Part 3  The Regulatory Framework

6. Rights and their tradeability

Types of rights

As already noted, the three most common types of entitlement are water rights, in communally-supplied irrigation districts; licences for individuals to pump (or otherwise divert) water out of streams themselves; and bulk entitlements held by water authorities. This section briefly describes these rights, plus the few additional ones, some of which are not tradeable.

Users’ rights in regulated systems

Most water used for agriculture comes as water rights held by farmers in irrigation districts, nearly 2,000,000 ML altogether. These are listed in a register kept by the authority that operates the district, and are perpetual. Water rights have a high reliability, and because of careful resource management they can be expected to be fully available by February in 96% to 99% of years.

Next are private diversion licences on regulated streams, accounting for about 500,000 ML. These have the same high reliability as the water rights in any districts supplied by the same system. They are generally issued for a period of 15 years, but can be issued for other periods, or for an unlimited period. The Minister is legally responsible for licences, but delegates management to rural water authorities.

The above two kinds of basic right mostly qualify farmers (though not those in the pump-supplied, horticultural districts) to additional, “sales” water, when storages have sufficient resources. “Sales” is offered only once there is enough water to meet basic rights in the current year, and, with minimum likely inflows, to meet basic rights in the following year.

“Sales” is usually offered as a proportion of the basic right, within a maximum allocation (often of 100% water right). When the basic right is sold, so is the ability to attract “sales”;

only an allocation in the current season can be traded separately, on the temporary market.

Licences for industry or domestic & stock purposes (D&S) attract no “sales”, and irrigation licences often attract “sales” at a lower level than water right. This is because, historically, lower volumes of water rights were given out, so there was a stronger claim for these to be supplemented. Thus, in most of northern Victoria, private diverters do not get the first 30% allocation of “sales” made to district irrigators.

A leap in trading of “sales” in 1994/95 prompted a rethink about its tradeability. The concern was especially about private diverters - who paid little for their licences and often did not use them all, let alone any “sales” - suddenly cashing in on their “sales” on the market. This was eroding reliability, and leading to higher overall usage at a time when the Murray-Darling Basin Ministerial Council had decided usage should be capped.

So in spring 1995 “sales” trading by private diverters was banned in northern Victoria. Then in mid 1997, with a need to tighten the “interim cap” and at the same time avoid allocation levels of “sales” declining too steeply, trading of “sales” above 30% by gravity irrigators was banned. This has left the first 30% “sales” in gravity areas - which is seen as more in the nature of a right than just a temporary opportunity - being the only “sales” that is tradeable.

To prevent barred “sales” trade happening indirectly, from 1995 private diverters were not allowed to use any “sales” if they temporarily transferred any of their licences, and from 1997 gravity irrigators lost access to all “sales” above 30% if they temporarily transferred any water right or any of the first-30% “sales”.

Irrigators may also be allowed to take off-quota water in times of “surplus” flow in the river. This allows use in excess of the irrigator’s seasonal allocation. However, it is counted as a diversion under the Cap, and the medium-term intention is to phase out off-quota in Victoria, except perhaps in years of very low seasonal allocation. Trading of off-quota has never been allowed.

Properties in irrigation districts also have a small domestic and stock (D&S) allowance, listed in the register, and having high reliability. The Water Act currently does not let these rights trade. This seems strange (e.g. licences for domestic and stock purposes are tradeable), and one day should be redressed.

**Users’ rights on unregulated streams**

Farmers using water from unregulated streams (except D&S water from creeks on their land) must have licences. These are usually annual licences, though the Water Act says licences must be renewed unless there are good reasons not to do so and renewal is traditionally automatic. They may be ordinary, “direct pumping” licences, allowing the taking of water at any time of the year including in summer, or “winter-fill” licences, which allow dams to be filled in wetter months (normally just from May to October).

On a reliable mountain stream licences may be relatively reliable, but on an intermittent creek not so. A licence is a flexible form of entitlement, and may include whatever conditions the Minister wants, e.g. these might relate to local rostering, or protection of flows. Trading is subject to special conditions described in chapter 8.

**Bulk entitlements**

Bulk entitlements are held by water authorities, and also by some electricity-generating companies. They are issued by the Minister under Part 4 of the Water Act, or may be held in various forms under earlier legislation. Pre-existing ones are being converted to a more precise and quantified form under the Water Act: this process has now covered most of Victoria.

Bulk entitlements are tradeable, as described in chapter 10 and attachment 2. For rural water authorities, though, they are accompanied by obligations to meet farmers’ water entitlements, which really constitute the tradeable right. When farmers under different authorities trade, the bulk entitlements of both authorities are subject to a consequential amendment.

**Entitlements for special situations**

i) **Groundwater** Licences to take groundwater are issued under the same legislative provisions as surface water licences. Trade is legally possible, and a small amount is taking place in southern Victoria. Trade obviously must be restricted to users of a common aquifer. Moreover, since groundwater resources are harder to assess than surface water resources, and can have a variety of connections with the surface but often consist of water that has accumulated over many years, introduction of trading is being approached with more caution.

ii) **Drainage** Drainage diversion agreements can encourage reuse of water in irrigation districts - which decreases the nutrient load on waterways. Drainage diversion agreements are an insecure form of water entitlement, and there is no guarantee that water will be available to divert. They are presently not tradeable.

iii) **Non-consumption** It is possible to have a right temporarily to divert water, but which obliges the user to return the water to the stream. Such non-consumptive rights could be in the form of a licence (e.g. for a fish farm) or a bulk entitlement or legal agreement (e.g. for a hydro-power company). These rights are fundamentally different from consumptive ones and cannot normally be sold for consumptive use. Farmers have on occasion paid for early release of water for hydro-power, though; and it’s certainly feasible for hydro-power companies to buy consumptive rights for their non-consumptive purposes (see chapter 10).
iv) The environment  Flows to protect the health of rivers and their wetlands are provided for in various ways. Thus minimum and flushing flows can be set as conditions of bulk entitlements or of licences; higher flows can be protected through caps inserted in bulk entitlements on the total volume diverted and the rate of diversion.

The environment may also hold extractive entitlements in the same way as an irrigator or an urban water authority. On the Murray the Minister responsible for the environment holds a “flora and fauna” bulk entitlement for 27,600 ML, which is used to water wetlands near Kerang, and which in some years is sold temporarily to farmers (see chapter 10).

Metering usage

In the past, some entitlements have been for irrigation of a specified area of land, and the exact volume of water applied to the land was not measured. Rights to domestic and stock water, on unregulated streams, and to groundwater are still in many cases not metered. But the great bulk of farmers who irrigate commercially have their water usage metered, and metering is being extended to irrigation in catchments and from groundwater.

Meters are generally installed and maintained by a rural water authority, with the cost recovered as part of the price of water. Where water is delivered out of channels, by gravity, a “Dethridge wheel” is used, and where water is piped under pressure, an in-pipe flow meter is used. Farmers caught interfering with or bypassing meters are taken to court, and fined or even jailed.28

Metering is essential where water usage is capped, entitlements are well specified, and any change to water access is via the market. Though not yet a formal condition of trade, authorities are recognising that metering must apply not only to the buyer, but also to the seller (unless the whole right is sold) - if not, the seller could just keep using the same volume as before.

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28 The penalty for a first offence is likely to be a fine of about $500, and for repeat offences $1,500, or up to three months in jail. G-MW, which has about 15,000 irrigator customers, has taken about 10 to court each year over the recent dry period, with prosecutions usually being successful. Whereas in times gone by, farmers took pride in inventing ways of grabbing extra water (jamming a frozen fish in the wheel was a favourite), now they know that stealing robs water from their neighbours, and it is generally frowned upon. G-MW takes steps to ensure offenders’ names are published in the local newspaper.
Approval processes

Practically all trade requires the approval of rural water authorities. Under the Water Act 1989, these authorities need to approve any trade within, into, or out of their own irrigation districts. The Minister can approve transfer of licences, but has delegated this function to rural water authorities (specifically, to the boards and certain senior officers of Goulburn-Murray Water, Sunraysia Rural Water, Southern Rural Water, Wimmera-Mallee Water; also of Coliban Water and Melbourne Water).

Besides this “retail” trade (between end-users of water), some temporary trade occurs from farmers to urban authorities (there is no explicit provision for this in the Water Act: it is treated like retail trade), and from urban authorities to farmers (the Water Act requires such trade to have the approval of the authority delivering the water). Any temporary trade of a bulk entitlement interstate needs the Minister’s approval, as does all permanent trade of bulk entitlements - but these trades are rare.

The requirement to obtain approval enables various rules and conditions to be applied to trade, in order to forestall any of the hazards that can arise from trade. The approval processes, and the key rules, for transferring water rights permanently are set largely by the Water Act itself or by the Water (Permanent Transfer of Water Rights) Regulations, and are relatively rigorous. Temporary transfers of water rights are subject to by-laws made by the authorities.

Transfers of licences, either permanent or temporary, take place under s.62 of the Water Act, which is not prescriptive about processes or rules, e.g. it simply says the impacts on other water users and the environment may be considered. In practice, however, most of the licence trade must, by determination of the relevant authority, follow similar processes and rules as for water rights. As well, the Minister has set some guidelines, applying north of the Divide, on how this licence-management function is to be exercised.

Permanent transfer process

For permanent transfer of water rights (and of licences, in most cases in practice), the seller’s application form must be signed by the owner on the title to the land where the water rights are currently (or the holder of the licence), and must be accompanied by:

- a copy of the land title (or of the licence);
- a statutory declaration by the seller, identifying each person who has a ‘prescribed’ interest in the land where the water rights are currently (or in the licence) (the regulations say the following have such an interest: mortgagee, caveator, chargee, share farmer, lessee, partner, life tenant, annuitant, unpaid vendor or purchaser of the holding);
- a copy of an advertisement of the intention to sell that has been placed in a newspaper generally circulating in the area at least four weeks prior to the application;
- the written consent of all the above people who have an interest in the land (or licence).

All this is so the authority can check that the seller does indeed own a tradeable right and that no-one with a legitimate interest in the entitlement objects to its sale. Consistent with this:

a) if the transfer is in the middle of an irrigation season then the authority will normally read the seller’s meter to determine how much of the current season’s allocation remains unused and is available for transfer; and

b) an authority may check whether the seller owes it any money relating to the entitlement, and, if the seller does, the authority as a ‘chargee’ can withhold approval until either the money is paid, or an arrangement is made to pay the money out of the sale proceeds.
6. Rights and their tradeability

One other matter can affect a seller’s application. An authority is entitled to refuse transfers of water rights out of certain authority-supplied areas, if water rights are being transferred out rapidly - which could be making operation and upkeep of the delivery infrastructure left behind a problem, and could be generally putting strain on the local community (see section after next).

The checks at the seller’s end are relatively straightforward compared with those at the buyer’s end. The buyer’s application form, which can be signed by the owner, occupier or lessee of the land to which the water is to be transferred, provides details of this land and of existing drainage arrangements. The authority considers three kinds of issue:

i) Source/supply issues:
- is there a physical connection to get the water to the new off-take point on the river?
- are there any river capacity or environmental problems in changing to the new off-take point?
- should any exchange rate be applied on account of change in reliability of the right?

ii) Delivery issues:
- is there enough delivery capacity - or will the trade cause congestion of channels or pipes?
- should any exchange rate be applied on account of different losses in channels etc?

iii) Site issues:
- will use of the right at its new location have adverse salinity or drainage impacts?
- for new development, are statutory planning and other approvals being obtained?

These issues are largely dealt with through the application of rules - which are discussed in the next chapter - but can sometimes be dealt with by specific conditions put on trade by the approving authority. If the issues are not addressed then trade can harm other water users or the environment. (Two other issues are: adjusting caps properly, and ensuring the playing field is even - but these mainly come up in relation to interstate trade, and are discussed later.)

The fees for permanent transfers of water rights are set in the regulations (though NRE is proposing a change to the Water Act so they can be set by authorities with the approval of the Minister, as the fees for transfers of licences are). The standard fee is $275, and where a transfer is between districts of different authorities, $75 goes to the seller’s authority, and $200 to the buyer’s authority (reflecting the amounts of administration at seller’s and buyer’s end).29

Where a trade is arranged through a broker or an exchange, then they will charge an additional fee for this service. For people arranging trades between themselves directly, without any such professional help, the authorities usually have kits, containing information about the process and rules, and forms to fill in.

**Temporary transfer process**

The process for temporary transfers echoes the one for permanent transfers, but is simpler. For the seller, ownership is confirmed on the basis of the authority’s register of rights: there doesn’t need to be a land title search, or public advertisement and consent from interested parties.

The seller’s meter may be read, or the authority may simply check the water ordered by the seller against the water allocated in the season. The authority can hold the seller responsible for ensuring water sold is really available, e.g. it might require any over-use of the seller’s allocation taking into account what has been sold, to be covered by buying water on the temporary market before the season ends.

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29 G-MW charges a non-refundable $130 fee for upfront checking of channel capacity and salinity/drainage issues – with the $275 transfer fee reduced by the same amount if the trade proceeds.
For the buyer, the approving authority checks the same three areas of:

i) physical links making supply feasible;
ii) availability of delivery capacity within districts; and
iii) salinity and drainage impacts of use at the new site;

but in less detail than for permanent trades. Changes to reliability of supply are not an issue for temporary transfers, since what is being traded is a defined volume of water in the current year. Any differences in losses are, under present arrangements, ignored.

The seller is responsible for all the fixed charges relating to the on-going right. The buyer must pay any variable charge for having the water delivered. The compulsory charge of around $25 a ML for water right in gravity districts currently includes delivery, so the buyer need pay no more, whereas for “sales” water there is no fixed charge at all, and the buyer must pay the full $25 a ML to get the water delivered.

The fees for temporary transfers of water rights are set in by-laws (made by authorities after clearance by the Minister; again, it is proposed that this process be simplified). Thus G-MW’s fee is $65. For temporary transfers, if two authorities are involved, both transfer fees must be paid. As with permanent transfers, trade via a broker or an exchange attracts a separate fee.

Preventing fraud

In the past there have been some inconsistencies in the records kept of transfers. This makes it hard to derive reliable transfer statistics, to check the accuracy of entitlement registers, to make correct adjustments to water supplies and financial obligations, and (most seriously) to be sure that there has been no dishonest manipulation.

By way of illustration, Goulburn-Murray Water’s 1997/98 annual report states that 1,095 ML of water traded permanently to Sunraysia that year, whereas Sunraysia Rural Water’s report states that the volume of this trade was 3,947 ML.

In this case the discrepancy appears to be largely due to something as innocuous as the authorities using different dates for transfers coming into effect (G-MW did not count trade approved during the year that came into effect on the following 1 July).

Lack of reconciliation between records is unsettling, particularly in the light of a court case heard during 2000. A licence administrator of one rural water authority was convicted and jailed for organising the sale, in several transactions between 1994 and 1998, of about 500 ML of water entitlement that did not really exist (taking into account scams involving another person, rights now worth over $1 million were fabricated).

Farmers’ water entitlements represent assets worth as much as $2 billion, and variations in ownership are frequent. The need to ensure integrity of entitlement registers and transfer administration has recently led to the adoption by approving authorities and the government of a collection of common standards and procedures, or code of practice, to be followed in the future. This is set out on the next two pages.
Standards for administering transferable water entitlements

Managing authorities shall ensure that transfers of water are processed and approved in accordance with the Water Act 1989 and the regulations, by-laws and guidelines under it.

Managing authorities shall ensure that entitlement registers reflect the ownership of the allocation or entitlement as at the effective date of the temporary or permanent water trade.

The effective date for temporary trades should be the date on which the buyer’s authority approves the temporary trade. The effective date should be included in the notice of approval.

The effective date for permanent trades should be as agreed by the buyer and seller. If this date is not achievable, the buyer’s authority should determine the effective date and notify the buyer and the seller, and the seller’s authority if a different authority is involved. The effective date should be included in the notice of approval.

The effective date is the date at which the legal ownership of the water entitlement changes. Entitlement registers are to be updated as at the effective date.

Authorities participating in inter-authority and interstate trades must use the same effective date.

When a trade has been approved with an effective date in the future, a note should be made in the entitlement register indicating that the transfer has been approved, its volume and its effective date. Information statements or certificates should note that the ownership of the entitlement will change from the effective date.

Managing authorities shall, at the end of each month, reconcile:

- the closing balance of the entitlement register for the previous month;
- trades that have been approved for the current month; and
- the current balance of the entitlement register.

The monthly reconciliation is to include inter-authority and interstate trades.

The monthly reconciliation shall be verified by an authorised officer. A register of monthly reconciliations shall be kept.

Managing authorities shall have systems which enable them to reconcile, at the end of each month during the irrigation season:

- the entitlement register;
- the declared seasonal allocation;
- maximum water use limits and other constraints and adjustments; and
- the total of the allocations made available to entitlement holders.

The monthly reconciliation shall be verified by an authorised officer. A register of monthly reconciliations shall be kept.

6. Rights and their tradeability
Managing authorities shall ensure the administrative separation of key water trading functions in order to protect the integrity of the trading system.

As a minimum, a different person should undertake:

1. **processing** - receipt, registration and checking of the seller’s and buyer’s applications;
2. **authorising** - determination of the applications, approval letters and update of entitlements register.

The "processing officer" shall confirm that all documentation has been received, that sellers and buyers have met all of their water trading obligations and that the trade is ready for authorisation and approval.

The "authorising officer" shall confirm the ownership of the water and check that all required documentation has been provided and has been processed.

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**Limits to water leaving areas**

The trading regulations include a rule that can be used to curb any rapid exodus of entitlement from an irrigation district (or a part of a district, or a group of districts). One reason for having the rule is to prevent a district’s infrastructure being suddenly stranded without enough customers to afford its upkeep.

More generally, the rule allows a ceiling to be put on the rate of structural change in an area, and any associated erosion of the community as a whole. For most areas this ceiling is high, its effect nominal. Yet the rule provides real comfort that areas won’t be allowed to collapse overnight, and has been important in achieving local concurrence for trade out of areas.

The regulations allow the seller’s authority to refuse a trade if it would mean that net trade out of a defined irrigation area in any year starting 1 July, exceeded 2% of the water rights in that area. The areas that have been defined are shown in table 5.

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**Table 5: Areas to which the 2% limit may be applied**

<table>
<thead>
<tr>
<th>Area</th>
<th>2% water rights at 30/6/01 (ML)</th>
<th>Highest net trade out in one year*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torrumbarry (without Woorinen from 1/7/00)</td>
<td>6,951</td>
<td>2.0 % (1998/9)</td>
</tr>
<tr>
<td>Murray Valley</td>
<td>5,182</td>
<td>0.2 % (1994/5)</td>
</tr>
<tr>
<td>Shepparton</td>
<td>3,628</td>
<td>0.3 % (1993/4)</td>
</tr>
<tr>
<td>Central Goulburn</td>
<td>7,820</td>
<td>0.4 % (2000/1)</td>
</tr>
<tr>
<td>Rochester</td>
<td>3,755</td>
<td>0.5 % (2000/1)</td>
</tr>
<tr>
<td>Pyramid Hill &amp; Boort</td>
<td>4,597</td>
<td>1.7 % (1998/9)</td>
</tr>
<tr>
<td>Campaspe</td>
<td>406</td>
<td>0.0 %</td>
</tr>
<tr>
<td>Nyah &amp; Tresco (from 1/7/02, now separate)</td>
<td>391 ( &amp; 225)</td>
<td>1.9 % (2000/1)</td>
</tr>
<tr>
<td>Merbein, Red Cliffs, Robinvale</td>
<td>2,318</td>
<td>0.1 % (1996/7)</td>
</tr>
<tr>
<td>First Mildura Irrigation Trust</td>
<td>1,463</td>
<td>Not possible till 2001.</td>
</tr>
</tbody>
</table>

* As % of water rights at beginning of that year. Woorinen has only been separate in 2000/1, with 0.0 % net trade out then.
This “2% rule” bites more sharply in small areas. In bigger areas (like Torrumbarry) there is greater scope for internal trade (e.g. away from Kerang and Swan Hill, to Cohuna). Such trade can hurt local communities, but in most cases (including Torrumbarry) it is within a single business unit: the rule is still effective in helping to protect the unit’s revenue base.

The 2% rule has been properly invoked only once, and then in one of the biggest areas. It was during the 1998/99 year, when net trade out of the Torrumbarry system reached an unprecedented high of 7,500 ML, or 2%, in mid February. Any applications after that were approved to come into effect from 1 July 1999.

This means that, at most, a transfer might have been held up by 4½ months. However, much permanent trade only really comes into effect on the following 1 July anyway - especially trade in February, two-thirds of the way through the season, when the current year’s allocation has mostly been used.

It is possible - though unlikely - that some trade was held up for a few weeks, but none was actually stopped. In the following season, net trade out of Torrumbarry fell back to 5,000 ML, well below the trigger point.

Some concern has been expressed that the 2% rule may act as a barrier to efficient trade, and therefore could be contrary to the water reform framework adopted by the Council of Australian Governments in 1994. The National Competition Council has suggested that exit fees and delivery rights may be preferable tools for dealing with stranded assets.

The government is keeping the rule under review, to ensure it does not suppress trade. Despite Victoria having the 2% rule, trade out of districts is currently far freer than in most States, as we shall see in chapter 9.

The alternative ways of dealing with stranded assets need to be and are being looked at further - see chapter 12. If not approached carefully, it is clear they can be real stoppers to trade. These alternatives are based on customers retaining financial responsibility for delivery infrastructure when they no longer wish to use it - which may substantially lessen the incentive to sell off water.

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30 The 2% rule was inadvertently invoked in 2000/01, when trade out of the small district of Nyah reached 2% in late February, and brokers were told further trade would have to wait till July. Under the regulations the rule applies to Nyah and another small district (Tresco) together, and trade out of this larger area did not reach 2%. No further applications out of Nyah were received, however, so it is likely this incident had zero effect.

31 Western Murray Irrigation, based at Dareton in NSW, provides a nearby illustration of the use of exit fees. Trade between its three areas – Buronga, Coomealla and Curlwaa – is subject to an “amortization levy”, of up to $207 in 2000/01. There is no corresponding entry credit (and no trade to land outside the three areas at all).
7. Rules on rights going to a new location

The rules and guidelines discussed in this chapter are those governing the movement of water entitlements to a new location, and they cover source or supply issues (physical connections, and reliability), delivery issues and site issues. In broad terms, the rules are designed to minimise adverse effects of trade on other water users and the environment.

The rules are largely set by the government and rural water authorities in co-operation:

a) Those dealing with source or supply issues are mostly in the regulations, occasionally in ministerial guidelines or determinations (in all cases prepared in close consultation with authorities); special limits (e.g. for trade out of Boort) may be set by authorities (since the regulations say an authority must not approve a transfer unless it is satisfied “that existing levels of service can be maintained...”).

b) Those dealing with local channel capacity matters are set by the authority concerned (under the “levels of service” provision).

c) For site issues, some low megalitre per hectare limits are set in the regulations, but these can be varied by authorities after consultation with local committees, taking into account limits set in salinity management plans (which are prepared by the community, approved by government); new development is subject to other controls, e.g. planning regulations.

Physical connections

The broad principles governing trade between different locations are reasonably simple, though their application can be quite complex:

1. Entitlement can move along a regulated river or trunk channel supplied from the same storage(s), subject only to channel capacity constraints.
   • Rights can move freely upstream from these locations to the Murray Valley area near Cobram, but not the other way because of channel capacity limits at Barmah Choke.

2. Entitlement can move from one supply system downstream to another supply system - if the two systems are connected.
   • Rights can trade from the Goulburn system (supplied primarily out of Eildon) to the Murray system downstream of the Goulburn/Murray junction, just by letting extra water run down the Goulburn River into the River Murray when it is needed.
   • Likewise, the Campaspe system (supplied out of Lake Eppalock) is considered upstream of the Goulburn system - though water actually has to be pumped a short way up from the Campaspe River into the Waranga Western Main Channel.

3. Trade may be allowed downstream past a channel capacity constraint, or upstream into a higher-level system, provided there has been trade the other way first.
   • Trade down the Goulburn system’s Waranga Western Main Channel was initially barred, but it didn’t seem a problem in the light of strong trade up, so from 1994 it has been allowed unless usage of the Channel ever gets back to 1991 levels.
   • Similarly, Goulburn-Murray Water now keeps accounts of trade up past Barmah Choke, and down out of the Goulburn to the Murray system, and allows the same volume of trade back the other way (“back trade”) - though these trades were originally barred.
4. Trade is possible between the upper reaches of two rivers that join up, by substitution, i.e. by the seller’s river taking over a downstream supply obligation from the buyer’s river.

- Thus trade can occur from the Goulburn to the Murray upstream of the Goulburn/Murray junction, with the Goulburn system relieving the Murray system of some of its supply obligations down in, say, Sunraysia or SA.

- Since the Thomson can supply the southern part of the Macalister district, it can take over some of the Macalister’s obligations there, allowing trade up into the northern part (except temporary trade in drought seasons, at the end, when the Macalister stops supplying the southern part). Trade the other way into the upper Thomson is only possible temporarily, in years when the Thomson is meeting a fair portion of the southern part of the Macalister district’s demand - it meets just 20% on average, performing the function of a drought reserve.

5. Trade may be allowed from a location supplied by two sources, upstream to a location that can only be supplied by one of the two sources, but usually special limits or an exchange rate will apply.

- Thus private diverters and towns on the lower Goulburn River are often supplied from regulated (Eildon) resources, but in wet seasons from unregulated tributary inflow downstream of Goulburn Weir. So temporary trade from the lower Goulburn up into the Goulburn system is not allowed in wet seasons (except as back trade), but up to 5,000 ML is allowed in dry seasons (when water has to be released for lower Goulburn users), with an assessment of the season made each December.

Over 100 years old, this weir raises the level of the Goulburn River by 18 metres, enabling water to gravitate to 8,000 farms, mostly along the East Goulburn and Waranga Western Main Channels. Only “back trade” is possible up over the weir, or temporary trade in certain years.
Similarly, the Boort vicinity obtains on average 80,000 ML supplement from Loddon storages and 50,000 ML down the Waranga Western Channel from the main Goulburn system. If 50,000 ML was traded out of Boort to say areas further up the Channel, the remaining demand would be supplied entirely from the Loddon; and if any more traded out, this would erode Goulburn reliability (and leave Loddon resources that couldn’t be used by anyone).

Since Boort gets 50,000 ML on average, reliability starts to be affected some time earlier. Moreover, another problem emerges earlier: water quality. Loddon water has a salinity of 1,000 EC, and relies on dilution by the Goulburn water, which is only 100 EC. For these reasons, no more than 8,000 ML is permitted to trade away, into the rest of the Goulburn system and beyond.32

Similarly, some trade from Boort up into the Loddon is possible, but since there is sometimes no Loddon supplement, trade has to be temporary, in certain years. The Campaspe too provides a supplement to the Goulburn system, but it is smaller, and is needed in peak demand weeks to deal with capacity constraints in the Waranga Western Channel - so trade cannot occur up into the Campaspe by cutting that supplement.

The rules currently applying to regulated rivers and supply systems are set out in table 6, with the zones (within which trade is always possible) depicted in map 5, inside the back cover. (What happens on unregulated streams depends more on the local circumstances, as explained in the next chapter.)

### Table 6: Physical connections allowing trade in regulated systems

<table>
<thead>
<tr>
<th>Zone</th>
<th>Can sell to:</th>
<th>Can buy from:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Northern Victoria</strong></td>
<td>(G-MW, Sunraysia Rural Water, FMIT, Coliban Water)</td>
<td></td>
</tr>
<tr>
<td>1. Greater Goulburn</td>
<td>Always to: zones 3, 6, 7, 8. Back trade to: zones 4A, 5A.</td>
<td>Always from: zones 4A, 5A. Back trade from: zone 5 (dry-season trade up to 5,000 ML), 6, 7, 8.</td>
</tr>
<tr>
<td>1A: Diverters from Lake Eildon to Goulburn Weir; Goulburn irrigation areas except Boort; lower Broken Creek irrigators.</td>
<td>Note: net trade out of sub-zone 1B &amp; zone 5 is limited to 8,000 ML.</td>
<td></td>
</tr>
<tr>
<td>1B: Boort.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Broken</td>
<td>Trade can take place within sub-zone 2A and within 2B, and from 2A to the downstream 2B.</td>
<td>Trade in is not allowed because not enough resource to support the extra commitment.</td>
</tr>
<tr>
<td>2A: Diverters from Lake Nilacootie to top of Casey’s Weir pool.</td>
<td>Lake Mokoan water quality issue means there is not enough resource to meet within-Broken demand and allow trade out.</td>
<td></td>
</tr>
<tr>
<td>2B: Diverters from Casey’s Weir pool to Goulburn River, &amp; to Waggarandall Weir on Broken Creek, and at Lake Mokoan.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Lower Goulburn</td>
<td>Always to: zones 6, 7, 8. Back trade, &amp; dry-season trade up to 5,000 ML to: zone 1 (&amp; indirectly to 4A, 5A).</td>
<td>Always from: zones 1, 4A, 5A. Back trade from: zones 6, 7, 8.</td>
</tr>
<tr>
<td>Goulburn River diverters below Goulburn Weir.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

32 If water trades from the Loddon River to the Goulburn above Boort, by substitution (i.e. the Loddon supplies more, and the Goulburn less, of Boort’s needs), the same problems can arise (amplified, since Loddon licences are met solely from the Loddon) – so the 8,000 ML limit applies to trade away from Boort and Loddon, combined.
### Zone Can sell to: Can buy from:

4. **Campaspe**
   - **4A:** Diverters from Lake Eppalock to Waranga Western Channel; Campaspe district.
   - **4B:** Licenses on Coliban channel system.
   - **From 4A, always to:**
     - zones 1, 3, 6, 7, 8.
   - **To 4A, back trade from:**
     - zone 1 (and so indirectly from 3, 6, 7 & 8 further downstream).
   - Trade physically possible to zone 4A and from there to other zones, but is not being allowed yet, pending steps to address the financial impact of rights leaving the system. Only trade within 4B allowed.

5. **Loddon**
   - **5A:** Diverters from Loddon River & Tullaroop Creek, from Cairn Curran & Tullaroop Reservoirs down to Loddon Weir & on Serpentine Creek system above Bear's Lagoon.
   - **5B:** Diverters from Newlyn Reservoir & Hepburn Lagoon, down Bullarook Creek to Lawrence Weir (offtake for Clunes).
   - **From 5A, always to:**
     - zones 1, 5, 6, 7, 8.
   - **To 5A, back trade from:**
     - zone 1 (and so indirectly from 3, 6, 7 & 8 further downstream).
   - **Note:** net trade out of zone 1B & zone 5, combined, is limited to 8,000 ML.
   - Temporary, in years Loddon supplement to Boort large, from: zone 1B.
   - Trade possible within 5B only; no managed links to zone 5A.

6. **Hume to Barmah**
   - Diverters on River Murray from Lake Hume to Barmah Choke; & on Mitta Mitta River below Lake Dartmouth; Murray Valley area.
   - **Back trade to:**
     - zones 1, 5, 6, 7, 8 (and indirectly to 4A & 5A).
   - **Always from:**
     - zones 1, 3, 4A, 5A, 7, 8.

7. **Barmah to Nyah**
   - River Murray diverters from Barmah Choke to upstream of Nyah pumps; Torrumbarry area, & Tresco district.
   - **Always to:**
     - zone 6, 8.
   - **Back trade to:**
     - zones 1, 3, 5, 7 (and indirectly to 4A & 5A).
   - **Always from:**
     - zones 1, 3, 4A, 5A, 8.
   - **Back trade from:**
     - zone 6.

8. **Nyah to SA border**
   - River Murray diverters from Nyah to SA border: Nyah, Robinvale, Red Cliffs, Merbein & FMIT districts.
   - In terms of physical connections, this zone is identical to zone 7; it is being separately defined because of salinity controls, p.57.

9. **Ovens and King**
   - **9A:** Diverters on Buffalo River and Ovens downstream from Lake Buffalo.
   - **9B:** Diverters on King River from Lake William Hovell downstream.
   - **No permanent trade allowed between 9A and 9B.**
   - **All trade out of zone is banned to preserve water contribution to Murray & integrated pricing: and to allow recognition of unused licences while protecting Murray “sales.”**
   - **No trade into, or between the two rivers, is allowed pending fixing bulk entitlements, since not clear could support the extra commitment.**

### Wimmera-Mallee (Wimmera-Mallee Water)

**(in Wimmera-Mallee Water)**

- Trade possible within and between all the various areas in the zone.
### Zone | Can sell to | Can buy from
--- | --- | ---
#### South of Divide (Southern Rural Water, Melbourne Water)

<table>
<thead>
<tr>
<th>Zone</th>
<th>Can sell to</th>
<th>Can buy from</th>
</tr>
</thead>
<tbody>
<tr>
<td>31. Werribee</td>
<td>Trade can take place within sub-zones 31A, 31B and 31C; and from 31A or 31C to the downstream 31B.</td>
<td>Net trade can go to 31A, from 31B or (by substitution) from 31C, up to 2,000 ML (the volume provided to Werribee from Pykes Creek). Temporary, in years Merrimu drought reserve not jeopardised, &amp;/or subject to an exchange rate or limit (e.g. since Southern Rural Water has 20% storage, but only 10% inflows), to 31C, from 31A or 31B.</td>
</tr>
<tr>
<td>31A: Bacchus Marsh district; diverters from Pykes Creek Reservoir down to junction of Werribee River &amp; Coimadai Creek. 31B: Werribee district, diverters on Werribee River below Coimadai Creek junction to Werribee Weir. 31C: Lake Merrimu.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32. Maribyrnong</td>
<td>Trade can take place within sub-zone 32A (though there may need to be a limit on upstream trade) and within sub-zone 32B; and from 32A to the downstream 32B. Trade from 32B up to 32A would be subject to a limit and/or exchange rate.</td>
<td></td>
</tr>
<tr>
<td>32A: Diverters on Jacksons Creek from Rosslynnne Dam to Maribyrnong River. 32B: Diverters from Maribyrnong River.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>41. Macalister</td>
<td>Trade from 41A to 41B could hit Main Southern Channel capacity. No late-season temp. trade from 41B to 41A if Lake Glenmaggie low.</td>
<td>Always to: 42C (subject to MSC if from 41A). Temporary, in years Thomson reserve not jeopardised, to: zone 42B. Always from: zone 42 (but to 41A, may be a limit, &amp; no late-season temporary trade when Lake Glenmaggie low).</td>
</tr>
<tr>
<td>41A: Macalister irrigation areas except for Nambrok/Denison; diverters from Lake Glenmaggie &amp; down Macalister River to junction with Thomson River. 41B: Nambrok/Denison.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>42. Thomson</td>
<td>Within zone 42, trade is always possible to a downstream sub-zone, i.e. from 42A to 42B and 42C; and from 42B to 42C. Temporary trade can take place from 42C to 42B, unless Thomson resources are poor and Lake Glenmaggie is being used for 42C. Any trade up into 42A would have a severe exchange rate: releases from Thomson Dam are only a fraction of supplies lower down.</td>
<td>Always to: zone 41 (but to 41A, may be a limit, &amp; no late-season temporary trade when Lake Glenmaggie low). To 42C, always from: zone 41 (subject to MSC if from 41A). To 42B, temporary, in years Thomson reserve not jeopardised, from: zone 41.</td>
</tr>
<tr>
<td>42A: Thomson Reservoir, &amp; any diverters down Thomson River to top of Cowwarr Weir. 42B: Diverters from Cowwarr Weir down Thomson River &amp; Rainbow Creek to siphon, &amp; on Cowwarr channel. 42C: Thomson River diverters from siphon to Latrobe River.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>43. Lower Latrobe</td>
<td>Trade can always take place within sub-zones 45A and 43B. Trade can take place from 45A to the downstream 43B (equivalent water must be released from Blue Rock Dam: 43B gets a lot of unregulated flows, and if buyers used these, flows to Gippsland Lakes would be cut). Trade can take place from 43B up to 45A with an appropriate exchange rate (will vary with nature of buyer’s entitlement).</td>
<td></td>
</tr>
<tr>
<td>43A: Diverters from Blue Rock Dam &amp; down Tanjil River to junction with Latrobe River. 43B: Diverters on Latrobe River downstream from junction with Tanjil River (incl. L Narracan).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: 1. **Trade is allowed within every zone** (except that there is a limit to trade out of sub-zone 1B, and no trade is allowed from 2B to 2A, and no trade is presently allowed into or out of 4B or 5B, and no permanent trade is allowed between 9A and 9B, and there are certain constraints on trade between sub-zones in zones 8, 10, 31, 32, 41, 42 and 43). 2. Some trade is allowed between these regulated zones and unregulated streams – see next chapter. 3. The ban on trade to the regulated Murray system from its unregulated upper tributaries was in 1998/99 extended to trade out of the Kiewa main stem, which has been treated as regulated for trading purposes (to allow awakening of unused licences while protecting Murray "sales"), and also out of the Ovens & King (for the same reason, but mostly to keep this system’s contribution to the Murray, and thus uniform Murray-Ovens pricing). See NRE (1999), pp 12-13. 4. Buyers or sellers in other States will be treated as being in zone 6 (if in NSW and above Barmah Choke) or zones 7 or 8 (if elsewhere in NSW or in SA) – but additional rules apply, covered in chapter 9. 5. Other matters, like the 2% rule or local channel capacity, may stop trade that is shown here as possible. Moreover, special limits (e.g. the 8,000 ML limit on trade out of zones 1B and 5) may need to be varied, e.g. as a result of past permanent trade (this limit was 5,000 ML until July 2001, but was lifted after 3,000 ML traded into Boort).
Supply reliability

Different water supply systems have different reliabilities. To some extent this is simply the result of the hydrological differences between catchments, but to some extent it is a consequence of the volume of entitlement originally allocated and/or the reserve and other policies used in allocating resources each year.

For example, the Murray system generally has higher allocations of “sales” than the Goulburn system, though the Murray has the potential to fail more severely in very dry sequences. The reliability of water right/licences in the Campaspe system is a little higher than in the two big systems, and on the Broken it is quite a bit lower. (On the NSW side of the Murray, most entitlement has a distinctly lower reliability, as we shall discuss later.)

Differences in reliability must be taken into account in the trading framework, or else trade will have third-party impacts.

Thus, if 100 ML of right trades to a higher-reliability system, where water is allocated to meet it more fully than before, there will be negative repercussions for other water users: either in the seller’s system (since, to cater for the higher reliability, water will need to be transferred to the new system even in seasons when the seller’s system fails), or, more likely, in the buyer’s system (since not enough water is transferred to meet the new obligation).

There are two ways to deal with this problem:

i) The first is to “tag” each entitlement, linking it back to its source, and have it retain its original reliability. With this approach, a company setting up a new horticultural enterprise at, say, Swan Hill and buying up entitlement could end up with a suite of entitlements, from the Murray, Campaspe, etc, each with its own reliability and seasonal allocation.

This tagging approach would be pure in water accounting terms, but up until now it has generally been considered quite messy to administer.

ii) The other way, which is being followed, is to convert the entitlement so it acquires the characteristics of entitlement in its new location. Then the Swan Hill horticulturist will hold only Murray entitlement, with Murray reliability and seasonal allocation.

Under this approach, 100 ML trading into a more reliable system is converted into the more reliable kind of entitlement. Its volume would be reduced to say 85 ML, but on average this would need the same resources and storage capacity as the original 100 ML entitlement had required - this would be the objective of the “exchange rate”.

In a particular season there could still be third-party effects (e.g. the seller’s system may have crashed badly, and, depending on the arrangement, not be able to transfer much water at all or still have to transfer the same amount of water; occasionally it may be the buyer’s system that is shorter of resources). But the up and downs should cancel out over time.

Initially, the exchange rate for trade in the interconnected systems of northern Victoria has been deemed to be 1:1. The simplification is justified on the basis that water rights, licences and urban entitlements there are all of approximately the same reliability.

A slight weakness of the conversion approach is that these discrepancies in individual years are open to exploitation: e.g., if the Goulburn system is going through a dry spell, a Goulburn irrigator can trade permanently to the Murray, and then trade annually back to the Goulburn. Because of problems like this, interest has grown recently in seeing if the purer, tagging approach could be made to work.

With tagging, there is no need to calculate exchange rates for reliability – or to keep reviewing them (since exchange rates wouldn’t be changed retrospectively, they would need to be overcorrected if ever it was found that trade under the existing ones was distorting system reliabilities.) One drawback, though, is that trade back into an upstream system would in theory be limited to just those rights previously acquired by downstream users.

Urban entitlements in the Goulburn system have been accorded an especially high, 99% reliability – it has been calculated that 1 ML of water right without “sales” there would translate to 0.942 ML of urban entitlement – but there has been no permanent transfers between these two kinds of entitlement as yet.
Already we know that there is a quite serious deficiency with the 1:1 exchange rate. Entitlement obtains the “sales” allocations applied at its destination, and these vary substantially.

Thus water rights trading permanently from Torrumbarry to Sunraysia, end up with no “sales” allocations (there is a clear incentive, in this case, to use temporary transfers instead). Similarly, water rights trading out of any of the gravity irrigation areas to become licences on the nearby Murray or Goulburn Rivers lose the first 30% of “sales”.

The original water rights should really be converted into a slightly higher volume of the entitlement they end up as - and, conversely, if trade is the other way, an exchange rate of one to a little less than one should be applied.

Trade should not have the effect of either creating entitlement or losing entitlement, and it is likely that the rules will be refined in the future to treat this issue more correctly.35

More acute exchange rates - possibly in the order of 5:1 - would apply if “sales” were to be swapped for water right. This is not allowed at present, but has the potential, because more water would have to be held in reserve and so would intermittently spill, to build up spring environmental flows. Trading in the opposite direction (from reliable water right to higher-volume “sales”) could not generally be permitted, because of the Cap.

**Delivery capacity and losses**

The capacity of pipes and channels to deliver water to farms within an irrigation district can be a limiting factor on trade. For example, channels within the Murray Valley area around Cobram are heavily utilised, and this has been one reason why there has been relatively little trade within or into this area.

The buyer’s authority always checks that there is capacity to deliver water to the buyer without affecting the service to other irrigators in the area too much. The authority usually applies a standard, e.g. that there must be enough capacity to deliver all the farmers' water rights within 100 days (i.e. 10% within 10 days). If there is spare capacity, then new rights can trade in.

Temporary transfers are not often knocked back on the basis of inadequate channel capacity. If there has to be rationing of delivery capacity, water bought temporarily supposedly has a lower priority than permanent entitlement - though in practice it is quite difficult to treat it differently and this is not normally attempted.

Any rationing is usually done by setting a rule such as, irrigators can take water equal to 10% of their water rights only every 12 days, or only every 15 days. Until now, water rights bought temporarily have counted as entitling an irrigator to delivery capacity; so people like tomato growers, who need water quickly if the weather turns boiling hot, have bought water right temporarily just to be assured that they can irrigate when they need to.

Later, these growers have been able to sell the water rights off again. Water rights entitle people to both resources and delivery, and in this case people were over-investing in water to gain access to delivery capacity. Sometimes the water rights have been on-sold to another grower who also uses them to gain delivery capacity - which seems questionable.

The losses incurred in delivering water to farms also need to be taken into account in managing trade. These losses - through evaporation or seepage from channels, channel outfalls because of cancelled orders following rain, under-measurement of farm meters, etc - may be in the order of 30% of water taken out of rivers.

Significant source or headworks “losses” also occur, e.g. through evaporation from storages or overflows along rivers (in the latter case, often with environmental benefits); however, these do not change appreciably when a relatively small amount of entitlement moves between, say, Hume Dam and the SA border, and so have always been ignored.

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35 In the meantime, the bias is towards keeping water rights in gravity districts, and when water rights trade out of these districts, the farmers left behind get to share in the benefit of the relinquished “sales”. This is probably not a bad thing, given the sellers’ tendency not to have used much “sales”, the cuts happening to the “sales” pool, and the otherwise open door for rights leaving districts.
In the same way, delivery losses are fixed - to large extent. So if an irrigator in a gravity district, where losses are high, sells to a diverter, where losses between river and farm are zero, this doesn’t mean a lot of district losses are freed up and can go to the new entitlement owner. Evaporation from channels, for example, depends on the surface area of water in channels, and this will hardly change.

In setting bulk entitlements for the Murray system, it was decided that losses for the pumped districts are fixed, i.e. they don’t vary with usage (though some latitude was given for year-to-year variation around an average). Despite this, when licences have traded into FMIT’s district, the authority has taken 15% off, putting this aside to cover the losses in meeting the new rights.

Logically, then, if any rights trade out of FMIT’s district, they should be augmented because of the water no longer needed to meet losses.

For the gravity areas, the bulk entitlements assume that about 70% of the losses incurred at typical levels of usage are fixed, and the rest are variable. When 1,000 ML of water rights shifts out of Torrumbarry to Sunraysia, variable losses are reduced by 80 ML (plus almost as much again associated with the freed up “sales”, mentioned above).

Yet when water rights trade out of these areas, there is presently no augmentation on account of freed up losses. By default, the “sales” pool is again benefiting. This is another situation where, arguably, a (quite small, i.e. close to 1:1) exchange rate should really be applied.

This time, though, the seller’s ownership of freed up water might be queried: the bulk entitlements give G-MW and the government a (conditional) right to save losses. What is clear is that the trading rules in relation to losses (like those in relation “sales”) are not quite correct at the moment, and could do with being refined.
Salinity and drainage impacts at site

The transfer should not worsen any salinity problems in your area. Of particular concern is the application of excessive irrigation water on light soils. This can cause salinisation of lower-lying areas, particularly if the groundwater is saline...

(from G-MW pamphlet on permanent transfers)

Water authority staff check that water use on the buyer’s property will not be such as to cause adverse off-site impacts. For its irrigation areas, Goulburn-Murray Water in consultation with elected irrigator committees and catchment authorities has revised the default water use limits set in the regulations, to the following:

<table>
<thead>
<tr>
<th>Drainage class</th>
<th>Maximum water use, on suitable land</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off-farm drainage and drainage re-use</td>
<td>10 ML/ha (11 in Swan Hill)</td>
</tr>
<tr>
<td>Either: off-farm drainage, or: drainage re-use</td>
<td>7.2 ML/ha</td>
</tr>
<tr>
<td>No off-farm drainage or drainage re-use</td>
<td>5 ML/ha</td>
</tr>
</tbody>
</table>

These use limits are applied fairly automatically for temporary transfers, but individual assessments are undertaken for permanent transfers.

Some farmers wish to hold enough water rights to use up to their use limit even in a dry year, when there is little or no “sales” allocated. They are permitted to do this: their water rights (rather than their water rights with maximum “sales”) must not exceed the limit. However, if they do opt for this strong reliability, in years with high “sales” allocations their use limit will stop them using all the water allocated to them (they can try to sell it on the temporary market).

Salinity impact zones and levees in Sunraysia

In Sunraysia, the River Murray starts to be incised below the level of the surrounding land, which is therefore not so prone to salinisation. Where necessary, the land can be protected by below-the-ground drains, affordable because of high crop values.

But even with these drains, excess irrigation water can filter into the very salty groundwater, pushing it towards the River. The challenge has been to deal with demand for major new irrigation enterprises, while ensuring water quality in the River is not worsened.

Victoria is strictly accountable for any adverse salinity impacts on the River Murray that are caused by irrigation development. It must offset any such impacts with credits it has earned (e.g. through contributing towards salt interception schemes).

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36 Increased salinity in the River Murray became a concern in the 1970s and 80s. Part of the problem was seen to be leaky irrigation developments producing mounds in the highly saline groundwater. In 1988 the three southern States agreed to a salinity and drainage strategy, now set out in Schedule C of the Murray-Darling Basin Agreement, to:

a) take joint steps (e.g. bores/pumps to intercept groundwater and remove it to evaporation basins) that aimed to reduce salinity, and also to give States some credits to cover new irrigation drainage;

b) make each State accountable for its future actions causing River salinity: these must be offset by credits the State has earned (through interception works, etc).

Measuring electroconductivity provides a quick way to assess salt concentrations: 1 EC unit indicates c. 0.6 milligrams total dissolved solids per litre. Salinity impacts are quoted in the average EC change in Murray water at Morgan in SA, but these are subsequently converted into “salinity cost effects” that take account of salinity costs all along the River: it is these that are used in entering debits and credits on MDBC’s register.
In 1993 the government accepted key proposals of the Nyah-to-the-SA-border salinity management plan - which had been prepared by a community working group. A combination of regulatory and market measures was adopted to control the salinity impacts of water trading into Sunraysia.

Two zones were delineated:

a) the “high impact zone” (HIZ), where groundwater drains to the River, and where the long-term impact on the River was calculated to be some 0.6 EC for each 1,000 ML brought in;

b) the “low impact zone” (LIZ), which is largely underlain by a big clay layer that keeps most drainage out of the River - though an impact averaging 0.1 EC per 1,000 ML was assumed.

Trade into the HIZ is banned, and trade within HIZ is confined to entitlement which has been used previously. Trade into the LIZ has been allowed, but developers are required to pay a levy of $130 per ML - to cover the capital cost of salt interception schemes or other projects that earn Victoria credits, to offset the impact that still occurs there.37

These arrangements have enabled a great deal of trade and development, with minimal environmental damage. Water has actually transferred into Sunraysia at a much higher rate than the 1,000 ML a year that was predicted: about 8,000 ML annually over the last three years.

The rapid intake has challenged the simplifying assumptions underlying the zoning system. In reality, the salinity impact in the LIZ can vary (around the assumed 0.1 EC average) from 0.0 to 0.2 EC per 1,000 ML - and, unfortunately, most of the trade has been to locations that have impacts in the upper part of this range.

Owing to this, and to the rapid influx of entitlement, and also to total trade out of the HIZ zone reaching only a fraction of the 7,200 ML that was anticipated, Victoria’s available salt disposal credits are almost used up. Earning new credits is becoming more problematic, drawn out, and expensive. So salinity management arrangements in Sunraysia have recently been reviewed, and are to be refined.

The existing LIZ zone has been divided up into seven sub-zones based on salinity impact; while these are to be used for accounting purposes, for administering trade they have then been grouped into four divisions - as shown in map 4. In general, the further from the River and the further upstream that a zone or division is, the lower is the impact on salinity.38

It has now been made definite that most of the land in the four communally-supplied irrigation districts lies within the HIZ. The ban on trade into the HIZ is set to continue.

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37 Minor exceptions to these rules: (1) some permanent trade into the HIZ, and into the LIZ without any levy, was briefly allowed in order to restore usage and reliability affected by the Murray bulk entitlements; and (2) temporary trade is allowed into the HIZ in sub-100% water right years, provided average annual usage stays the same.

An on-going annual levy of $3.30 a ML is also imposed, to cover the operation and maintenance of the schemes. Most developers elect to pay the $130 a ML levy in ten annual installments of $16.40 a ML (which together have the same present value); temporary trade attracts a levy of 10% of this, i.e. $1.64 a ML, but this is under review.

38 Note that, while the zoning system is still based on average impacts, the finer divisions mean there is far less scope for greater impacts. Moreover, where there is uncertainty, the system leans towards overestimating impacts. It assumes River salinity increases the minute a trade is made. It assumes no use of tile drainage, since this has nowadays been made largely redundant by precise watering systems. It also assumes leaching of water past the root-zone will be 10% of the total water applied; state-of-the-art drip irrigation could easily halve this, but it seems wise to allow for differences in management skill.

(SA has a slightly different approach: it aspires to 85% efficiency for new irrigation developments, with the 15% loss being made up of leaching and evaporation. Evaporation is often 5% or more, so the implicit leaching fraction in SA is broadly consistent with what Victoria assumes.)
Map 4: Salinity impact zones/divisions in Sunraysia
In the LIZ, development will be steered to those divisions with the lowest impacts on River salinity. Thus, divisions with slightly greater impacts are likely to be allotted a limited portion of the available salt disposal credits, effectively capping net trade (including temporary trade) into those divisions - see table 7.

Altogether 3 ECs of credits should be available in Sunraysia in the next five years. Rather than have these credits eaten up by a quite small amount of development, it is proposed to reserve most of them for the very low impact divisions (L2 and L1), where they will go further.

In these very low impact divisions, the levy per ML will be correspondingly very low, which will also slant development that way. Thus, if the levy stays at $130 a ML in the 0.1 EC per 1,000 ML division, it could be only $26 a ML in the division with a fifth that impact.

These levy levels may not initially make a big difference to developers, who are faced with far higher infrastructure and operating costs in the very low impact divisions because of their greater distances from the River. But the levies are to be reviewed regularly, and if the cost of earning credits rises steeply in coming years, so will the levies.40

The aim is for Sunraysia over time to become self-reliant in containing and offsetting its salinity impact. If new credits being generated are inadequate, then caps on trading may have to be extended even further.

The caps are on net trade, so if water traded out of the slightly greater impact LIZ divisions, then this would allow more trade in. Ideally, perhaps, the person selling would receive a payment on account of the salinity credit freed up (e.g. $130 or $260 for each ML sold).

Under the Nyah-to-the-border plan, $50 a ML has been provided for each ML sold out of the HIZ - too little to provide effective inducement. One obstacle in the way of more adequate payments is that, in theory, credits are only given out by the Murray-Darling Basin Commission (MDBC) when the lowering in River salinity eventuates; because groundwater moves slowly, this may be decades after irrigation stops.

Table 7: **Low Impact Zone divisions: salinity impacts, levies, and trade per EC credit**

<table>
<thead>
<tr>
<th>LIZ division</th>
<th>River impact per 1,000 ML (EC)</th>
<th>Trade levy per ML</th>
<th>Total trade into division to use 1 EC credit (ML)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>0.02 to 0.0</td>
<td>$26</td>
<td>50,000 or more</td>
</tr>
<tr>
<td>L2</td>
<td>0.05</td>
<td>$65</td>
<td>20,000</td>
</tr>
<tr>
<td>L3</td>
<td>0.1 to 0.07</td>
<td>$130</td>
<td>10,000 to 14,000</td>
</tr>
<tr>
<td>L4</td>
<td>0.2 to 0.15</td>
<td>$260</td>
<td>5,000 to 7,000</td>
</tr>
</tbody>
</table>

Note: L1, L3 and L4 have two impact figures, because each of these divisions combines two impact sub-zones.

In the LIZ, development will be steered to those divisions with the lowest impacts on River salinity. Thus, divisions with slightly greater impacts are likely to be allotted a limited portion of the available salt disposal credits, effectively capping net trade (including temporary trade) into those divisions - see table 7.

Altogether 3 ECs of credits should be available in Sunraysia in the next five years. Rather than have these credits eaten up by a quite small amount of development, it is proposed to reserve most of them for the very low impact divisions (L2 and L1), where they will go further.

In these very low impact divisions, the levy per ML will be correspondingly very low, which will also slant development that way. Thus, if the levy stays at $130 a ML in the 0.1 EC per 1,000 ML division, it could be only $26 a ML in the division with a fifth that impact.

These levy levels may not initially make a big difference to developers, who are faced with far higher infrastructure and operating costs in the very low impact divisions because of their greater distances from the River. But the levies are to be reviewed regularly, and if the cost of earning credits rises steeply in coming years, so will the levies.40

The aim is for Sunraysia over time to become self-reliant in containing and offsetting its salinity impact. If new credits being generated are inadequate, then caps on trading may have to be extended even further.

The caps are on net trade, so if water traded out of the slightly greater impact LIZ divisions, then this would allow more trade in. Ideally, perhaps, the person selling would receive a payment on account of the salinity credit freed up (e.g. $130 or $260 for each ML sold).

Under the Nyah-to-the-border plan, $50 a ML has been provided for each ML sold out of the HIZ - too little to provide effective inducement. One obstacle in the way of more adequate payments is that, in theory, credits are only given out by the Murray-Darling Basin Commission (MDBC) when the lowering in River salinity eventuates; because groundwater moves slowly, this may be decades after irrigation stops.

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Note: L1, L3 and L4 have two impact figures, because each of these divisions combines two impact sub-zones.

57 This estimate of 3 ECs takes into account both the higher-than-assumed impact of past development (which has cut available credits), and some credits to be claimed for improved irrigation practices.

The dilution effects of intrastate trade are not accounted for in Sunraysia, but the site effects only in Sunraysia. It is possible a little credit will come from the dilution effect of trade from the gravity areas down to Sunraysia – and also from the associated fall-off in irrigation in the gravity areas, though Sunraysia is unlikely to share in this site effect. (Initial modelling shows a small rise in Morgan salinity from this trade, since there is less mixing of fresh Murray water with Kerang groundwater and putting it on farms (the rise is worse if diversions into the Torrumbarry system are maintained and returns increased, to keep the Kerang Lakes from getting saltier). In the longer term, though, less irrigation will mean some decline in groundwater inflows to channels and drains, and so a fall in salinity in the Murray.)

40 The benefit to society of a 1 EC salinity reduction at Morgan was estimated in 1999 to be about $140,000 a year (about the same as the 1984 estimate increased for inflation, though with different components). This is equivalent to $2.5m. at 4% discount rate – i.e. $250 a ML if 1,000 ML makes 0.1 EC difference.

To earn an EC credit under the Salinity and Drainage Strategy Victoria has been paying $1m. capital, $25,000 recurrent, or $1.45m. capitalised (note, the levy only has to meet the capital cost). In the future, Victoria will get no Commonwealth contribution for new development; and the costs per EC credit are trending up, towards $2m. capitalised.
Obtaining permission for a new irrigation development

Where water is being bought for a completely new irrigation development, several criteria must be met and a number of approvals obtained - some to do with salinity and drainage issues but some relating to other aspects of the site and its development. Water authorities will generally not consent to the transfer until all government agency requirements are fulfilled.

For northern Victoria, a co-operative effort has recently been made to produce *Irrigation Development / Approvals Process Guidelines*, aimed at helping irrigators understand and negotiate the hoops. Key requirements are as follows:

a) An environmental checklist (preliminary assessment) is to be filled out by the developer in conjunction with NRE - who may provide a case manager to assist with the whole approval process.

b) A hydrogeological assessment may be asked for by the water authority.

c) An irrigation and drainage management plan must be prepared, to the standards specified by NRE and the water authority (a whole farm plan may be adequate in areas covered by an official Land and Water Management Plan). The plan is used for obtaining various approvals and must include:

i) a description of the proposed development (area to be irrigated and proposed crops; also existing native vegetation, heritage sites, etc);

ii) topographical survey
   (steepest slope for non-horticultural developments is 1:50);

iii) a soil survey -
   • for horticultural developments: 75 m x 75 m x 1.5 m samples, with a report indicating potential rootzone depth, “readily available water” (amount of water able to be held in the soil, that plants can access easily), land capability, amelioration recommendations, etc, so an irrigation system capable of applying accurate watering depth can be designed;
   • for broadacre (sprinkler or flood) irrigation: 150 m x 150 m x 0.9 m samples, indicating soil salinity and permeability, so suitability for irrigation can be determined;

iv) irrigation design (for horticulture, the system should be able to apply an irrigation depth equivalent to or less than the soil’s readily available water in different areas);

v) a contingency drainage system design, to be installed as required, covering subsurface and surface drainage, including disposal or re-use, with suitable monitoring.

d) A local council permit is required for clearing of native vegetation, and in many areas for earth-moving works or other development.

For land close to ancient or current wetlands or to a registered Aboriginal site, or proposed to be subject to significant disturbance, notice must be given to Aboriginal Affairs Victoria, who may require an archaeological survey.