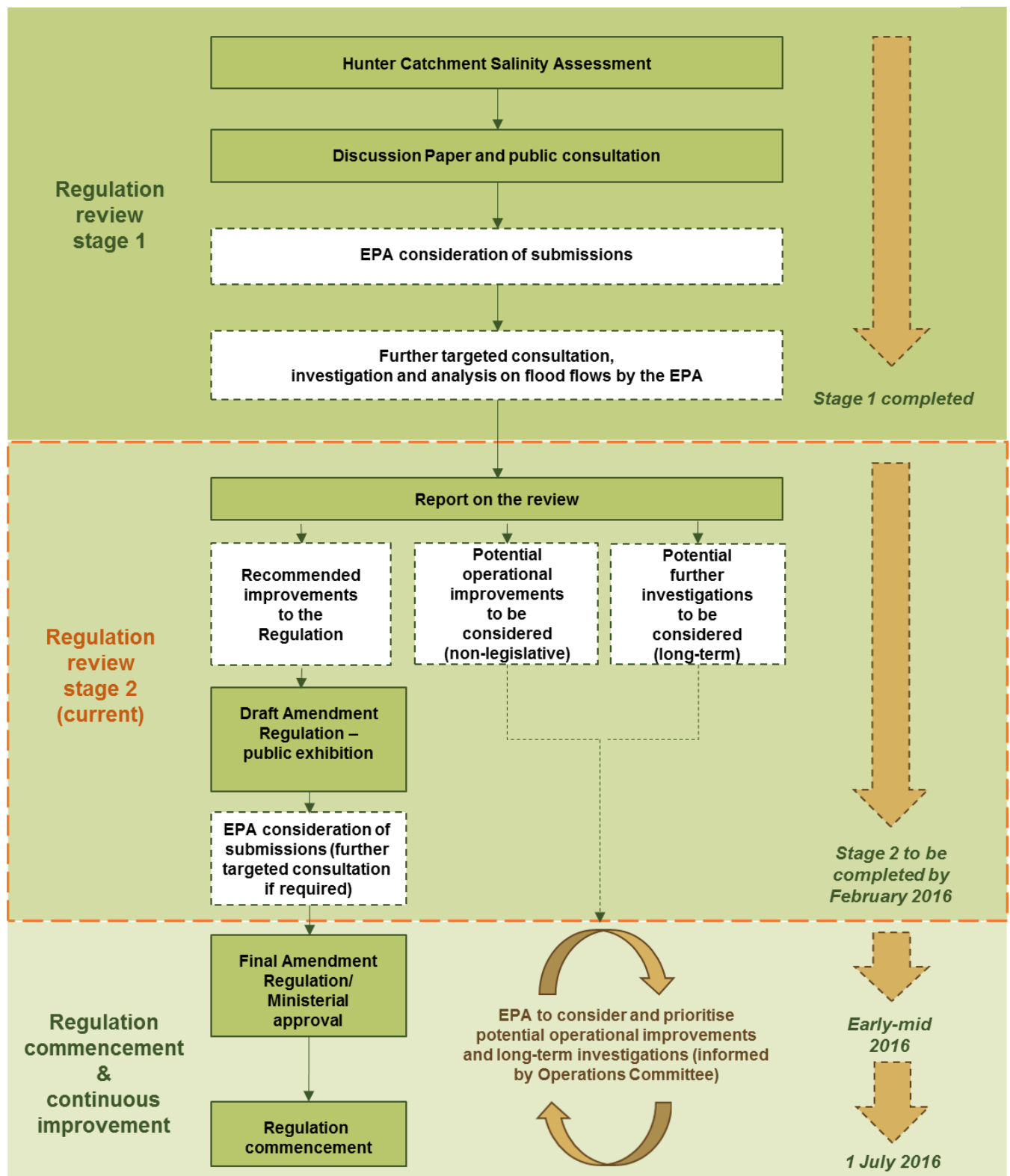
The EPA will also, in consultation with the scheme Operations Committee, consider and progress the identified operational improvements to the scheme and further investigations and studies to improve the scheme in the medium to long term.

The review process is summarised in Figure 1-1 below.

¹ Note that a new committee was appointed on 18 May 2015.

² Note that this report recommends that the proposed amendments to the Regulation should commence on 1 July 2016 (see section 3.3.1).

Figure 1-1: Process for reviewing the Regulation



1.4 Purpose of this report

The main purpose of this report is to make recommendations to improve both the Regulation and the general operation of the scheme, based on the outcomes of the review. This report:

- a) gives an overview of the review process (including consultation)
- b) discusses the results of consultation and the EPA's position on the issues raised
- c) makes a number of detailed recommendations and suggestions:
 - i) to improve the Regulation
 - ii) to improve the general operation of the scheme
 - iii) for further investigations to support the scheme in the medium to long term.

1.5 Draft Amendment Regulation - on exhibition

A draft Amendment Regulation is now on public exhibition and accompanies the release of this report. The draft Amendment Regulation includes the recommended amendments in this report and also a number of other minor technical amendments.

The EPA invites stakeholder comment on the draft Amendment Regulation by **19 February 2016**. The draft Amendment Regulation and details on how to make comment are available at: [Review of the Protection of the Environment Operations \(Hunter River Salinity Trading Scheme\) Regulation 2002](#)

2 Consultation on discussion paper

2.1 Consultation process

On 22 November 2012, the EPA published a Discussion Paper (EPA 2013c) seeking public feedback on the Regulation and the scheme.

The purpose of the Discussion Paper was to explain the EPA's review of the Regulation and present a number of focus questions and key issues to assist stakeholders in making their submission. The Discussion Paper was developed in consultation with the scheme Operations Committee and was informed by the Hunter Catchment Salinity Assessment (EPA 2013a).

2.1.1 Advertising

The EPA advertised broadly in a number of local papers, in the NSW Government Gazette and on the [EPA website](#) and the NSW Government [Have Your Say website](#) to publicise the release of the Discussion Paper and details of a public information session. Letters were also sent to a wide range of stakeholders including:

- scheme participants (licensees)
- peak and local environment, community, industry and water users groups
- local members of parliament
- local councils
- relevant state government agencies.

2.1.2 Public information session

The EPA held a public information session at Singleton on 12 December 2013, to explain the review process and present the Discussion Paper (EPA 2013c). A range of stakeholders attended this session (39 in total), including:

- | | |
|---|-----------------------------------|
| • coal mine industry (9) | • State Member of Parliament (1) |
| • electricity/gas industry (2) | • local council (1) |
| • wine industry (1) | • academic/economist (1) |
| • water users (1) | • individuals (2) |
| • environmental/community interests (7) | • scheme Operations Committee (5) |
| • environmental consultants (5) | • State government agencies (4) |

The EPA also held a briefing in Newcastle on 31 January 2014 for the:

- Lower Hunter Agricultural Water Users Association
- Hunter Valley Water Users Association
- Hunter Local Land Service.

2.1.3 Submissions

The EPA received 27 submissions on the Discussion Paper (EPA 2013c) from:

- Nature Conservation Council
- Environmental Defenders Office
- Lock the Gate Alliance
- Hunter Valley Protection Alliance
- Hunter Environment Lobby
- Hunter Communities Network

- Lower Hunter Agricultural Water Users Association
- Hunter Valley Water Users Association
- NSW Minerals Council
- Macquarie Generation (scheme participant)
- Another scheme participant (name withheld)
- Agriculture NSW
- Individual (economist/academic)
- Individual (resident and former scheme operator)
- Other individual/joint submissions (13).

Where permission was provided, these submissions have been posted on the EPA website: [Review of the Protection of the Environment Operations \(Hunter River Salinity Trading Scheme\) Regulation 2002](#).

Appendix A provides a condensed summary of the issues raised in submissions.

3 Issues and recommendations

3.1 General feedback on the success of the scheme

Overall, the vast majority of stakeholders either directly expressed or implied support for the scheme, recognising its significance in improving the management of saline discharges in the Hunter River catchment.

Responses from community and environment groups generally expressed the importance of not compromising or watering-down the scheme through the review of the Regulation, especially given the rapid expansion of coal mining across the catchment.

Industry submissions expressed a view that the scheme is an effective means of meeting salinity objectives in the Hunter River whilst still allowing industry to discharge saline water.

The EPA agrees with these assessments. The Hunter Catchment Salinity Assessment (EPA 2013a) found that the scheme has been an important response to the rising catchment and river salinity levels that were being seen in the 1980s and early 1990s. The success of the scheme has been significant, especially considering that new industry participants have joined the scheme and saline water discharges have increased over the life of the scheme, without detrimental impacts on salinity targets. Occasional exceedances of salinity targets have occurred, however, these are largely attributed to natural or diffuse sources.

One contrary view was from an economist/academic who argued that there is not enough evidence to justify that any current intervention is necessary to manage salinity in the Hunter River, and if it is, whether the scheme remains the preferred intervention instrument.

However, this issue is outside the scope of the review. Section 1.2 of the Discussion Paper (EPA 2013c) clearly stated that the review was not to be a review of the fundamental basis for the scheme. Considering the scheme's success, the review focussed primarily on how the environmental effectiveness and cost effectiveness of the scheme could be improved and also looked at a number of other issues. These are discussed in the following sections.

3.2 Environmental effectiveness

Section 2.1 of the Discussion Paper (EPA 2013c) provided an overview of issues relating to the environmental effectiveness of the scheme. It posed two focus questions for the review, which were:

Focus question 1: Is the scheme (including salinity targets) working to manage the impacts of saline water discharges on aquatic ecosystems in the Hunter River catchment? What improvements could be made to the Regulation?

Focus question 2: Is the scheme (including salinity targets) working to manage the impacts of saline water discharges on irrigators and other water users in the Hunter River catchment? What improvements could be made to the Regulation?

A number of specific issues were raised in the Discussion Paper to help improve the environmental effectiveness of the scheme, and these are dealt with separately below.

3.2.1 Altering salinity targets

The background to this issue is discussed in section 2.1.3 of the Discussion Paper (EPA 2013c, p.6).

It is important to recognise that participants in the scheme are only permitted to discharge saline water (and the 600 and 900 $\mu\text{S}/\text{cm}$ salinity targets³ only apply) during high and flood flow conditions, which is a relatively small proportion of the time. The amount of time that the scheme allows industrial discharges varies from year to year and is heavily affected by the climatic regime for that period. As an example, during 2013 the scheme only permitted discharges for approximately 9% of that year.

Therefore, for the vast majority of the time when low flow conditions prevail, the scheme simply does not permit discharges and the salinity targets do not apply. During these times, natural variability⁴ and other sources of salt (see section 3.2.3) are the main contributors to any elevated salinity levels in the river. The scheme is not designed to control actual salinity levels in the Hunter River in low flow conditions; however it helps to protect the health of the river by removing the pressure of industrial saline discharges during these times. It is worth noting that during one of the region's most significant drought periods on record (between 2002 and 2007), the existence of the scheme meant that participant discharges were able to be heavily restricted, which helped protect the river during this vulnerable time.

As expected, stakeholder opinion on the issue of potentially altering the salinity targets for high and flood flows was somewhat divided. Environmental, community and water user representatives generally advocated for lowering salinity targets or retaining the current targets to protect or enhance water quality for ecosystem health, drinking water and/or for stock watering/irrigation purposes. Industry representatives advocated retaining the current targets at this stage but also supported further studies to investigate whether there is scope to raise targets without compromising the environment, agriculture or ecosystem services.

These different perspectives are further discussed below.

Ecosystem health perspective

Summary of stakeholder views

Some community and environment group stakeholders advocated for retaining or lowering salinity targets to improve ecosystem health. While industry stakeholders supported retaining salinity targets at this stage, they would seek to raise the targets if it can be demonstrated that the environment and ecosystem services would not be compromised.

Discussion

The Salinity Assessment (EPA 2013a) considered ecosystem health throughout the Hunter River catchment by analysing available ecological health data, using macroinvertebrate health as the key biological indicator. The Salinity Assessment also reviewed recent scientific research into the relationships between salinity and macroinvertebrate community structure.

³ The high flow salinity targets are 600 $\mu\text{S}/\text{cm}$ for the upper sector and 900 $\mu\text{S}/\text{cm}$ for the middle and lower sectors. The flood flow salinity target is 900 $\mu\text{S}/\text{cm}$ in all sectors. Refer to the Discussion Paper (EPA 2013c) for more explanation.

⁴ There is evidence to suggest that some point sources of natural salt contamination existed around the time of European settlement in the Central Lowlands (e.g. early geographic names with salinity connotations – such as Saltwater Creek). Forest clearing in these areas is likely to have further exacerbated these natural salinity levels due to increased run-off, erosion and rising water tables (Kellet *et al.* 1989 cited in EPA 2013a).

Based on the available data⁵, the Salinity Assessment found that ecosystem health throughout the Hunter River catchment is generally good; however, there are some areas which are quite poor, including several locations along the main stem of the Hunter River which were found to be significantly impaired.

The Salinity Assessment found that salinity appears to be a relatively important factor affecting stream macroinvertebrate communities in the Hunter River catchment, although other major stressors must also be considered including flow regulation, land clearing and riparian degradation. The Assessment noted that it can be difficult to tease out the relative contributions of these confounding stressors to altered macroinvertebrate communities in areas where these issues converge.

Focussing on salinity as a factor, the Salinity Assessment demonstrated that there are various potential sources of salinity in the Hunter River catchment including rainfall, atmospheric deposition, run-off and infiltration, weathering of geological strata, groundwater and a variety of anthropogenic sources, including participant discharges under the scheme.

It is therefore difficult to determine how much of an impact participant discharges and the scheme's salinity targets have had on ecosystem health, particularly given that the targets only apply for a small proportion of the time when the Hunter River is in high or flood flow conditions. Furthermore, the salinity targets only apply to the main stem of the Hunter River at certain locations between Lake Glenbawn and Singleton and not to any of its tributaries (this is further discussed in section 3.2.5).

During low flow conditions, the scheme acts to protect ecosystem health by prohibiting participants from discharging saline water. However, it is during low flow conditions that salinity levels in the Hunter River can sometimes be elevated. This is generally attributed to the natural or diffuse sources of salinity mentioned above.

There is evidence to suggest that the scheme has had an overall positive effect on salinity levels in some sections of the Hunter River. The Salinity Assessment considered long-term trends⁶ in flow and salinity and found that salinity levels in the Hunter River had improved at Singleton and Greta since the scheme was implemented and has also potentially⁷ improved between Denman and Singleton. The scheme was not found to have had an effect on salinity levels upstream of Denman (i.e. in the upper sector).

In considering whether the scheme salinity targets were set appropriately, the Salinity Assessment found that the 900 $\mu\text{S}/\text{cm}$ high and flood flow salinity targets for the middle and lower sectors of the Hunter River represent a level that may be appropriate for the protection of 95% of macroinvertebrate species⁸ from salinity impacts, based on recent scientific research (see Cardno Ecology Lab Pty Ltd 2010 cited in EPA 2013a, p. 41) and the more restricted 600 $\mu\text{S}/\text{cm}$ high flow salinity target for the upper sector should provide a more conservative level of protection.

However, the Salinity Assessment also cautioned that focussing purely on electrical conductivity may mask the effects of different ionic compositions (e.g. water that is high in sodium bicarbonate) and complex mixtures of metals, metalloids and non-metallic

⁵ Data limitations included that: a) sampling sites were often clustered and not distributed randomly, and b) sample sizes for some sub-catchments were relatively small (EPA 2013a).

⁶ Data was partitioned into three major time periods: *before* scheme operations (1970s and 1980s), *during the initial stages* of the scheme's operation (1990s) and *after formal commencement* of the scheme (2000s onwards).

⁷ Limited data was available during the 1970s and 1980s to clarify pre-existing salinity levels prior to the scheme operation.

⁸ In most cases the 95 per cent protection level trigger value should apply to ecosystems that could be classified as slightly to moderately disturbed (ANZECC/ARMCANZ 2000)

inorganic constituents in mine saline water discharges, which are emerging issues in the scientific literature (e.g. Cardno Ecology Lab Pty Ltd 2010 cited in EPA 2013a).

The Salinity Assessment concluded that the weight of scientific evidence suggested that the current salinity targets for the scheme should not be raised and that further scientific analysis and modelling would be required to support altering the targets in the future, in order to better understand existing salinity impacts on ecosystem health in the catchment and its tributaries.

Drinking water (human) perspective

Summary of stakeholder views

Some environment and community group representatives and individuals expressed a view that the salinity targets should be lowered in order to align with human drinking water quality standards.

Discussion

In the Hunter River catchment, town water supply is sourced from Lake Glenbawn and Glennies Creek Dam, which are both outside of the scheme area (upstream) and therefore not affected by salinity targets. It is unlikely that water is being sourced directly from the Hunter River for human consumption in the area that the scheme operates.

Nevertheless, the scheme salinity targets do comply with relevant drinking water quality guidelines and objectives. According to the 2011 *Australian Drinking Water Guidelines*, water with total dissolved solids (TDS)⁹ measuring less than 600 mg/L (approximately 938 $\mu\text{S}/\text{cm}$) is considered to be of good quality in terms of palatability and water with TDS in the range of 600-900 mg/L (approximately 938–1406 $\mu\text{S}/\text{cm}$) is considered to be of fair quality¹⁰ (NHMRC 2011). The *NSW Water Quality Objectives* for the Hunter River set drinking water trigger values for salinity at <1500 $\mu\text{S}/\text{cm}$ (NSW Government 1999).

Stock watering/irrigation water perspective

Summary of stakeholder views

Some environment and community group representatives and individuals advocated lowering salinity targets to improve the quality of water used for irrigation and livestock. While industry stakeholders supported retaining salinity targets at this stage, they would seek to raise the targets if it can be demonstrated that the agriculture in the catchment would not be compromised.

⁹ TDS (in mg/L) is an alternative measure of salinity to electrical conductivity. The *Australian Drinking Water Guidelines* (NHMRC 2011) present TDS (mg/L) values for salinity. TDS figures can be converted to $\mu\text{S}/\text{cm}$ by dividing the value by a conversion factor which recognises the water source and typical composition. The conversion factor used in this case was 0.64, which is relevant to the Hunter River catchment (see Muschal 2006).

¹⁰ Note: Appendix A of the Discussion Paper (EPA 2013c) incorrectly quoted the 2004 NHMRC figures for TDS and also described these figures as electrical conductivity units (as $\mu\text{S}/\text{cm}$) rather than as TDS units (as mg/L).

Discussion

The salinity targets are below tolerance levels for livestock. For example, poultry tolerate drinking water with TDS of up to 4000 mg/L (around 3500 $\mu\text{S/cm}$) and cattle tolerate up to 4000 mg/L (around 7000 $\mu\text{S/cm}$) without any adverse effects (ANZECC/ARMCANZ 2000). The targets are also below tolerance levels for the majority of crops¹¹, as shown in Table 3-1 below.

Table 3-1: General irrigation water salinity ratings based on electrical conductivity

EC ($\mu\text{S/cm}$)	Water salinity rating	Plant suitability
<650	Very low	Sensitive crops
650-1300	Low	Moderately sensitive crops
1300-2900	Medium	Moderately tolerant crops
2900-5200	High	Tolerant crops
5200-8100	Very high	Very tolerant crops
>8100	Extreme	Generally too saline

Source: DEC (2004)

In addition, Agriculture NSW has submitted that the existing targets '... represent an acceptable level for the majority of agricultural land/water uses and Agriculture NSW does not support altering the targets'.

Summary of stakeholder views

A small number of stakeholders suggested that the EPA should consider removing the 900 $\mu\text{S/cm}$ flood flow targets completely in order to increase discharge opportunities for participants. The justification for this was that it is unlikely that irrigators would be drawing water from the river during a flood and that any temporary salinity spike would be unlikely to affect aquatic species.

Discussion

The flood flow salinity targets act as a safety-net for the river in flood flow conditions. While irrigation may not occur during larger floods, the targets also seek to protect ecosystem health. While natural salinity spikes occur from time to time, the goal of the scheme is to avoid salinity spikes as a result of participant discharge.

This issue is also linked to the issue of increasing discharge opportunities (see section 3.2.2) and the issue of the flood flow exemption (see section 3.3.1).

Possible removal of the 1500 $\mu\text{S/cm}$ flood flow block maximum limit

Summary of stakeholder views

A submission by the former scheme operator suggested that the 1500 $\mu\text{S/cm}$ flood flow block maximum limit should be removed. The justification for this was that the target cannot be managed or modelled within the 900 $\mu\text{S/cm}$ target and furthermore it does not add to the functionality of the Regulation.

¹¹ Note that ANZECC/ARMCANZ (2000) also provides a list (see Table 4.2.5) of the tolerances of individual plant species to salinity in irrigation water.

Discussion

While the 900 $\mu\text{S}/\text{cm}$ salinity target during flood flows applies at each of the sector reference points (at Denman, the Glennies Creek Confluence and at Singleton), the 1500 $\mu\text{S}/\text{cm}$ limit is an additional protection that aims to prevent excessive salinity spikes occurring at intermediate locations. This limit helps to ensure that river water quality is suitable for uses that are likely during flood flow periods, even downstream of discharge points. Each licensee has been required through a series of pollution reduction programs to carry out an assessment of salinity immediately downstream of their discharge points.

The 1500 $\mu\text{S}/\text{cm}$ flood flow block maximum limit is consistent with scientific findings (e.g. Hart *et al.* 1991, Nielsen *et al.* 2003) which suggests aquatic biota in Australian freshwater ecosystems can be adversely affected where salinity exceeds 1500 $\mu\text{S}/\text{cm}$. However, as discussed above, caution needs to be exercised, as focussing purely on electrical conductivity may mask the effects of discharge waters with differing ionic composition and complex mixtures of metals, metalloids and non-metallic inorganic constituents (e.g. Cardno Ecology Lab Pty Ltd 2010 cited in EPA 2013a).

Conclusion: No change to Regulation

The EPA considers that the current salinity targets are set at appropriate levels and the review did not find any scientific justification for altering the current targets at this stage. No change to the Regulation is proposed.

From an ecological perspective, at this stage the EPA does not support altering the targets, without further tailored scientific studies and modelling, particularly into the full effects of highly variable saline mine water compositions on ecosystem health in the Hunter River and its tributaries. There is a clear need to better understand and characterise the full environmental impacts of current participant discharges (beyond the impact of salinity alone). This work would need to be undertaken before any consideration of raising salinity targets and allowing more discharges to enter Hunter River under the scheme. This is further discussed under section 3.2.6.

From a drinking water perspective, it is unlikely that water is being sourced directly from the Hunter River for human consumption in the area that the scheme operates. Nevertheless, the EPA considers that the current salinity targets are appropriate from a drinking water perspective, being consistent with both Australian drinking water standards and the Hunter River water quality objectives (drinking water criteria).

From a stock watering and irrigation perspective, the EPA considers that currently salinity targets to be appropriate, being lower than the tolerance levels for livestock and for the vast majority of crops.

The EPA does not support the removal of either 900 $\mu\text{S}/\text{cm}$ flood flow salinity targets or the 1500 $\mu\text{S}/\text{cm}$ flood flow block maximum limit. Both are important safety-nets for the protection of ecosystem health during flood flow conditions.

3.2.2 Increasing discharge opportunities

The background to this issue is discussed in section 2.1.3 of the Discussion Paper (EPA 2013c, p.8).

The paper explained that participants have not been fully using existing discharge opportunities (the 'total allowable discharge' – TAD) under the scheme (within the current regulatory limits) and yet have been requesting that the EPA investigate expanding discharge opportunities. The paper suggested and sought feedback on the possible reasons for this. In particular, the paper sought feedback on operational barriers to discharging and whether there may be ways for participants to make better use of existing

opportunities, before considering ways to expand discharge opportunities through regulatory amendment.

In response, industry stakeholders identified both operational and regulatory barriers to discharging and made suggestions for removing them. A large range of stakeholders (industry, community/environmental groups and water users) also commented on some of the avenues mentioned in the Discussion Paper for expanding discharge opportunities through regulatory amendment.

Operational barriers to discharge

Summary of stakeholder views

Some industry stakeholders suggested removing operational barriers to making full use of discharge opportunities within the current bounds of the Regulation by:

- providing more advanced warning of possible discharge opportunities (especially for the upper sector) through the use of weather forecasting and flow modelling (including improved salinity and flow monitoring in the upper reaches). This would help participants to prepare for a potential discharge event
- improving the notification of actual (and potential) discharge events using the latest communication technology
- using the latest technology to implement transparent and effective temporary credit trading.

Discussion

In consultation with the scheme Operations Committee, the EPA regularly reviews the various operational and administrative aspects of the scheme and implements changes and improvements as needed on an ongoing basis. The suggested improvements above can be considered in this context and represent an opportunity to improve the scheme to benefit industry without amending the Regulation.

Regulation barriers to discharge - definition of 'high flow'

One way to increase discharge opportunities may be to redefine the lower limit of the high flow threshold in the Regulation. Lowering the low/high flow threshold under the scheme (that is, allowing discharges to occur at lower flows) may provide more discharge opportunities.

Summary of stakeholder views

Some industry submissions claimed that there are occasionally days where the salinity of a 'low flow' is lower than the 600/900 $\mu\text{S}/\text{cm}$ salinity target, which represents a potential untapped opportunity to discharge.

There was strong opposition to this proposal by representatives of community, environment and water user groups and also opposition from one scheme participant. It was considered that allowing discharges to occur during lower flows would compromise the integrity of the scheme and that the change would increase the pressure on the river's ecosystem.

Discussion

Discharges during lower flows would undermine a core objective of the scheme, which is to limit discharges to times where there are higher flows bringing sufficient fresh water through the system for dilution and to ensure that discharges occur when there is enough flow in the river to transport the discharged salt load to the ocean, preventing

accumulation within the river system. The Salinity Assessment (EPA 2013a) found that the success of the scheme is closely linked to restriction of discharges during low flow conditions.

If the scheme were re-designed to allow discharges under lower flow, it is likely that any opportunity would be extremely limited, as low flows are often more saline than higher flows.

Regulation barriers to discharge - definition of saline water

Summary of stakeholder views

One industry submission requested that the definition of saline water be amended, to either align with the long term average salinity of the Hunter River, or to be consistent with recognised standards for the definition of saline water versus freshwater. Such a change would potentially allow some additional discharges (up to a revised/higher conductivity threshold, e.g. 600 μ S/cm) to occur at any time.

Discussion

The current definition of saline water provides an important protection measure to ensure that all water that has been contaminated with salt is discharged via the scheme and not via alternative means.

Under the scheme Regulation, a licensee automatically becomes a scheme participant if their licence authorises the discharge of saline water in the area of the scheme, which is relatively low. However, it is appropriate for ensuring that only non-saline, fresh stormwater is able to leave the participant's premises outside the bounds of the scheme rules and not any water that has come into contact with coal.

Under the Regulation, participants can discharge non-saline water (i.e. <400 μ S/cm) into the Hunter River at any time if it will not pollute waters.

The Regulation also includes clauses that prohibit licensees from discharging saline water (as defined) from their premises except through the specified scheme discharge points, which means that other discharge points on the licence (such as sedimentation dam overflow points) may not be used to discharge saline water. This is important because it means that all saline water discharges are governed by the scheme and potentially restricted, even in situations where the receiving water is *more* saline than the discharge water.

Conclusion: No change to the Regulation. Operational improvements (to be considered).

In consultation with the scheme Operations Committee, the EPA will consider options to maximise discharge opportunities within the current regulatory framework.

In consultation with the scheme Operations committee, the EPA will consider a program of operational/technological improvements that could improve the operational efficiency of the scheme by helping participants make better use of discharge opportunities (through improved notification, communication, forecasting etc.)

The EPA considers that the definitions of 'high flows' or 'saline water' in the Regulation are appropriate as they stand. The current definition of high flows helps to ensure that discharges occur when there is enough flow in the river to transport the discharged salt load to the ocean, preventing accumulation within the river system. The current definition of saline water provides an important protection measure to ensure that all water that has been contaminated with salt is discharged via the scheme and not via alternative means.

3.2.3 Other significant sources of salt within the scheme area

The background to this issue is discussed in section 2.1.3 of the Discussion Paper (EPA 2013c, p.9).

Summary of stakeholder views

There was broad support from stakeholders (industry, environment/community groups, water users and individuals) for research to identify other significant sources of salt within the scheme area not currently captured by the scheme. There was also support for potentially expanding the scheme to include any additional sources, if appropriate and practical to do so.

As recommended by the Salinity Assessment (EPA 2013a), a number of individual, community and environment group submissions requested that the EPA investigate the source of the occasionally high salinity levels (not related to flow) in Wollombi Brook at Warkworth during the mid to late 2000s. The Salinity Assessment also noted that the very high salinity levels have now declined, but recommended ongoing monitoring.

Discussion

The Salinity Assessment noted that participant discharges under the scheme have only accounted for a small proportion¹² of the total salt load entering the Hunter River catchment.

Identifying the relative contribution of salt and sources of salt from each sub-catchment to the overall salt budget for the broader Hunter catchment could allow government agencies to identify specific management actions to reduce sources of salinity that are currently outside the scope of the scheme.

Opportunities to expand real-time salinity monitoring throughout the catchment or in priority areas such as the upper Goulburn River (Bylong Valley) are discussed in section 3.2.4.

With regards to sedimentation dam overflows from non-participating mines that may contain saline water, the EPA is responsible for administering section 120 of the *Protection of the Environment Operations Act 1997* (POEO Act), which prohibits water pollution. Licensees and other activities that discharge to waters are responsible for complying with section 120 of the POEO Act and for understanding the environmental impacts of their discharges and ensuring that their licence provides them with appropriate defences (see EPA 2013b).

Conclusion: No change to the Regulation. Operational improvements (to be considered). Further investigation (to be considered).

In consultation with the HRSTS Operations Committee, the EPA will consider the costs and benefits of preparing a 'salt budget' for the Hunter River catchment, which investigates and identifies the major sources of salt on a sub-catchment basis.

The EPA will review existing discharges from licensed premises to ensure licensees understand their obligations under section 120 of the POEO Act, and that management controls aim to prevent pollution of waters.

It would be challenging to pinpoint the cause of a specific elevated salinity event up to 10 years ago. However, the EPA through the Services Co-ordinator will continue to closely monitor flow and conductivity levels in the Wollombi Brook/Warkworth area (and

¹² on average only 10% since 2002, however, in recent years it has been up to 20%

throughout the scheme area) to identify if any elevated salinity levels, not related to flow, re-occur and if they do, to identify and act on the cause.

3.2.4 Salt from the Goulburn River sub-catchment

The background to this issue is discussed in section 2.1.3 of the Discussion Paper (EPA 2013c, p.10).

Summary of stakeholder views

Only one environment/community group submission proposed that discharges in the Goulburn River sub-catchment should be included in the scheme.

The vast majority of stakeholders recognised this limitation, and also supported more research and monitoring in the area and a more coordinated management of salt from the sub-catchment.

Discussion

As noted in the Discussion Paper, it is practically impossible to include the Goulburn River sub-catchment in the scheme primarily due to geographical constraints, which means that it is not possible to give mines in this area adequate advanced warning of discharge opportunities.

The EPA currently regulates three coal mines in the sub-catchment and there are salt management plans associated with their licences. The EPA works closely with these mines to ensure that their discharges do not compromise the Hunter scheme.

However, as further coal mining and coal seam gas exploration and production is proposed in the region, there is also a window of opportunity to increase understanding of natural flow and salinity relationships in the sub-catchment (including establishing baseline salinity and flow data), which will better inform consideration of future major developments/expansions.

Such investigations could also facilitate better coordination of the management of salt impacts from and within the sub-catchment and potentially reduce current and future impacts on the scheme.

Conclusion: No change to the Regulation. Further investigation (to be considered).

In consultation with the HRSTS Operations committee, the EPA will consider the costs, benefits and relative priorities of:

- a. establishing baseline salinity and flow data for the Goulburn River sub-catchment, including the expansion of real-time salinity monitoring
- b. coordinating the management of salt impacts from and within the Goulburn River sub-catchment to potentially reduce impacts on the scheme.

3.2.5 The scheme's impact on tributaries and on the lower Hunter River

A small number of stakeholders, including environment and water users groups, raised concerns with how discharges under the scheme may be affecting the health of tributaries and also the lower Hunter River (including the tidal pool), given that salinity targets only apply to the main stem of the Hunter River at certain locations between Lake Glenbawn and Singleton. These issues were not raised in the Discussion Paper.

Tributaries in the scheme area

Summary of stakeholder views

The argument posed by stakeholders was that participant discharges into tributaries within the scheme area that flow into the Hunter River should be managed and protected (either via the scheme or via some other mechanism), rather than just the Hunter River itself.

Discussion

As discussed in section 3.2.1, the scheme's salinity targets only apply to the main stem of the Hunter River at certain locations between Lake Glenbawn and Singleton and not to any of its tributaries.

While the scheme in isolation is limited in its ability to manage salinity impacts on tributaries, it forms part of a broader regulatory framework, including section 120 of the POEO Act and the environment protection licensing system, which consider the impact of participant discharges on tributary health.

The EPA requires tributary impact studies to be carried out before any discharge point from a premise is approved and added to a licence. Discharge volume limits (also known as tributary protection limits) are also typically applied to protect the tributaries from erosion.

Further to this, section 3.2.6 discusses the need to better understand and characterise the full environmental impacts of current participant discharges (beyond the impact of salinity alone).

Lower Hunter River – outside the scheme area

Summary of stakeholder views

Some stakeholders also raised concerns about how the scheme might be affecting the salinity levels of the lower Hunter River downstream of Singleton, where the scheme ends. Water users in the tidal pool area are concerned that the scheme may be adding salt to an already salty environment and question whether the scheme has appropriate regard for downstream water users.

Discussion

The scheme was designed so that if the 900 $\mu\text{S}/\text{cm}$ target at Singleton is being met during high and flood flows, then the flow levels are sufficient to flush this water to the ocean without it accumulating in the river system. Any increase in salinity downstream of Singleton is therefore not due to discharges under the scheme, but is more a result of other influences such as:

a. Estuarine flows under tidal conditions

Salinity in the Tidal Pool¹³ of the Hunter River is highly influenced by the natural tidal system, as well as by flushing flows in each river. As the tide comes in, salinity peaks and as the tide recedes, salinity levels drop due to dilution from the fresher water flowing in from the Hunter River. It is during these times of lower salinity that irrigators are able to extract and use water.

¹³ The 'Tidal Pool' extends along the Hunter River up to the tidal limit, which is just upstream of Maitland (2.1 km upstream from the railway bridge at Oakhampton). The Tidal Pool also extends up the Paterson River (to 1 km downstream of the Gostwyck Bridge) and up the Williams River (up to at Seaham Weir).

- b. Insufficient fresh water for dilution making its way down the lower Hunter River (or indeed other rivers contributing to the Tidal Pool, such as the Paterson and the Williams rivers)

This could be caused by factors such as natural low flow or drought conditions, or high extraction rates upstream (e.g. during the summer months).

- c. Ambient salinity problems

For example, flows from naturally saline areas of the catchment or inflows from ground water can cause elevated salinity levels in some areas of the river.

None of these factors can be addressed via the scheme, which only currently extends to the Hunter River catchment between Lake Glenbawn and Singleton and only operates during high or flood flows.

Furthermore, extending the scheme to capture the downstream reaches and tributaries of the Hunter River catchment would not be effective because the only potential participants are in locations where it would be impractical for them to participate (i.e. they are located in higher areas of the catchment and are not able to be given advanced notice of a discharge event). These premises are adequately regulated via the broader regulatory framework, including section 120 of the POEO Act and the environment protection licensing system using site-specific licence conditions, to manage the impacts of saline water discharges on the environment.

Conclusion: No change to Regulation.

The EPA does not consider it necessary to expand the scheme to address the impacts of salinity on tributaries of the Hunter River as the broader regulatory framework, including section 120 of the POEO Act and the environment protection licensing system regulates this issue. The EPA does not consider it necessary to expand the scheme to cover lower reaches and tributaries of the Hunter River (downstream of Singleton) as salinity issues in these areas are primarily due to factors (such as impacts from estuarine flows, insufficient fresh-water river flows and ambient salinity problems) that could not be managed by the scheme even if it were extended to cover these areas.

3.2.6 Other pollutants present in saline water discharges

The background to this issue is discussed in section 2.1.3 of the Discussion Paper (EPA 2013c, p.12).

The issue of other pollutants potentially present in participant discharges received significant interest during consultation. This was expected given that the Salinity Assessment (EPA 2013a) highlighted recent research showing that the different ions that make up salinity and other contaminants within mine water (e.g. dissolved metals/metalloids) can have their own varying impacts on aquatic ecosystems.

Summary of stakeholder views

Some stakeholders requested that the scheme be expanded to include additional pollutants of concerns, while others highlighted how impractical it would be to do so.

Despite these differing opinions, there was very broad stakeholder support (from industry, environment/community groups, water users and individuals) for further research in order to fully understand the environmental effects of the different components of saline water discharges under the scheme, followed by an appropriate management response. Industry stakeholders also stated that it was important for individual mines to be aware of the substances that are leaving their premises as per their licence conditions.

Discussion

There are practical limitations which would make including other pollutants difficult and would complicate the scheme. For the scheme to work effectively, the pollutant must be able to be measured in real time, which is not the usual practice for the monitoring of metals. Furthermore, different credits would likely be required for different pollutants, which would significantly complicate the scheme and potentially render it unworkable.

Nevertheless, it should be noted that the scheme ensures that any mine water discharged into the Hunter River is significantly diluted. This means that the acute impact of metal concentrations in discharge waters is likely to be less than in other areas of the state where mine water is discharged into low flow environments.

However, the Salinity Assessment has recommended that experimental studies be carried out in order to fully understand the environmental effects of the different components of saline water discharged to the Hunter River catchment (ionic composition and metals/metalloid contamination, in particular), as these are emerging issues in the scientific literature.

In addition to the scheme, the EPA uses a number of complementary regulatory tools to protect waterways from the impacts of pollution. These tools include environment protection licensing, investigations, research, monitoring and reporting programs and education. If new information becomes available indicating that a contaminant(s) contained in participant discharges presents a specific problem that needs to be addressed, the EPA would consider the most appropriate tool to regulate that pollutant. However, this is unlikely to be dealt with through fundamental changes to the scheme, which has been designed to fulfil a specific purpose.

Conclusion: No change to the Regulation. Further investigations (to be considered).

The EPA will consider the most appropriate mechanism for further investigating the issue of other contaminants that may be present in participant discharge waters and their impacts on the Hunter River catchment, as recommended by the Salinity Assessment (EPA 2013a). Any issues identified through this process will be managed by applying an appropriate tool from within the EPA's existing regulatory framework.

3.3 Cost-effectiveness

Section 2.2 of the Discussion Paper (EPA 2013c) provided an overview of issues relating to the cost-effectiveness of the scheme. It posed two focus questions for the review, which were:

Focus question 3: Is the scheme operating efficiently and cost-effectively? What improvements could be made to the Regulation?

Focus question 4: Is the scheme providing an ongoing incentive for scheme participants to reduce the environmental impact of their saline water discharges? What improvements could be made to the Regulation?

A number of specific issues were raised in the Discussion Paper to help improve the cost-effectiveness of the scheme, and these are dealt with separately below.

3.3.1 The flood flow exemption

The background to this issue is discussed in section 2.2.3 of the Discussion Paper (EPA 2013c, p.14). Appendix B of this report also provides additional background.

Under the Regulation, saline water discharges are only permitted during high and flood flow conditions. No discharges are permitted during low flows. Credit holdings determine

the amount that participants can discharge during a high flow event. However, during a flood flow event, credit holdings do not limit what can be discharged by participants.

When the pilot scheme commenced in 1995, it was believed that flood flows (at the established thresholds) were too large to be influenced by the salinity of participant discharges. However, when the pilot scheme was reviewed in 2002, modelling demonstrated that there was potential for the salinity targets to be exceeded during flood flows by participant discharges. This led to the inclusion in the Regulation of a 'trading rules order' that stipulates that if targets are exceeded during a flood flow event, then the flood flow exemption would be suspended. This led industry to establish the 'Managed Envelope of Residual Flows' (MERF) flood-sharing process. The MERF process only operates during flood flow events and effectively duplicates the scheme with regards to determining discharge loads for individual premises except that it does not require credits to be formally transferred.

The Discussion Paper explained that the flood flow exemption in the Regulation offers no real advantage to participants and should be removed. The paper also explained that the industry-run MERF system represents an unnecessary layer of complexity, duplication and financial burden on participants. In addition, it appears that some of the costs associated with running the MERF are potentially being absorbed by the scheme (e.g. including the calculation of total allowable discharges during flood flows).

Furthermore, the EPA is not able to prosecute individual participants for any exceedance of the flood flow salinity target that may result through either a failure or circumvention of the MERF. The only recourse available is for the EPA to implement a trading rules order, which means that all scheme participants are at risk of having the flood flow exemption suspended.

Summary of stakeholder views and further consultation

Stakeholder submissions on this issue were divided, with environment and community groups largely supporting the EPA's position of removing the exemption, while some industry submissions were in opposition to this. There is a perception amongst participants that the flood flow exemption allows greater discharge opportunities and that this justifies keeping flood flows in the Regulation.

In response to these concerns, the EPA met with industry stakeholders to further understand their concerns and also consulted the scheme Operations Committee extensively on this issue.

Further analysis of flood flows

Following these meetings, with the assistance of the NSW Department of Primary Industries (DPI) - Water, the EPA undertook a thorough analysis of flood flows to demonstrate the advantages and disadvantages of retaining the exemption and thresholds and to examine whether raising the flood flow thresholds could also be a viable option.

The analysis (presented in Appendix B) looked at:

1. The utilisation of flood flows – how have flood flow opportunities been used by participants since the scheme commenced?
2. The level of constraint – would participants have been constrained if the flood flow exemption did not exist and high flow rules were in place?
3. Raising the flood flow threshold – would it be viable to raise the flood flow threshold as an alternative to removing the flood flow exemption completely?

The analysis also found that, since the Regulation commenced, the flood flow exemption has provided only a minimal benefit to a minority of participants in the middle and lower sectors. There has been no benefit for participants in the upper sector.

The analysis also examined the outcomes that could be achieved by simply removing the flood flow exemption versus raising the flood flow thresholds and concluded that raising the thresholds would achieve most of the same objectives as removing the exemption entirely, while still allowing participants with some opportunity for full capacity discharges on very limited occasions.

Raising the flood flow thresholds

By raising the flood flow threshold, the EPA would not be stopping or limiting the ability of participants to discharge under the scheme. Discharges would still be able to occur under high flow rules, through the use of discharge credits.

The purpose of raising the flood flow threshold is to reduce the risk of simultaneous, full capacity discharge by participants impacting on the river (i.e. breaching salinity targets) during flood flow conditions and to remove the need for the MERF process, which represents an additional layer of complexity and financial burden on participants. The proposal will bring more discharges into the EPA's compliance and enforcement framework and will strengthen the integrity of the credit trading system.

Conclusion: Amend the Regulation to raise the flood flow thresholds. Operational improvements (to be considered).

Based on the analysis of flood flows, it is recommended:

1. That the flood flow exemption in the Regulation be retained.
2. That the Regulation be amended to raise flood flow thresholds to:
 - a. 5000 ML/day for the upper sector (up from 4000 ML/day)
 - b. 15 000 ML/day for the middle sector (up from 6000 ML/day)
 - c. 25 000 ML/day for the lower sector (up from 10 000 ML/day).

Note: these recommended revised thresholds represent the required flow in the river to safely accommodate simultaneous full capacity discharges by all participants under the scheme during a flood flow event. The thresholds also include a buffer to accommodate possible increases in saline water discharge capacity over the next 10 years. After 10 years, the Regulation will be reviewed again and the flood flow thresholds re-set if necessary.

3. That the proposed amendments to the Regulation (including the revised flood flow thresholds) should commence on 1 July 2016, after the next credit auction. This will allow participants an opportunity to acquire additional credits (if required).
4. That the NSW Minerals Council reconsider the need for the MERF process in line with any amendment to the Regulation.

3.3.2 Improving the auction process

The background to this issue is discussed in section 2.2.3 of the Discussion Paper (EPA 2013c, p.15).

The Regulation requires the EPA to 'make arrangements' for the sale of 20% of credits by auction every two years. However, the EPA is given discretion on how the auction process should be established and how it is run.

The Discussion Paper sought stakeholders' views on how the auction process could be improved.

Summary of stakeholder views

Most submissions on this issue acknowledged that auctions were a valuable component of the scheme. Two of the three industry submissions called for auctions to be removed from the scheme or replaced by an alternative process of allocating credits. Two environment/community group submissions focussed on the value of the auction process, and were opposed to auctions being removed from the scheme.

The industry submissions also raised specific issues with the auction design for consideration by the EPA, including:

- concerns with the proposed move to a Vickrey auction system (e.g. the invisibility of the bidding process and the difficulty in assigning a real business value to the credits in order to bid effectively)
- suggestions that EPA investigate alternative auction/sale processes to make the bid price transparent and to reduce costs to participants
- suggestions to improve the conventional auction process (e.g. no new bids after round one and reporting after each round to show all bids)
- only allowing legitimate dischargers (or potential future dischargers) to bid for credits.

Discussion

As outlined in the Discussion Paper, there were compelling reasons for including an auction process in the scheme's design. Auctions are important because they:

- assist new participants to enter the scheme
- assist the market by signalling price information
- avoid potential monopolistic behaviour by participants
- provide a 'polluter pays' mechanism
- provide a financial incentive for participants to invest in abatement activities.

Limiting auction participation to those who have a genuine (current or potential future) need to discharge is problematic because the scheme has been designed as an open market. The auction system seeks to allocate credits to those who value them the most and credits can be valued for a range of different reasons, not just for the ability to discharge.

The Discussion Paper mentioned that the EPA had recently reviewed the auction format following the results of the 2010 auction, where concerns were raised by auction participants regarding the format of the auction. In May 2014, for the first time, the EPA ran an online single-bid Vickrey auction. The aim of implementing the new system was to help ensure that the auction process distributes credits to those who value them the most and continues to provide an ongoing incentive to reduce the impacts of saline water discharges on water users and the environment.

A report on the 2014 Credit Auction is available on the EPA website at: [Scheme credit auctions](#). The EPA will continue to monitor and evaluate the auction process with the scheme Operations Committee, based on the results of the 2014 auction. The next credit auction will be held in 2016.

Conclusion: No change to the Regulation.

Given the recent review of the auction format and process, and the results of the recent 2014 auction, this review of the Regulation does not make any specific recommendations for improvements. However, the EPA will, in consultation with the scheme Operations

Committee, continue to monitor and evaluate the auction process to help ensure that it is running efficiently and meeting its objectives.

3.3.3 Improving the credit trading process

The background to this issue is discussed in section 2.2.3 of the Discussion Paper (EPA 2013c, p.16).

The Discussion Paper outlined rationale to support the view that the economic efficiency of the scheme would be improved by making the price of traded credits publicly available.

Summary of stakeholder submissions

Both industry and environment/community groups that made a submission on this issue agreed with this position. The industry submissions also requested that appropriate contextual information about prices be made publicly available (e.g. where trades are cash, in-kind or reciprocal). One submission suggested allowing free trade of credits between commonly owned mines by linking common corporate entities on the credit register.

An upper sector industry participant requested that the value of credits in the upper sector be proportionally lowered because the sector is disadvantaged (i.e. less lead-in time for an event, lower salinity targets etc.).

A more general issue raised in industry submissions was how credit trades can be difficult to organise ahead of a discharge event once a River Register has been published, which advises of the upcoming event. Sometimes participants have little advanced warning of a discharge opportunity, particularly in the upper sector. It can be difficult to organise credit trades during these times.

One industry submission suggested that the credit trading system could be re-designed to allow 'unused credits' to be automatically re-allocated during a high flow event to participants indicating that they do wish to discharge. This would be an opt-in system similar to how the industry-run MERF process runs for flood flows (Appendix B provides more detail on how the MERF runs).

Some other suggestions were made to overcome the inherent difficulties of trading (and the associated transaction costs) in the lead up to a discharge (e.g. better facilitation of temporary trading including direct notification when credits become available and automatic prevention of unintentional illegal trades).

The former scheme Operator also suggested that functionality could be built into the credit trading system so that the Operator is advised of trades that occur after a River Register is published. This would allow the River Register to be re-published in the event that a sector discount factor needed to be applied following the new allocation of credits.

Discussion

Clause 64 of the Regulation sets out the information that the EPA can require participants to enter into the Credit Register once a trade has occurred. The current wording of this clause does not allow sufficient flexibility to require that the credit price be recorded. The clause could be amended to allow the EPA to require the addition of a credit price (or other particulars if appropriate) to the credit register.

Setting a fixed price for credits or discounting credits traded in the upper sector is likely to over-complicate the scheme. It is acknowledged that participants in the upper sector have less lead in time and generally have fewer discharge opportunities than participants in the

middle and lower sectors. However, this is due to natural/geographical constraints, and is not due to the scheme's design.

The automatic reallocation of unused credits during high flow events is problematic because it:

- a. relies on an 'opt-in' system for each discharge event, which means that the system would need to be operated and be 'fail-safe' 24 hours a day, 365 days a year. This would be administratively costly and difficult to manage. The current system establishes basic credit entitlements in advance of a discharge event.
- b. would undermine the value of credits. For any potential non-participant credit holders, credits would be worthless. The scheme was designed to support an open market.

A specific review of the efficiency of the credit trading platform could help to identify and assess the costs and benefit of implementing a range of potential operational improvements to help facilitate trading and reduce associated transaction costs, including:

- the disclosure of credit prices
- providing instant notification (e.g. by email or SMS) when participants indicate that credits are wanted or for sale
- functionality to facilitate more efficient trading
- functionality to prevent unintentional illegal trades/or alternatively increasing education about the scheme rules
- functionality to notify the scheme operator of trades made after the River Register has been published
- generally improving public access to credit trading information.

Conclusion: Amend the Regulation to allow the EPA to require the addition of a credit price (or other particulars if appropriate) to the credit register. Operational improvements (to be considered).

It is recommended that clause 64 of the Regulation be amended to allow the EPA to require the addition of a credit price (or other particulars if appropriate) to the credit register.

In addition, the EPA will also consider a specific review of the efficiency of the credit-trading platform, in consultation with the HRSTS Operations committee, to examine the costs and benefits of implementing a range of operational improvements to help facilitate trading and reduce transaction costs.

As this report recommends raising the scheme flood flow thresholds (see Section 3.3.1), it is likely that there will be some increase in credit trading activity. As there are transaction costs associated with arranging mutually beneficial trades, there may be some additional costs to participants. A more efficient credit-trading platform would minimise these transaction costs, resulting in more cost-effective trades and participants would have greater confidence in their ability to trade credits ahead of a discharge event.

3.4 Other improvements

Section 2.3 of the Discussion Paper (EPA 2013c) provided an overview of other key issues relating to the effectiveness of the scheme (not specifically related to environmental effectiveness or cost effectiveness). It posed two focus questions for the review, which were:

Focus question 5: Are there other improvements that could be made to the Regulation?

Focus question 6: Are there other non-legislative proposals for improving the operation of the Scheme?

A number of specific issues were raised in the Discussion Paper to help explore these questions and these are dealt with separately below.

3.4.1 Additional uses for revenue generated via auctions

The background to this issue is discussed in section 2.3.3 of the Discussion Paper (EPA 2013c, p.18).

At the time the Discussion Paper was written, there was a trend of increasing revenue from credit auctions including the 2012 auction which generated revenue 300 per cent higher than the previous auction. This resulted in an excess of funds over and above that which was needed to operate the scheme for the year following the auction. This was the first time excess funds had been generated.

As discussed under section 3.3.2, the most recent auction held in May 2014 was a new online Vickrey single-bid auction format. This auction generated far less revenue than in previous years.

It is difficult to say whether the lower result of this auction was due to the revised auction format, bidder timidity (due to the new format) or purely reflective of the market value of credits at the time of the auction. However, what is certain is there are less funds available than from previous auctions.

Ultimately, the amount of revenue generated from credit auctions is irrelevant to the operation of the scheme. The scheme is designed to levy participants for the costs of the scheme, including for studies or assessments considered necessary for the proper functioning of the scheme. Auction revenue is used to offset the costs of this levy, however, the scheme is not reliant on these auction funds to operate.

The results of the 2012 auction show that it is possible for auctions to generate more money than is necessary to operate the scheme in a particular year. In the Discussion Paper, the EPA expressed a view that ideally, excess funds could be used for a range of beneficial uses within the catchment. However, section 295I of the POEO Act places limits on how the scheme funds can be used. It states that the funds may go towards management and administration, compliance activities and other costs relating to the scheme.

Stakeholder views on this issue

There was broad support from a large number of stakeholders (industry, environment/community groups, water users and individuals) for excess scheme funds to be used for a range of monitoring programs/other investigations for the benefit of the scheme and/or the Hunter River catchment, many of which were identified in the Salinity Assessment (EPA 2013a) including:

- representative groundwater monitoring program for the catchment
- cumulative impact assessment of land disturbance and mining
- research to fully understand the full environmental effects of the different components of saline water discharges under the scheme (see section 3.2.6)
- research into the macroinvertebrate health, particularly in areas where there is poor health
- strategic real-time monitoring of flows and salinity in the Goulburn River sub-catchment (see section 3.2.4)
- assessment of high salinity levels in the lower Hunter River.

Other industry stakeholder suggestions for use of excess scheme funds included greater education about the scheme generally and returning unspent funds to participants.

Discussion - POEO Act limitations

Section 295I(4) of the POEO Act only allows scheme funds to be used for purposes relating to the management and administration of and ensuring compliance with the scheme. Technically, the legislation does not allow funds to be used for investigations or other actions that are not directly related to the scheme. This is the case even if those actions are intended to achieve (or improve or expand on) the same objectives or outcomes as the scheme (e.g. reduced salinity in the catchment). A Regulation amendment would not resolve this issue – rather an Act amendment would be required. This is outside the scope of this review.

Excess funds should be used for the benefit of the health of the catchment. Returning excess auction revenue to credit holders is not consistent with this and does not align with the polluter pays principle.

Conclusion: No change to the Regulation. Operational improvements (to be considered).

In consultation with the scheme Operations Committee, the EPA will continue to monitor the amount of revenue generated via auctions. If a trend of increasing revenue is observed over time, the EPA, in consultation with the Operations Committee will:

- i. consider whether an amendment to the POEO Act would be beneficial in order to allow scheme funds to be used for a range of potentially beneficial investigations and works within the Hunter River catchment. That is, investigations and works that are not directly related to the administration or operation of the scheme and therefore cannot currently be funded out of the scheme funds.
- ii. consider developing and documenting a process for identifying and prioritising beneficial projects that could be potentially funded out of any excess revenue in the scheme fund.

3.4.2 Increasing public transparency and access to information

The background to this issue is discussed in section 2.3.3 of the Discussion Paper (EPA 2013c, p.19).

Summary of stakeholder views

The paper outlined a range of ways that information about the operation of the scheme could be made more transparent and accessible and these suggestions were generally supported by stakeholders across the board. Additional suggestions included public access to information and data about metals in discharges (see also section 3.2.6).

Conclusion: No change to Regulation. Operational improvements (to be considered).

In consultation with the Operations Committee, the EPA will consider a review of the effectiveness of online materials (including annual reports), particularly whether more information (e.g. on cost-effectiveness) or publicity could assist with making this information more accessible to the public.

In consultation with the Operations Committee, the EPA will consider increased training on the scheme for participants, including catering for prospective credit holders and also interested members of the public.

3.4.3 Improving representation

The background to this issue is discussed in section 2.3.3 of the Discussion Paper (EPA 2013c, p.19).

The Discussion Paper sought stakeholder views on whether the composition of the Operations Committee remains appropriate.

Summary of submissions

Only a few submissions responded to this issue and agreed that the composition of the Operations Committee was appropriate. One water user group submission was supportive of reviewing the composition if necessary, with appropriate consultation. No stakeholders expressed concern over lack of representation.

Discussion

It is considered that the current representation on the scheme Operations Committee is appropriate, given that there are four industry representatives, four non-industry representatives and a Chairperson. It should be noted that some agency names in clause 70 of Regulation are out of date.

Conclusion: Amend Regulation to update agency names for Operations Committee. Operational improvements (to be considered).

It is recommended that clause 70 of the Regulation be amended to update agency names.

The EPA supports information about the Operations Committee, including current representation, being made more accessible to the public. This would allow stakeholders an opportunity to engage with their member on the committee on a variety of issues.

3.4.4 The scheme as a model for other trading schemes

The background to this issue is discussed in section 2.3.3 of the Discussion Paper (EPA 2013c, p.20).

Summary of stakeholder views

Only two submissions commented on the suitability of the scheme as a model for other emissions trading schemes. One industry submission on this issue expressed support for the scheme to be used as a model noting that the system of cap and trade works well but that there is room for improvement. The submission suggested caution around two yearly auctions and its effect on the distribution of credits and escalating cost to industry.

One environment group submission cautioned that similar schemes should only be established when there is adequate understanding of the receiving environment and its ability to tolerate the introduction of pollutants on a cumulative basis.

Discussion

The EPA considers that the Hunter River Salinity Trading Scheme (HRSTS) is effective and efficient. The following factors should be considered where the HRSTS is being considered as a model for other emissions trading schemes:

- a. The HRSTS seeks to manage a significant, single water pollutant that can be measured in real-time. Precise measurement and timing of discharges underpins the scheme.

- b. A scheme based on the HRSTS model that targets a pollutant that cannot be simply and continuously measured (e.g. metals), or a scheme that targets multiple pollutants, may not be as effective.
- c. The HRSTS only seeks to manage the pollutant from point sources (not diffuse sources). Each participant is also part of the EPA's licensing regime which means that they are regulated based on the level of risk they pose to the environment. Participants are generally large businesses with the ability to implement sophisticated management techniques in order to comply with the scheme.
- d. A scheme based on the HRSTS model that targets smaller industries or typically un-regulated industries (such as farming), or targets diffuse (or mixed) sources of pollution may not be as effective.
- e. HRSTS Participants are able to store the pollutant (saline water) for long periods and discharge only at appropriate times.
- f. A scheme based on the HRSTS model whose participants had limited ability to control their discharges may not be as effective.
- g. The receiving environment for the HRSTS (being a river) has well defined spatial and temporal boundaries, transporting the pollutant in a predictable, linear manner. The river system is relatively easy to monitor and model.
- h. A scheme based on the HRSTS model with less defined boundaries (e.g. a broad airshed, estuary or marine environment) may be more difficult to define, monitor and control.
- i. The HRSTS is well-resourced, with participants paying ongoing fees for the administration and management of the scheme.

An under-resourced scheme based on the HRSTS model may not be as effective.

As a whole, the HRSTS has been custom built to address a specific problem present in the Hunter Valley catchment. While it is unlikely that the HRSTS as a whole would be a suitable model for the development of an emissions trading scheme in another location, individual elements of the HRSTS model may be applicable and able to be adapted to other circumstances.

For example, the HRSTS auction design and format could potentially be used in a variety of circumstances. Similarly, elements of the river flow and salinity monitoring and modelling technology used throughout the Hunter River catchment may be of use in other catchments.

However, site-specific circumstances and requirements should be the overarching guide for the development or adoption of any emissions trading scheme or market based instrument.

Conclusion: No change to Regulation.

3.5 Other minor technical improvements

Section 2.3.4 of the Discussion Paper (EPA 2013c) stated that, separate to the consultation process, the EPA would consider a number of minor technical issues with the Regulation and how they could be rectified.

As a result of this process, the following minor amendments to the Regulation have been identified:

- linking credits to discharge points rather than to a whole premises
- clarifying how the total allowable discharge is calculated

- removing redundant references to first issue credits and the pilot scheme
- clarifying the circumstances in which a trade can occur when a sector credit discount factor of less than one is in effect
- clarify that any funds generated at auction that are in excess to that needed to cover the cost of the scheme for the following year, can be carried over and used to cover the costs of the scheme in any future year
- allowing for the next review of the Regulation to commence in 10 years (consistent with last period for review)
- updating the gauging station number for the lower sector reference point. Allow the EPA to publish an alternative gauging station reference on the EPA HRSTS website, if required
- other mechanical, administrative and tidy-up amendments as required.

4 Summary of recommendations and supported actions

4.1 List of recommended regulatory amendments

The EPA recommends the following substantial and minor amendments to the Regulation.

Table 4-1: Substantial amendments

Issue	Recommended amendment
Commencement – Clause 2 Amendments to the Regulation should commence after the next credit auction (April–May 2016). This will allow participants an opportunity to acquire additional credits (if required), as a result of changes in the flood flow thresholds (below).	It is recommended that the amendments to the Regulation commence on 1 July 2016.
Flood flow thresholds – Clause 11 The flood flow thresholds are too low to allow for simultaneous full capacity discharges by participants without adversely impacting on flood flow salinity targets.	It is recommended that the flood flow thresholds be increased from 4000 to 5000 ML/day in the upper sector; from 6000 to 15 000 ML/day in the middle sector; and from 10 000 to 25 000 ML/day in the lower sector.

Table 4-2: Minor amendments

Issue	Recommended amendment
Credit location – Various clauses Credits are currently linked to licensed premises. Where participants have more than one authorised discharge point (and in particular where those points span across more than one sector), complications can arise in relation to how discharges are scheduled and organised.	It is recommended that the Regulation be amended to require credits to be assigned to specific authorised discharge points.
Total allowable discharge (TAD) – Clause 25 The way that the TAD is expressed and illustrated in the Regulation is unclear.	It is recommended that the description of how the TAD is calculated be clarified and the examples deleted.
First issue credits and first auction of credits and pilot scheme – Various clauses The Regulation contains various redundant references to ‘first issue credits’, ‘the first auction of credits’ and the ‘pilot scheme’.	It is recommended that these redundant references be removed.
Credit transfers – sector credits discount factors – Clause 60 The Regulation does not allow credits to be transferred out of a restricted sector (i.e. where a sector credit discount factor of less than one applies) and into a non-restricted sector. However, issues only arise where credits are transferred from a non-restricted sector into a restricted sector; only these transfers should be prohibited.	It is recommended that credit transfers from a restricted sector to a non-restricted sector, be permitted.

Issue	Recommended amendment
Credit Register details – Clause 64 The details which can be recorded about credit transfers on the Credit Register are limited (e.g. the price of the traded credit cannot be recorded).	It is recommended that the Regulation allow the Registrar (i.e. the EPA or a person or body appointed by the EPA) more scope to determine how credit transfers are recorded in the Credit Register.
Operations Committee – Clause 70 Some agency names in clause 70 are out of date.	It is recommended that the agency names be updated.
Excess auction proceeds – Clause 84 The Regulation allows auction proceeds to be used to support the operation of the scheme in the year following the auction. However, the Regulation does not anticipate a situation where auction proceeds may exceed the estimated costs of the scheme for that year, thereby creating an excess.	It is recommended that the Regulation clarify that any excess funds can be carried over and used to cover the costs of the scheme in any future year.
Review of Regulation – timetable – Clause 93 The Regulation needs to include a timeframe for the next statutory review.	It is recommended that the Regulation prescribe that the next review is to commence in 10 years (consistent with last period for review).
Sector reference points - Dictionary The gauging station for the lower sector reference point has changed. As these gauging stations may be damaged or offline for various reasons, the Regulation needs to allow flexibility for another station to be identified.	It is recommended that the gauging station number for the lower sector reference point be updated in the Regulation. It is recommended that the Regulation allow the EPA to publish an alternative gauging station reference on the EPA's website, if required.
Other miscellaneous amendments – Various clauses Various mechanical, administrative and tidy-up amendments to the Regulation are required in order to improve clarity and consistency.	It is recommended that all necessary miscellaneous amendments be made to the Regulation.

4.2 List of operational improvements (to be considered)

Increasing discharge opportunities (section 3.2.2)

- a. In consultation with the scheme Operations Committee, the EPA will consider options to maximise discharge within the current regulatory framework.
- b. In consultation with the scheme Operations Committee, the EPA will consider a program of operational/technological improvements that could improve the operational efficiency of the scheme by helping participants make better use of discharge opportunities (through improved notification, communication, forecasting etc.)

Other significant sources of salt within the scheme area (section 3.2.3)

- a. The EPA will review existing discharges from licensed premises to ensure licensees understand their obligations under section 120 of the POEO Act, and that management controls aim to prevent pollution of waters.

The flood flow exemption (section 3.3.1)

- a. The EPA recommends that the NSW Minerals Council reconsider the need for the MERF process in line with any amendment to the Regulation.

Improving the credit trading process (section 3.3.3)

- a. The EPA will consider a specific review of the efficiency of the credit-trading platform, in consultation with the HRSTS Operations Committee, to examine the costs and benefits of implementing a range of operational improvements to help facilitate trading and reduce transaction costs.

Additional uses for revenue generated via auctions (section 3.4.1)

- a. In consultation with the scheme Operations Committee, the EPA will continue to monitor the amount of revenue generated via auctions.
- b. If a trend of increasing revenue is observed over time, the EPA, in consultation with the Operations Committee will:
 - i. consider whether an amendment to the POEO Act would be beneficial in order to allow scheme funds to be used for a broader-range of potentially beneficial investigations and works within the Hunter River catchment. That is, investigations and works that are not directly related to the administration or operation of the scheme and therefore cannot currently be funded out of the scheme funds.
 - ii. consider developing and documenting a process for identifying and prioritising beneficial projects that could be potentially funded out of any excess revenue in the scheme fund.

Increasing public transparency and access to information (section 3.4.2)

- a. In consultation with the Operations Committee, the EPA will consider a review of the effectiveness of online materials (including annual reports), particularly whether more information (e.g. on cost-effectiveness) or publicity could assist with making this information more accessible to the public.
- b. In consultation with the Operations Committee, the EPA will consider increased training on the scheme for participants, including catering for prospective credit holders and also interested members of the public.

Improving representation (section 3.4.3)

- a. The EPA supports information about the Operations Committee, including current representation, being made more accessible to the public. This would allow stakeholders an opportunity to engage with their member on the committee on a variety of issues.

4.3 List of further investigations (to be considered)

Other significant sources of salt within the scheme area (section 3.2.3)

- a. In consultation with the HRSTS Operations Committee, the EPA will consider the costs and benefits of preparing a 'salt budget' for the Hunter River catchment, which investigates and identifies the major sources of salt on a sub-catchment basis.

Salt from the Goulburn River sub-catchment (section 3.2.4)

- a. In consultation with the HRSTS Operations Committee, the EPA will consider the costs, benefits and relative priorities of:
 - i. establishing baseline salinity and flow data for the Goulburn River sub-catchment, including the expansion of real-time salinity monitoring
 - ii. coordinating the management of salt impacts from and within the Goulburn River sub-catchment and to potentially reduce impacts on the scheme.

Other pollutants present in saline water discharges (section 3.2.6)

- a. The EPA will consider the most appropriate mechanism for further investigating the issue of other contaminants that may be present in participant discharge waters and their impacts on the Hunter River catchment, as recommended by the Salinity Assessment (EPA 2013a). Any issues identified through this process will be managed by applying an appropriate tool from within the EPA's existing regulatory framework.

5 References

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Appendix A: Summary of issues raised in submissions

Submissions

The EPA received 27 submissions on the Discussion Paper (EPA 2013c), including from:

- NSW Minerals Council
- scheme participants (2)
 - Macquarie Generation
 - Name withheld
- Environment/community groups (6)
 - Nature Conservation Council
 - Environmental Defenders Office
 - Lock the Gate Alliance
 - Hunter Valley Protection Alliance
 - Hunter Environment Lobby
 - Hunter Communities Network
- Water users association (2)
 - Hunter Valley Water Users Association
 - Lower Hunter Agricultural Water Users Association
- Agriculture NSW (1)
- Academic/economist (1)
- Former scheme operator (1)
- Individuals/joint submissions (14)

Full submissions can be viewed on the EPA website: [Review of the Protection of the Environment Operations \(Hunter River Salinity Trading Scheme\) Regulation 2002](#).

The following table provides a summary of those submissions.

Abbreviations:

EDO	Environmental Defenders Office	HWVUA	Hunter Valley Water Users Association
HCN	Hunter Communities Network	LHAWUA	Lower Hunter Agricultural Water Users Association
HEL	Hunter Environment Lobby	LTGA	Lock the Gate Alliance
HVPA	Hunter Valley Protection Alliance	NCC	Nature Conservation Council

Table 5-1: Summary of issues raised in submissions

Issue/comment raised in submissions	Raised by	Total subs
Overall feedback on the scheme		
Stated support for the existence of the Scheme	Scheme participant (1) Env/comm groups (NCC, HEL, HCN) (3) Water users (HWVUA) (1) Individuals/joint subs (4) Former scheme operator (1) Minerals Council (1) Agriculture NSW (1)	12
Not enough information or monitoring to assess the success of the scheme	Env/comm groups (HEL) (1)	1
Not enough justification for the existence of the scheme	Academic/economist (1)	1
Implied support for the existence of the scheme	All other submissions (13)	13
Issue 1: Altering salinity targets		
Do not alter current targets	Agriculture NSW (1) Water users (HWVUA) (1) <i>Note: Minerals Council and another scheme participant also support retaining targets at this stage but advocate further studies to investigate whether there is scope to raise targets (see below).</i>	2
Do not raise targets	Water users (LHAWUA) (1) Env/comm groups (HVPA, HCN, LTGA) (3) Individuals/joint subs (5)	9
Lower targets – generally (improve macro invertebrate health, allow wider range of irrigated cropping, meet drinking water standards)	Env/comm groups (NCC, LTGA) (2)	2
Lower the 900 EC middle & lower sector targets – specifically to 800 EC (improve water quality for a wider range of irrigated crops, improve health of macro invertebrates and to align with drinking water quality standards)	Env/comm groups (HEL, HCN, HVPA) (3) Individual/joint sub (6)	9
Lower the 900 EC middle & lower sector targets – specifically to 700 EC (to protect lucerne, grape and other crops, reducing salt burden in cropping soils.)	Individual/joint sub (2)	2

Issue/comment raised in submissions	Raised by	Total subs
Further studies: investigate Raising the 600 EC upper sector high flow target – to 900 EC	Minerals Council (1) Scheme participant (1) Former scheme operator (1)	3
Further studies: investigate raising the 900 EC targets (generally investigate)	Minerals Council (1)	1
Further studies: investigate raising the 900 EC upper sector flood flow target – to 1500 EC	Scheme participant (1)	1
Further studies: areas of poor macroinvertebrate health (with view to lower targets generally)	Env/comm groups (LTGA) (1)	1
Consider removing the 900 EC flood flow targets – unlikely irrigation demand during floods, temporary salinity spike unlikely to affect aquatic species. Would increase discharge opportunities.	Minerals Council (1) Academic/economist (1)	2
Remove the 1500 EC flood flow block maximum limit The target cannot be managed or modelled within the 900 EC target. It does not add to the functionality of the Regulation.	Former scheme operator (1)	1
Issue 2: Increasing discharge opportunities		
Low flow – allow some discharge (investigate)	Minerals Council (1) Scheme participant (Macquarie Generation) (1)	2
Low flow – do not allow discharge	Env/comm groups (HEL) (1) Water users (HVWUA, LHAWUA) (2) Scheme participant (1)	4
'High flow' definition – do not redefine the lower limit of 'high' flows to allow discharge events to occur at lower flows.	Env/comm groups (HVPA, NCC, HEL, HCN, LTGA) (5) Water users (LHAWUA) (1) Individual/joint sub (6)	12
'High flow' definition – redefine the lower limit of 'high' flow to allow discharge events to occur at lower flows. A risk-assessment is required.	Minerals Council (1) Scheme participant (Macquarie Generation) (1)	2
'Saline Water' definition (>400 EC) – change (raise) so that water with a higher EC can be released at any time	Minerals Council (1)	1
Remove operational barriers <ul style="list-style-type: none"> Provide more advanced warning of possible discharge opportunities – especially for the upper sector - through the use of weather forecasting and flow modelling (including improved salinity and flow monitoring in the upper reaches) Improve notification of events (esp. for upper sector) Better technology Documented history 	Minerals Council (1) Scheme participant (1)	2

Issue 3: Other significant sources of salt within the Scheme area		
Support research to identify range of sources and potentially expand Scheme to capture (if appropriate)	Agriculture NSW (1) Env/comm groups (HCN, EDO)(2) Minerals Council (1) Scheme participant (1) Individual/joint sub (1)	6
Support investigation of high salinity levels in Wollombi Brook at Warkworth (as identified in Salinity Assessment)	Env/Comm groups (HVPA, HEL, HCN, LTGA) (4) Individuals/joint subs (8)	12
Issue 4: Salt from the Goulburn River sub-catchment		
Include the Goulburn River sub-catchment in the scheme – also support more research	Env/comm groups (LTGA) (1)	1
Support more research, monitoring and/or better/more coordinated management of salt from Goulburn River sub-catchment	Minerals Council (1) Env/comm groups (HCN, HEL, EDO, LTGA, NCC) (5) Water users (HVWUA, LHAWUA) (2) Former scheme operator (1) Scheme participant (1) Individuals/joint subs (8)	18
Stop all mine/coal seam gas (CSG) expansion in Goulburn River sub-catchment	Individuals/joint subs (1)	1
<i>New issue raised: Have better regard for tributaries and lower reaches of the catchment</i>		
Tributaries health – discharges into tributaries should also protect the health of the tributaries (whether captured by scheme or by some other mechanism)	Env/comm group (EDO) (1) Former scheme operator (1) Water users (HVWUA) (1)	3
Lower reaches – scheme needs to have better regard for the tidal pool/monitoring required	Water users (LHAWUA) (1) Individuals/joint subs (1)	2
Issue 5: Other pollutants present in saline water discharges		
Include other pollutants in the scheme – support further research and management	Env/comm groups (HEL) (1) Water users (HVWUA) (1) Individuals/joint subs (1)	3
Do not include other pollutants in the scheme – impractical - support further research and management.	Minerals Council (1) Scheme participant (1)	2
Individual mines should be aware of substances leaving their premises as per Environment Protection Licence (EPL) conditions		

Further research is supported to fully understand the environmental effects of the different components of saline water discharges under the scheme. Then appropriate management response.	Minerals council (1) Agriculture NSW (1) Env/comm groups (NCC, HEL, HCN, EDO, HVPA, LTGA) (6) Water users (HVWUA, LHAWUA) (2) Former scheme operator (1) Individuals/joint subs (9)	20
Other issues raised relating to environmental effectiveness		
Representative groundwater monitoring – support a more comprehensive and representative groundwater monitoring program for the Hunter catchment (as per EPA Salinity Assessment report findings)	Env/comm groups (HVPA, NCC, HEL, HCN, LTGA, EDO) (6) Former scheme operator (1) Water users (HVWUA, LHAWUA) (2) Individual/joint sub (6)	14
Issue 6: Removing the flood flow exemption		
Remove exemption	Env/comm groups (NCC, HEL, HCN, EDO, LTGA, HVPA)(6) Water users (LHAWUA) (1) Individual/joint sub (8) Former scheme operator (1)	14
Do not remove exemption – improve existing flood flow arrangement	Minerals Council (1) Scheme participant (1)	2
Potentially do not remove (requires careful economic analysis)	Academic/economist (1)	1
Issue 7. Improving the auction process		
Auctions are a valuable component of the scheme	Env/comm groups (EDO, HCN) (2)	2
Do not remove auctions - opposed to perpetual credit holdings – will undermine polluter pays principle	Env/comm groups (EDO) (1)	1
Remove auctions – move to perpetual credit holdings	Scheme participant (Macquarie Generation) (1)	1
Explore alternative processes for allocating credits (e.g. non-auction processes; fixed credit price; other auction processes)	Minerals Council (1)	1
Concerns with proposed Vickrey auction system	Minerals Council (1) Scheme participants (including Macquarie Generation) (2)	3
Limit auction participation – scheme should only allow legitimate dischargers to bid for/hold credits	Minerals Council (1)	1
Operational improvements to existing auction process (various suggestions)	Minerals Council (1) Scheme participants (including Macquarie Generation) (2)	3

Issue 8: Improving the credit trading process		
Support making price of traded credits publically available	Minerals Council (1) Scheme participant (1) Env/comm groups (LTGA)	3
Better facilitation of temporary trades Or automatic reallocation of unused credits under high flow (MERF style)	Minerals Council (1)	1
Better and more transparent trading using latest technology (including the prevention of unintentional illegal trades)	Minerals Council (1) Scheme participant (1)	2
Adjust the cost of credits in the upper sector (disadvantages due to less lead-in time)	Scheme participant (1)	1
A range of other operational improvements to the credit trading process	Scheme participant (1) Minerals Council (1)	2
The scheme operator should be notified when trades occur after a River Register is published	Former Scheme operator (1)	1
Other comments/issues raised relating to cost-effectiveness		
Conduct a rigorous economic analysis to assess whether any current intervention to manage salinity in the Hunter River is justifiable and, if it is, whether the HRSTS is the preferred intervention instrument	Academic/economist (1)	1
The cost effectiveness of the Scheme should consider whether the full environmental costs of operating the Scheme are covered (e.g. the costs of research needed to ensure discharges are being appropriately managed)	Env/comm group (EDO) (1)	1
The effectiveness of the scheme should be judged by utilisation of the TAD.	Scheme participant (1)	1
Issue 9: Additional uses for revenue generated via auction		
Support for funds to be spent on a range of monitoring programs/other investigations for the benefit of the scheme/catchment	Env/comm groups (NCC, HEL, HCN, EDO, LTGA, HVPA) (6) Water users (HVAWUA, LHAWUA) (2) Agriculture NSW (1) Minerals Council (1) Individuals/joint subs (9) Scheme participant (1)	20
Education about the scheme	Water users (HVWUA) (1)	1
Refund unspent revenue to credit holders	Minerals Council (1) Scheme participant (1)	2
Excess funds should not be used for generic EPA/environmental projects	Minerals Council (1)	1
Operations Committee to approve/agree to appropriate uses of funds	Minerals Council (1) Scheme participant (1)	2

Issue 10: Increasing public transparency, access to information and representation		
General support for increased public access to a range of information and data related to the scheme (including: when and where discharges occur; water quality data; research and investigations; credit holdings; current participants; more user friendly scheme website etc.)	Env/comm groups (HCN, HEL, EDO, LTGA, HVPA, NCC) (6) Water users (HVWUA, LHAWUA) (2) Minerals Council (1) Individuals/joint subs (8)	17
Support public access to data about heavy metals in discharges	Individuals/joint subs (2)	2
The cost-effectiveness of the scheme should be reviewed and reported (publically) more frequently to enable continuous improvement	Scheme participant (1)	1
Operations Committee – retain current make up	Minerals Council (1) Scheme participant (1)	2
Operations Committee – support consideration of revision/expansion - with full consultation before final decision is made	Water Users (HVWUA) (1)	1
Issue 11: The Scheme as a model for other trading schemes		
In support – but caution around 2 yearly auctions, distribution of credits and escalating revenue / cost to industry	Scheme participant (1)	1
Only where there is adequate understanding of the receiving environment and its ability to tolerate the introduction of pollutants on a cumulative basis.	Env/comm groups (EDO) (1)	1

Appendix B: Flood flow analysis

B1 Introduction and background

B1.1 Overview of flood flows

Under the Regulation, river flows are divided into ‘blocks’ (clause 9). A block is a body of water that passes through Singleton in a 24-hour period and is given a unique identification number in the River Register.

River blocks are also classified as either ‘low flow’, ‘high flow’ or ‘flood flow’, which refers to the rate of flow (clause 10). Clause 11 defines the flow thresholds for each sector of the river that determine the flow classification for the block. The flow thresholds are expressed in megalitres per day (ML/d).

A flood flow is defined as a flow of > 4000 ML/day in the upper sector, >6000 ML/day in the middle sector and >10 000 ML/day in the lower sector (see Table B-1 below). (Note: A catchment map showing the Scheme river sectors can be found on page 33 of the Discussion Paper (EPA 2013c)).

Table B-1: Current river flow thresholds for the Hunter River Salinity Trading Scheme (ML/day)

	Low Flow	High Flow	Flood Flow
Upper sector	<1000	1000 > 4000	> 4000
Middle sector	<1800	1800 > 6000	> 6000
Lower sector	<2000	2000 > 10 000	> 10 000

An important component of the flood flow classification is that an upper or middle sector block cannot be classified as a ‘flood flow’ block, unless the lower blocks are also in flood (clause 12). So a situation can arise where the upper sector has the flow required to be in flood flows, but the middle and lower sectors do not. This means that the upper sector cannot be defined as a flood flow.

For example: hypothetical block 2015–201, predicted flow rates for each sector are:

- Upper sector: 4500 ML/day (over flood flow threshold)
- Middle sector: 5500 ML/day (within high flow thresholds)
- Lower sector: 9500 ML/day (within high flow thresholds)

In this example, all three sectors would be classified as being in **high flow**, despite the upper sector being over the flood flow threshold.

What is the flood flow exemption?

Under the Regulation, saline water discharges (defined as water with an electrical conductivity (EC) >400 µS/cm) are only permitted during high and flood flow conditions. No discharges are permitted during low flows. Credit holdings determine the amount that participants can discharge during a high flow event. However, during a flood flow event, credit holdings do not limit what can be discharged by participants – acting as an exemption from the credit system during flood flows.

The flood flow exemption is set out in clause 26 of the Regulation. A participant's credit holdings determine their volume discharge limit during high flow events (clause 23), however, clause 26 effectively removes the volume discharge limit for flood flows and credit holdings are irrelevant.

The flood flow exemption allows an opportunity for participants to discharge larger volumes of saline water at a time when the river has greater capacity to receive it and without being limited by credit holdings. There is no need for participants to trade credits in the lead up to a flood flow event to ensure they have enough to cover their intended discharge. The only limitation on participants is their tributary protection limits (volume limits) set out in their environment protection licences.

In summary, under:

Low flows → no discharge is permitted

High flows → discharge is permitted: but is limited by credit holding **and** the licence tributary protection limit (TPL)

Flood flows → discharge is permitted: but is limited by the licence TPL **only**.

Trading rules order

Under the Regulation, the EPA can suspend the flood flow exemption for up to five years, if it is shown that discharges during flood flow conditions caused the salinity targets to be exceeded. This can be done via the publishing of a 'trading rules order' in the Government Gazette (clause 27). However, the EPA is not able prosecute individual participants for their role in any exceedance.

Salinity targets have never been exceeded during flood flows and a trading rules order has never been invoked.

B1.2 Original intention of flood flows and development

The original intention of the flood flow exemption was to provide participants with an opportunity for full capacity discharge without the restriction of credit holdings, where the volume of water in the river was so large that simultaneous¹⁴ full capacity discharges by all participants would not breach the salinity targets for the river.

During the pilot scheme, flood flow thresholds were set at 2000 ML/day in the upper sector, 6000 ML/day in the middle sector and 10 000 ML/day in the lower sector. During the review of the pilot scheme and the development of the Regulation for the formal scheme, modelling was undertaken which indicated that the salinity targets could be breached if all participants were to discharge simultaneously into flood flow conditions.

A draft Regulation was exhibited in March 2001, with proposed increased flood flow thresholds values of 20 000 ML/day for the upper sector (a 10 X increase), 10 000 ML/day for the middle sector (a 1.7 X increase) and 10 000 ML/day for the lower sector (no change). The rationale for the large increase in the upper sector was significant mine expansion in the

¹⁴ 'Simultaneous' discharge refers to discharges by participants into the same river block, which may in effect occur hours or days apart as the block proceeds down the river.

sector since the pilot flood flow thresholds were set, and also further mine expansion in the upper sector was predicted to follow the commencement of the Regulation.

Industry opposed the size of the proposed flood flow threshold change, claiming that the EPA's proposed restriction was too conservative (particularly for the upper sector), and that simultaneous full capacity discharge was unlikely. Further modelling and negotiations followed and a revised approach was eventually agreed between the EPA and industry, which included:

- a. raising the flood flow thresholds by a smaller amount than was proposed in the draft Regulation to 4000 ML/day for the upper sector (a 2 X increase from the pilot scheme), 6000 ML/day for the middle sector (no change), and 10000 ML/day for the lower sector (no change)
- b. allowing industry to self-coordinate discharges during flood flows.

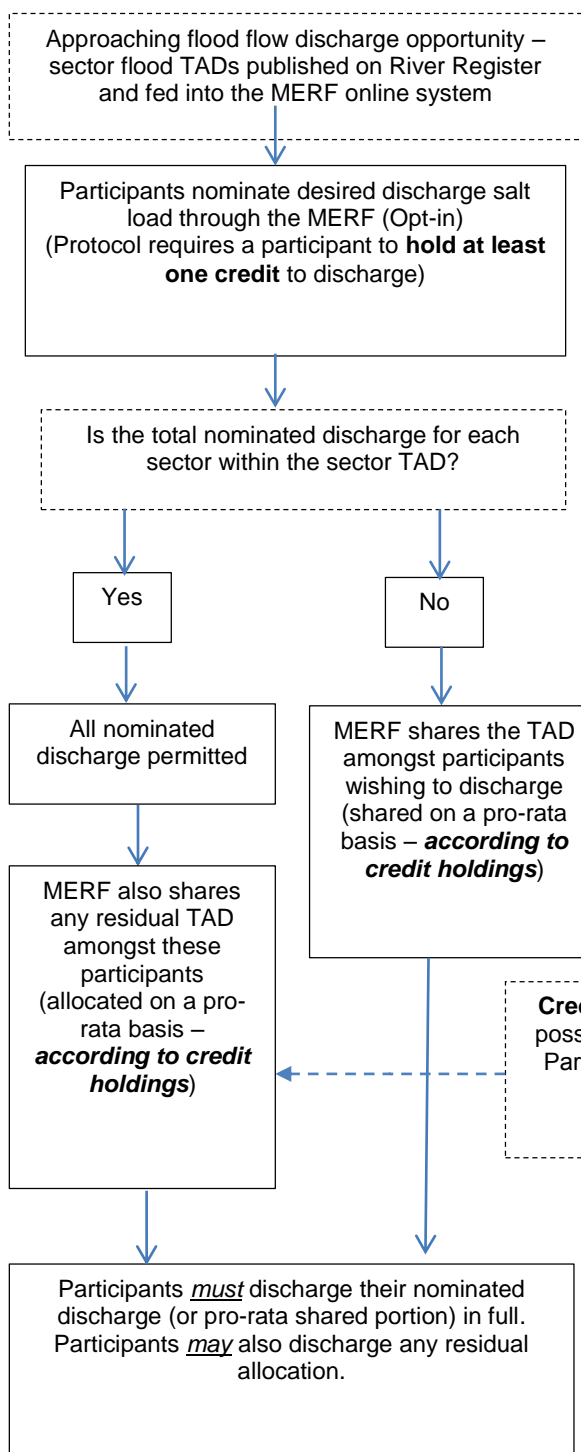
The final regulation commenced in December 2002, with flood flow thresholds set as they are today (see section B1.1).

B1.3 The Managed Envelope of Residual Flows (MERF) process

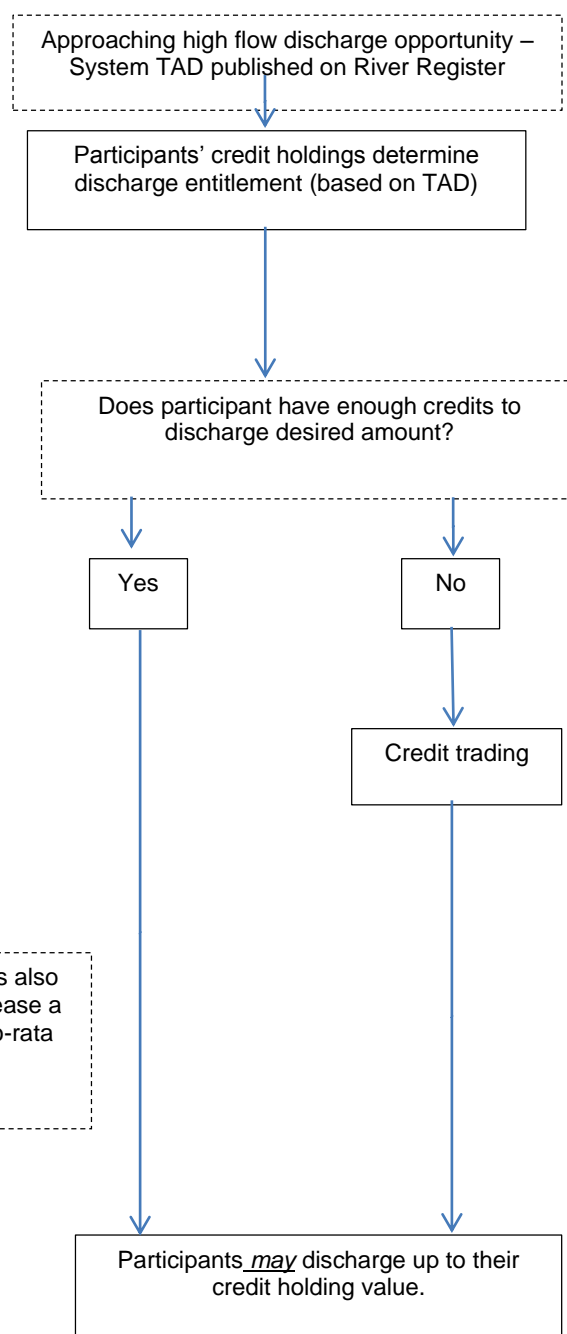
As mentioned above, the flood flow thresholds set in the final Regulation were set much more modestly than was originally intended in the draft Regulation. To ensure that salinity targets are not breached during flood flows (and to ensure that a trading rules order is not invoked), participants self-coordinate and self-regulate during flood events by operating the industry-run Managed Envelope of Residual Flows (MERF) process. The MERF is a flood sharing process which mirrors the operation of the Scheme (with some key differences – see figure B-1 below) and is governed by a MERF Protocol. The total allowable discharge (TAD) is distributed by an industry-based group (coordinated by the NSW Minerals Council) and costs approximately \$27 000 per annum to administer. The EPA is not involved in the administration of the MERF process.

Figure B-1: Key differences between the MERF and the HRSTS

Flood flows – Managed envelope of residual flows (MERF) process (industry protocol)



High flows – Hunter River Salinity Trading Scheme (HRSTS) credit trading (Regulation)



Advantages and disadvantages of the MERF

The main concern expressed by industry stakeholders was that removing the flood flow exemption would result in more discharge opportunities being controlled through the credit trading system, which is viewed as cumbersome. While they acknowledged that the additional layer of administration with the MERF is not ideal, there are advantages that the MERF has over the credit trading system, including the 'opt-in' design and the automatic TAD sharing, although there are also a number of disadvantages. The advantages and disadvantages of the MERF process are described in table B-2 below.

Table B-2: Summary of the advantages and disadvantages of the MERF process

Advantages of the MERF process	Disadvantages of the MERF process
<ul style="list-style-type: none"> • Aims to minimise the risk of salinity targets being exceeded during flood flow events. • The MERF process shares the discharge opportunity only among those who actually want to discharge (an opt-in system). 	<ul style="list-style-type: none"> • The MERF process is not legally-binding and does not provide a transparent and robust framework for managing saline discharges during flood conditions. • The EPA's compliance and enforcement capabilities are severely limited during flood flow events.
<ul style="list-style-type: none"> • The MERF process runs largely automatically once TADs are calculated. • Credit trading (viewed as costly and cumbersome by some participants) is not necessary under the MERF process. 	<ul style="list-style-type: none"> • The MERF process adds complexity (another administrative layer which has slightly different rules to the HRSTS). • The Regulation makes it clear that credits are not required for flood flow discharges, however the MERF process still relies on HRSTS credits to determine a basic discharge entitlement. • While credit trading is not necessary under the MERF and this is seen as advantageous, credit trading is in fact a possibility that has been built into the MERF process. This allows participants to increase any pro-rata discharge allocation.
<ul style="list-style-type: none"> • The MERF process is largely a fixed cost. (According to the NSW Minerals Council, the MERF costs approx. \$27 000 per annum to administer. However, this figure does not include the costs absorbed by the HRSTS mentioned in adjacent column) 	<ul style="list-style-type: none"> • The HRSTS is potentially absorbing a proportion of the costs associated with running the MERF. • If a participant heavily relies on flood flows in order to discharge (and generally holds insufficient credits to discharge under the HRSTS), then they are paying a lower participant contribution under the HRSTS, which is in part based on the number of credits held. • In effect, these points mean that the HRSTS funds are being diverted to the MERF.
	<ul style="list-style-type: none"> • The MERF process lacks public transparency, which is important for accountability.

B2 Flood flow analysis

To examine the issue of flood flows, the EPA undertook an analysis in three parts to examine:

Part 1: The utilisation of flood flows – how have flood flow opportunities been used by participants since the scheme commenced?

Part 2: The level of constraint – would participants have been constrained if the flood flow exemption did not exist and high flow rules were in place?

Part 3: Raising the flood flow threshold – would it be viable to raise the flood flow threshold as an alternative to removing the flood flow exemption completely?

Part 1: Utilisation of flood flows

The analysis looked at utilisation of flood flow opportunities when the MERF process operates and found that, since the Regulation commenced, 30% of the total number of discharge opportunities (for all premises, all flood days) were used by participants.

Analysis inputs

This analysis considered all flood flows declared via the River Register, since the Regulation commenced on 1 December 2002 until the end of 2013. Flood flow days occurred in the years 2007, 2008, 2010, 2011, 2012 and 2013. Flood flows prior to the commencement of the Regulation were not considered because:

- the purpose of the analysis was to examine flood flows during the life of the Regulation
- the upper sector flood flow thresholds were set lower prior to the commencement of the Regulation (i.e. during the pilot phase).

The analysis considered TADs published on the River Register for flood flows from 2008 onwards. State Water undertook retrospective modelling to provide TADs for flood flows in 2007, as no sector (flood) TADs or whole-of-system TADs were produced prior to 2008 and no other records were retained.

The analysis also considered each participant in the Scheme for each flood flow event, their credit holding¹⁵ at that time and their actual discharges (tonnes of salt) into those flood flows¹⁶.

Table B-3: Utilisation of flood flows since the Regulation commenced

	Upper sector	Middle sector	Lower sector	Total
No. of flood days	14	34	40	40*
No. of possible individual discharges during flood flows (No. of premises X flood days by sector)	42	170	234	446
No. of actual individual discharges during flood flows	6	74	54	135
% uptake of discharge opportunities during flood flows	14%	44%	23%	30%

* Days with flood flows in at least one sector

At least one participant discharged into every flood flow block since the Regulation commenced.

¹⁵ Sourced from HRSTS Online: River Sector Reports. <http://www.epa.nsw.gov.au/hrstspublicapp/default.aspx>

¹⁶ Sourced from the EPA HRSTS Compliance Spreadsheets

In terms of utilisation of the TAD, since the Regulation commenced, participants have discharged 41,128 tonnes of salt into flood flows out of a combined total allowable discharge of 445,753 tonnes of salt. This represents a **9.5% utilisation of the TAD during flood flows**.

Part 2: Level of constraint if high flow rules applied

The analysis looked at all discharges that occurred during flood flows since the Regulation commenced and retrospectively applied high flow rules to assess whether these discharges would have been constrained (i.e. not permitted due to low credit holdings)¹⁷.

The analysis found that 4% (6 of 135) individual discharges would have been constrained by high flow rules. 96% of discharges that have occurred during flood flows would have been possible within high flow rules according to participant credit holdings at the time of discharge.

Table B-4: Discharges during flood flows that would have been constrained by high flow rules

	Upper sector	Middle sector	Lower sector	Total
No. of actual discharges that would have been constrained	0	4	2	6
No. of actual individual discharges during flood flows	6	74	54	135
% of actual discharges that would have been constrained	0%	5%	4%	4%

The extent of constraint in the middle and lower sectors

Of the 4% of discharges that would have been constrained, all were from participants within the middle or lower sectors. All occurred during smaller flood events, with TADs much smaller than the average TAD for flood flows. The level of constraint can be categorised as follows:

- One particular discharge would have had a comparatively **high** level of constraint (based on additional credits that would have been required to discharge):
 - Ravensworth/Narama, middle sector: block 2010-343, December 2010
 - Discharged 223% the value of its credit holding (128 credits)
 - Would have required an additional 157 credits
 - There would have been 419 unused credits for this block based on all participant discharges
 - TAD was smaller than (i.e. 26% of) the average flood flow TAD.
- For the same flood flow block as above, another one particular discharge would have had a comparatively **moderate** level of constraint (based on additional credits that would have been required to discharge):
 - Bayswater, middle sector: block 2010-343, December 2010
 - Discharged 142% of the value of its credit holding (296 credits)
 - Would have required an additional 87 credits
 - There would have been 419 unused credits for this block based on all participant discharges
 - TAD was smaller than (i.e. 26% of) the average flood flow TAD.

¹⁷ The analysis looked at instances where the actual volume discharged by a participant was > 100% of the volume discharge limit that would have applied if high flow rules were in place.

NB: Ravensworth and Bayswater would have needed 157 and 87 credits respectively (244 in total) to discharge into block 2010-343 under high flow rules. This is still below the 419 credits that would have been unused for that block based on all participant discharges.

- The other four discharges would have had a comparatively **low** level of constraint (based on additional credits that would have been required to discharge):
 - Bayswater, middle sector: block 2008-254, September 2008
 - Ravensworth, middle sector, block 2010-342, December 2010
 - Mt Thorley, lower sector, block 2007-164, June 2007
 - Mt Thorley, lower sector, block 2007-165, June 2007
 - Discharged between 102% and 118% of the value of their credit holdings
 - Would have required between three and 23 additional credits
 - For these blocks there was between 681 and 955 unused credits for these blocks based on all participant discharges
 - TADs were larger than the above block (between 31% and 72% of) the average flood flow TAD.

This analysis demonstrates that the vast majority of flood flow discharges into the middle and lower sectors, since the Regulation commenced, would have been possible under high flow rules. For the very few instances where a participant would have been constrained, most of these would have been possible through the acquisition of a small number of credits.

For the two instances where the constraint would have resulted in the need for a medium/high number of additional credits, there would have been ample unused credits available at this time that could have been potentially traded amongst participants.

No constraint in the upper sector

An important finding of the analysis was that since the Regulation commenced, there has been a very low utilisation of flood flow discharge opportunities by participants in the upper sector:

- there were seven individual discharges out of 42 individual opportunities to discharge (14%)
- salt discharges by the upper sector represented 1.8% of the total tonnage of salt discharged by all sectors during flood flows, when all three sectors were in flood
- discharges by the upper sector represented 0.16% of the combined total allowable discharge during flood flows, when all three sectors were in flood.

When high flow rules were retrospectively applied to these discharges in the upper sector, all were well within the range that their credit holdings would have permitted them to discharge.

This finding is significant because industry's original concern with the flood flow threshold, when the Regulation was first proposed, was primarily centred on the argument that the flood flow threshold for the upper sector was proposed to be set excessively high (20,000 ML/day). As a consequence, when the Regulation commenced, the flood flow threshold was set at a much lower level of 4000 ML/day.

This analysis shows that the upper sector has not benefited from the low 4000 ML/day flood flow threshold and would not have been adversely affected by a higher threshold or indeed the absence of the flood flow exemption. This is likely to be due to the inevitably limited notice that participants in the upper sector receive prior to discharge events because of their geographical location.

Conclusion

Since the Regulation commenced, the flood flow exemption has provided only a minimal benefit to a minority of participants in the middle and lower sectors. There has been no

benefit for participants in the upper sector. For the vast majority of the time, the exemption has not been necessary and the same result could have been achieved through the trading of a small number of credits.

Part 3: Raising the flood flow threshold

The EPA considered whether raising the flood flow threshold, to accommodate a TAD for simultaneous full capacity discharge, would be a viable alternative to removing the flood flow exemption entirely.

The EPA considered what would happen if all participants were to discharge up to their full capacity (up to their licence tributary protection (volume) limits) during flood flow events. The analysis found that there is a risk of the TAD (and salinity targets) being breached for some flood flow events. With increased growth in the mining sector, there is a further increased risk of the TAD being breached.

It is important to note that by raising the flood flow threshold, the EPA would not be stopping or limiting the ability of participants to discharge under the scheme. Discharges would still be able to occur under high flow rules, through the use of discharge credits. The purpose of raising the flood flow threshold is to reduce the risk of simultaneous, full capacity discharge by participants impacting on the river (i.e. breaching salinity targets) during flood flow conditions.

Required TAD for simultaneous full capacity discharge

Based on recent maximum ECs of participant discharges, a system TAD for a given flood flow block (discharge event) would need to be 9294 tonnes of salt or higher, to enable full capacity discharge from all participants into a single flood flow block.

In order to understand how common a TAD of this magnitude is for flood flows, since the scheme commenced in 2002, a TAD of 9294 or higher occurred during flood flows on 22 occasions (i.e. 55% of the time). This means that 45% of the time during flood flows, there was a smaller TAD and so a risk that discharges would have exceeded the TAD (if all participants discharged to their full capacity into a single flood flow block).

The addition of the MERF process mitigates the risk of the salinity targets being exceeded during flood flows by coordinating participant discharges so they are effectively 'shared' as needed. However, the MERF cannot completely remove this risk and the EPA is not able to prosecute individual participants for any exceedance of the flood flow salinity target that may result through either a failure or circumvention of the MERF. In addition, as outlined above and in the Discussion Paper (EPA 2013c), the EPA's view is that the MERF adds another operational layer to the Scheme, is not transparent, and adds complexity and cost for participants.

Growth scenarios

In setting an appropriate flood flow threshold for the Scheme, possible increases in saline water discharge capacity over the next 10 years needs to be considered and an appropriate buffer added to account for the increase. After 10 years, the Regulation will be reviewed again and the flood flow thresholds re-set if necessary.

Coal mine saline water discharge capacity could increase over time if:

- a. new discharging mines come on-line
- b. existing non-discharging mines become discharging mines, and/or
- c. existing discharging mines increase their discharge capacity.

Point c) is hard to predict, however a) and b) can be roughly estimated by considering projected growth in coal production in the Hunter Valley. While there is not necessarily a

linear relationship between coal production and saline water discharges, using projected increases in coal production is a way of determining a conservative buffer for the protection of salinity targets over the next 10 years.

The analysis considered two projections for growth in coal production in the Hunter Valley:

- *Australian Energy Resource Assessment* (Geoscience Australia and ABARE 2010)¹⁸ – has growth projections for Australian coal production at 1.8% per year to 2030 (chapter 5.4). 1.8% per year equates to 19.5% over 10 years. While this figure is for the whole of Australia, the report notes that the majority of growth will be in NSW and Queensland and in NSW the majority from the Hunter Valley. So in the Hunter Valley, production may be at a higher rate than 1.8% per annum.
- *Vision 2020 Project: The Australian Minerals Industry's Infrastructure Path to Prosperity* (ACIL Tasman, 2009)¹⁹ - a more specific projection for the Hunter Valley is provided in this assessment, used for the purposes of planning infrastructure works in the Valley to support the coal mining industry. Coal movements are projected to increase by 26% between 2014 and 2024.

For the purposes of the flood flow analysis, projected coal production growth scenarios of **20-25%** over the next 10 years were considered as conservative estimates.

Revised thresholds

On behalf of the EPA, the NSW Department of Primary Industries (DPI) Water conducted a statistical analysis of all flow events in the Hunter River since 1993, in order to determine a range of flood flow thresholds that could accommodate the required TAD for full capacity discharge. The analysis looked at different discharge scenarios in terms of the electrical conductivity (EC) of the discharge water and also likely increases in discharge capacity over the next 10 years.

Based on the results of DPI Water's statistical analysis, the EPA accepted the following revised flood flow thresholds as a basis of this analysis (all rounded to the nearest 1000 ML):

- Upper sector: **5000 ML/day**
- Middle sector: **15 000 ML/day**
- Lower sector: **25 000 ML/day**

These thresholds are based on the following assumptions:

1. The EC of participant discharge water will remain consistent with recent observed or estimated maximums.

DPI Water's analysis also considered two other discharge EC scenarios. The first was a conservative estimate whereby each mine discharge is 7000 EC and each power station discharge is 2200 EC. The second was a very conservative estimate whereby each mine discharge is 9000 EC and each power station discharge is 2500 EC. The EPA considered that each of these alternative discharge EC scenarios were too conservative for the purposes of setting a flood flow threshold and that it was appropriate to use recent recorded (or estimated) maximum ECs for each participant as a basis for setting the thresholds.

2. A 25% increase in industry discharge capacity over the next 10 years.

DPI Water's analysis also considered other incremental increases in discharge capacity (ranging from 0-100 per cent). The EPA considered that 25 per cent was most

¹⁸Geoscience Australia and Australian Bureau of Agricultural and Resource Economics (2010) *Australian Energy Resource Assessment*, Canberra. Accessed online: http://www.ga.gov.au/corporate_data/70142/70142_complete.pdf

¹⁹ ACIL Tasman (2009) *Vision 2020 Project: The Australian Minerals Industry's Infrastructure Path to Prosperity*, prepared for NSW Minerals Council, Sydney. Accessed online: http://www.minerals.org.au/file_upload/files/resources/vision2020/MCA_2020_Vision_NSW_report_FINAL.pdf

appropriate as it aligns closely to the Hunter Valley coal mining projections in the *Vision 2020 Project Report* (see 'growth scenarios' above).

3. Accepting a 0.2% risk of participant discharges at full capacity exceeding the sector TAD at the nominated flood flow threshold. (i.e. for 0.2 per cent of days (< 1 day) per year on average, there would be a risk that simultaneous full capacity discharges by all participants would exceed the required sector TAD, for flows at or above the flood flow threshold).

DPI Water's analysis considered a range of risk scenarios (from 1.0% to 0.0% of days per year), however, it concluded a risk level above 0.5% would be high risk. The EPA considered that a 0.2% risk is acceptable given that:

- a. it is unlikely that all participants would discharge simultaneously up to their full capacity into a single flood flow block
- b. any salinity target breach would occur during a significant flood event when it is unlikely that water would be being used for irrigation
- c. The EPA can still issue a trading rules order should this situation ever result in a breach of the salinity targets, effectively removing the flood flow exemption from the Scheme for up to five years.

Removing the flood flow exemption vs. raising the flood flow threshold

Considering the viable, higher flood flow thresholds above, the flood flow analysis then considered how this option compared to the simple option of removing the flood flow exemption. From an environmental perspective, both options produce similar results – both mitigating the risk that the salinity targets would be breached.

The simplest way of carrying out this comparison was by analysing the total allowable discharge (TAD).

Firstly, the analysis examined the six participant discharges that would have been constrained had high flow rules applied at the time of discharge. Both potential options - either removing the flood flow exemption or raising the flood flow threshold - would have resulted in similar discharge scenarios being captured by high flow rules²⁰. So neither option is more advantageous in this regard – both options would have produced the same constraint on the six participant discharges.

Secondly, looking at the current credit holdings of scheme participants, the analysis considered whether retaining the flood flow exemption with increased flood flow thresholds would have any other potential benefits for participants.

²⁰ That is, the TADs for all these discharge events (range: 2868-8005) were below all the TAD scenarios for full capacity discharge (9294 upwards).

Table B-5: Comparison of option to remove the flood flow exemption vs. option to increase the flood flow thresholds

Advantage	Remove flood flow exemption	Raise flood flow thresholds
Environmental	<ul style="list-style-type: none"> No risk of salinity targets being exceeded (provided other aspects of the scheme function successfully). 	<ul style="list-style-type: none"> Minimal risk of salinity targets being exceeded due to simultaneous full capacity discharges including expected growth in the mining sector. Trading rules order retained as penalty in Regulation.
Industry	<ul style="list-style-type: none"> A minority of discharges require purchase of additional credits or marginally reduce discharge volumes Duplicative MERF process is redundant. 	<ul style="list-style-type: none"> A minority of discharges likely to require purchase of additional credits or to marginally reduce discharge volumes. Opportunity for full capacity discharge without credits remains in some larger flood events. Duplicative MERF process no longer required (although may still be used).
Economic	<ul style="list-style-type: none"> Likely to be some increases in credit trading. Transactions costs associated with trading higher relative to other options, but potentially more than the alternative option. 	<ul style="list-style-type: none"> Likely to be some increases in credit trading, but potentially less than the alternative option. Transactions costs associated with trading higher relative to status quo, but potentially less than the alternative option.
Governance	<ul style="list-style-type: none"> Full regulatory oversight of all discharge arrangements. Regulation made simpler. All discharges to be governed by high flow rules - increased control and oversight. Individual breaches can be prosecuted in all situations. 	<ul style="list-style-type: none"> Much increased regulatory oversight of discharge arrangements. A much greater proportion of discharges to be governed by high flow rules - increased control and oversight. Individual breaches can be prosecuted, in more situations compared to the status quo.

The above comparison shows that there are marginal differences between the environmental, economic and governance advantages of either removing the flood flow exemption or raising the flood flow thresholds. However, there may be some advantage to industry in retaining the exemption and raising the flood flow threshold. That is, there will be some (even if much reduced) opportunity for full capacity discharges to occur without the need for salinity credits or the MERF, which may reduce overall transaction and administration costs for participants.

B3 Conclusion and recommendations

The flood flow exemption, particularly with the flood flow thresholds set at the current levels, presents challenges for the efficient operation of the HRSTS as a whole. Analyses prior to the establishment of the Regulation (and confirmed in recent analyses) showed that there is a risk that simultaneous, full capacity discharges by participants could breach salinity targets at the flood flow threshold level. Industry's response to this risk – the introduction of the MERF process to 'share' flood flow discharge opportunities – adds another layer of complexity and cost to the scheme and for participants *without being able to guarantee that salinity targets will not be exceeded*.

The analysis outlined in section B2 above showed that, since the Regulation commenced, the flood flow exemption has provided only a minimal benefit to a minority of participants in the middle and lower sectors. There has been no benefit for participants in the upper sector. For the vast majority of the time, the exemption has not been necessary and the same result could have been achieved through the trading of a small number of credits.

Given the disadvantages associated with retaining the flood flow exemption and the flood flow thresholds at their current level (described in sections B1.3 and B2), and the small benefit of retaining the exemption, the EPA considered what outcomes could be achieved by simply removing the flood flow exemption versus raising the flood flow thresholds.

There are marginal differences between the environmental, economic and administrative advantages of either removing the flood flow exemption or raising the flood flow thresholds. However, raising the flood flow threshold may provide some advantage to industry over removing the exemption entirely. That is, there will be some (even if much reduced) opportunity for full capacity discharges to occur without the need for salinity credits or the MERF, which may reduce overall transaction and administration costs for participants.

Considering industry's concern around removing the exemption, the EPA makes the following recommendations for the review of the Regulation:

Recommendation 1: That the flood flow exemption in the Regulation be retained.

Recommendation 2: That the Regulation be amended to raise flood flow thresholds to:

- a. 5000 ML/day for the upper sector (up from 4000 ML/day),
- b. 15 000 ML/day for the middle sector (up from 6000 ML/day), and
- c. 25 000 ML/day for the lower sector (up from 10 000 ML/day).

Recommendation 3: That the proposed amendments to the regulation (including the revised flood flow thresholds) should commence on 1 July 2016, after the next credit auction. This will allow participants an opportunity to acquire additional credits (if required).

Recommendation 4: That the NSW Minerals Council reconsider the need for the MERF process in line with any amendment to the Regulation.