Submission on the Draft Towamba Catchments Water Sharing Plan.

Mick Harewood, November 2009.

These notes refer mainly to sections of the Background document on the Draft Water Sharing Plan (WSP) for the Towamba River unregulated and alluvial water sources. A pro-forma with some comments on the prescribed response form is also attached.

Water Interception.

Under "Water Interception Activities" (page 14) are the following statements:

"There are no significant water interception activities anticipated for the Towamba catchment within the life of the plan."

This statement ignores the ongoing effects of past activities (principally pine plantation establishment and intensive integrated logging for sawlogs and woodchips) on water interception. Pine plantation establishment within the Towamba catchment expanded rapidly during the 1980s when the Kapunda Development Corporation invested in the Wog Wog catchment above Pericoe. Subsequently, State Forests of NSW purchased these plantations. There are other extensive areas of Radiata pine in the upper Cowbail Creek catchment, the mid Towamba Valley and near Towamba village, most owned by State Forests and some by private landholders.

Pines use significantly more water than the pasture lands or forests that they have generally replaced. The CSIRO division of Land and Water undertook an extensive review of the impact of afforestation in the Murray-Darling Basin (Zhang et al, 2007). Their figure 7 showed the relationship between water yield reductions (due to planting pines on pasture land) and rainfall. At 1000mm annual rainfall, the water yield deficit is about 220 mm, rising to about 350 mm p.a. for sites with 1500 mm rainfall. Their figure 10 cites a study by Cornish which shows similar, but slightly smaller, water yield reductions as a result of replacing native eucalypt forest with pines.

Vertessey (1999) cites South African data that shows that the impact of pines is greatest on streamflow in the warmer months. Water yield reductions last for many decades and may be only partly ameliorated by thinning.

"The majority of forests within the catchment are managed with selective logging techniques, resulting in minimal changes to catchment hydrology."

Most people regard "selective logging" to mean low intensity logging for potential sawlogs. The integrated harvesting regime used by State Forests in the Eden Management Area since the opening of the woodchip mill at Edrom has been very high intensity logging for both sawlogs and pulp logs. In the early years, all the merchantable trees were removed from the site. Subsequent modifications to ameliorate the impact on wildlife and regeneration-risk (due to wildfire) have seen the retention of some "habitat trees" (usually 3 to 5 per 15 hectares) and "seed trees". However, the hydrological effects of these ameliorative changes would be negligible, since the principal reason for water yield reductions is the increase in stand density in regrowth relative to oldgrowth.

Successful regeneration in the Eden Management Area is said to have been achieved when a minimum of 5000 stems per hectare of crop trees are established after a couple of years post logging. By contrast, oldgrowth forest typically has of the order of 100 stems per hectare. Studies measuring evapotranspiration directly using the heat pulse technique to measure sap velocity have shown that evapotranspiration is directly proportional to the total cross sectional area of sapwood in the stand. (See references by Jayasuria et al 1993 for Mountain Ash and Sandra Roberts 2000 for Silvertop Ash, cited below).

Previously, State forests have argued that they only log about 1-2 % of any major catchment in any year, so the effects are negligible. This ignores the fact that water yield reductions due to increased evapotranspiration losses by dense regrowth last for many decades. Moreover, the most important parts of a catchment for sustained baseflow generation tend to be those parts with the

highest site quality (deep soils, high rainfall) and that these have often been the first areas targeted for intensive logging. In the case of the Towamba catchment, this would include parts of South-East Tantawangalo State Forest and Coolangubra State Forest, intensively logged in the 1980s and 1990s.

Water yields from the pine plantations, established in the 1980s, and eucalypt regrowth areas from 1980s and 90s logging, would now be approaching their expected nadir. While this last decade has seen a significant rainfall deficit and slight temperature increase, the streamflow deficit seems well out of proportion to these effects. An addition impact of water yield change due to vegetation condition is evident. This is likely to continue throughout the term of the plan.

The Towamba WSP proposes to protect environmental water and basic landholder extraction rights by the imposition of "cease to pump" rules on licensed users. There is no CTP for regrowth or pines. Water use by deep rooted vegetation would only cease once wilting point is reached, and surface streamflow is likely to have ceased well-before this occurs.

These issues have been debated in the past by the South Coast Water Management Committee. Attached is a paper presented to the SCWMC at a Bateman's Bay meeting in 2000 (Attachment 1:Seasonal Reductions in Water Yield due to Intensive Logging and Regeneration). Attached also is part of my submission to the review of the Plantations and Reafforestation Act and code. (Attachment 2). This covers some of the evidence on increased water use by plantations and a suggested indicator for assessing the impact.

No effective whole-of-government approach has been taken to deal with the interaction between intensive forestry and water resource management, either through Forestry EISs, the CRA/RFA forestry reforms or the Water Reforms, or the review of the Plantations and Reafforestation Act and code.

The water reforms embodied by the Towamba WSP will fail to protect low flows, refuge pools and the size of important small fresh flows from antecedent water interception, while at the same time imposing restrictions on water users and diminishing the amenity of riparian landholders. If the current industrial forest management achieved a significant economic gain for the region, the situation might be seen as a tolerable compromise by some. However, there is virtually no value added in the local economy to the pulp and pine logs being extracted. We are effectively subsidising the export of precious water resources.

As the climate warms and population pressure grows, the value of fresh water resources is likely to increase much faster than general price increases in the economy. Past decisions to try to develop a resource base for industrial forestry enterprises will be seen as a mistake for this region. A strategy to manage vegetation for water yield and flow duration should include:

- Re-naturalisation of areas of exotic pines as mixed species eucalypt plantations
- A limit on logging intensity of native forests to about 15% of the canopy area of any (mapped) first order stream in any 15 to 20 year period.
- Retention of any multi-aged or oldgrowth forest still in existence.

Kiah Borefield Extraction by the Bega Valley Shire Council.

The proposed rules for access to the Kiah alluvial aquifer for urban water represent a very modest reform relative to the previous situation (table 10, page 31 of Background document).

In the warmer months, a flow of about 10 ML/day at the Towamba gauge is required to produce a surface flow at the Kiah borefield. This was demonstrated by a 50mm rainfall event in July 2004, following a period of very low flows.

The proposal to set the flow triggers at 5 ML/day (cease to pump) for the extraction of 3 ML/day by the BVSC will mean that there will be long periods in the warmer months when surface flow has ceased at Kiah and the continued extraction will deplete the aquifer. This obviously is contrary to the first 2 river flow objectives for the Towamba River of protecting natural low flows and refuge

pools. Moreover, antecedent depletion of the borefield in prolonged periods of no surface flow at Kiah will cause some important freshes to fail to cross the borefield, as was the case in July 2004. At that time, a 50 mm rainfall event at Towamba produced a flow of about 10 Ml/day at the gauge. The progress of the resulting fresh flow was documented by Kiah resident Monica McMahon. It did reach the borefield but failed to produce a surface flow across the length of the borefield.

Therefore, the proposed rules for BVSC extraction from the Kiah bores are likely to result in the failure to meet the first 3 River Flow Objectives set for the Towamba River. **The case for proposing a plan the fails to meet these objectives has not been made out.**

Alternative strategies for meeting town water supply needs with no significantly diminished level of security have been put to the BVSC. In brief, the strategy would be to cease pumping from the Kiah bores when surface flow fails in the river adjacent to the bores, and maintain town supply from the off-stream dams. If and when the dams fell to a level of concern, say 50 or 65% of capacity, water restrictions could be introduced. If and when the dams fell to a level of greater concern, say 25%, extraction from the bores could re-commence at a level that would meet reasonable needs.

This strategy would not only help to meet the river flow objectives but would arguably be more secure. Water in the surface dams is actively deteriorating in quality through evaporation and concentration of nutrients and contaminants. This risks the development of a toxic "blue green algae" (*Cyanobacteria*) bloom. Previously, the BVSC has argued that this could be treated with an "approved algicide". This means treatment with a copper based product, all of which are broad spectrum biocides. Thus the aquatic ecosystem in the surface dams would be altered, probably in a way that would decrease the future natural rate of sequestration of nutrients. The extremely poor quality of water supplied in recent years to Bateman's Bay, from the Deep Creek Dam, may be in part due to past treatment of algal blooms in that storage with algicides.

By contrast, once surface flow in the river has ceased, there will be no significant loss in the volume of water stored in the aquifer, either by evaporation or movement downstream. The aquifer itself is the secure drought reserve for the town schemes. The arguments the BVSC has put in the past for continued pumping throughout periods of no surface flow have been the limited transfer capacity of pumps and pipes to fill the Yellow Pinch Dam and the poorer quality of water stored in the dams relative to that extracted directly from the sand aquifer.

The first issue has been rather inadequately addressed by an upgrade of the pumps at Kiah. There is some scope for a further upgrade if the borefield were expanded upstream (deeper bores trialled earlier this year produced water of very poor quality). The main way the Yellow Pinch Dam can be filled more quickly will become available when the pipeline from the Bega Sands aquifer is completed.

The issue of water quality from the surface dams is one that has probably been exacerbated by the current strategy of the BVSC, which has been to keep the dams as full as possible for as long as possible by extracting from the Kiah bores without regard to the River Flow Objectives. Thus the water in the dams is not turning over very much at all and is probably actively deteriorating in quality. We have recently been through the longest period of no surface flow at Towamba since records began, and yet the Ben Boyd Dam remained full throughout that time. Was the BVSC saving the water in Ben Boyd Dam for a "rainy day"?

The BVSC has been using the Kiah aquifer as a free water treatment plant. A modest investment in water treatment would enable the off-stream storages to be "turned-over" more often with no reduction in water quality and arguably greater security of supply, since the risk of a toxic algal bloom in the storages at a time when the Kiah borefield is already greatly depleted would be lower.

Other Comments

Page 16 under "defining water extraction limits", the second last para refers to "roll out of tidal pool licences to reflect the history of use." This may be more relevant in other river systems.

The paragraph below table 5 on page 21 confirms that tidal pool extraction is not significant in the Towamba catchments.

The support for a study of the Towamba estuary (page 21) is wholehearted endorsed. Local observation suggests that infilling by bedload sand has been rather alarmingly rapid over the last few decades. There has also been some serious river-bank slumping, mainly in the late 1980s when intensive logging in the upper catchments, combined with moderately heavy rain events, produced very prolonged high flows. Although well vegetated, some sections of river bank slumped due to a combination of wet soils and the constant removal of saturated material from the lower bank by unusually prolonged high flows.

The Towamba estuary is undoubtedly important as breeding habitat many fish species. In recent years, eel-grass has spread upstream as the salinity levels have increased in the upper tidal reaches due to low rainfall and increased extraction from the borefield.

Basic Landholder Rights
(page 22 and 23).
The volume allocated to BLR is presented as an aggregate rather than per property. If one assumes a rough estimate of 600 households enjoying BLR above the Kiah bridge, the annual allocation per household would be about 1.5 ML. This is reasonably generous relative to the 220KL pa used by urban households in the shire. It is less than what might have been allowed under riparian rights (that is, the ability to irrigate about 5 acres of pasture?) but households these days no longer rely on horse transport or a house cow, and the river just could not sustain more extraction below the CTP for commercial irrigators.

Water Trading.
I agree with the Interagency Panel decision not to permit trades between sources in the Towamba catchments. Generally, all sub-catchments with existing entitlement are under hydrological stress, as defined by the DLWC Stressed Rivers Assessment Report (1999). It is difficult to think of any water source where trading in could be accommodated without significantly affecting environmental values or other uses or both. The only exception might be in an ultra high flow class (where developments such as clearing or road construction have actually increase stormflow runoff above the pre-settlement level).

High Flow Conversion.
The high flow conversion rules as proposed on page 29 are sensible.

In-stream Dams.
I agree with the ban on in-stream dams. Harvestable rights have generally been under-utilised, so there is sufficient scope for many to increase water storage on their properties within reasonable limits.

Conclusions.
The local implementation of the Water Act (2000) formally gives effect to the State Governments decision, under Minister Knowles, to make annual water licenses a compensable property right in perpetuity and a no additional cost to license holders. The opportunity to retain water for the environment without paying compensation comes with the development of this plan. It is unlikely to occur again since there will always be 5 years (and an election) between the time when WSPs are changed and when reduced entitlements come in to force.

Even when Federal funding has been available to pay compensation, NSW has tried to limit the reduction in irrigation water within the Murray-Darling Basin, contrary to previous undertakings.

Commercial irrigation in the Towamba Catchments is small in scale, mainly due to the paucity of the water resource in dry times. The biggest extractor by volume is the Bega Valley Shire Council. The impact of the BVSC on the river has been to cause a failure to meet the first 3 river flow objectives for considerable periods of time. **The WSP for the Towamba River does not make any**

case to justify this, and the impacts are understated in the table (Appendix 3 of the background document).

Rather than operating as a supplier of an essential service, the BVSC has avoided water restrictions and operated its water supply functions as a commercial enterprise, maximising sales to maximise revenue. There is no particular reason therefore to apply, to the BVSC, different rules for access than those which apply to other commercial users.

Ongoing impacts of increased water interception (by past pine plantation establishment and very high intensity native forest logging) have not been adequately assessed and addressed by the plan.
These impacts are likely to continue over the next few decades, and will increase in severity as the climate warms, since evapotranspiration effects are very sensitive to temperature. The State Government is potentially incurring very significant liabilities as the value of water rises much faster than the value of industrial forestry commodities.

References.

Jayasuria M D A, Dunn G, Benyon R and O'Shaughnessey P J. (1993) Some factors affecting water yield from mountain ash (*Eucalyptus regnans)* dominated forests in south-east Australia. *Journal of Hydrology*, 150, 345-367

Roberts S (2000). Presentation to research colloquim held at CSIRO Black Mountain Laboratories, by Sandra Roberts, PhD candidate, on the relationships between sap flow velocity, sapwood cross-sectional area and evapo-transpiration in *Eucalyptus seiberi* of various ages. 16/8/2000.

Vertessey R A. (1999) The impact of forestry on streamflows: A Review. In: Forest Management for Water Quality and Quantity. Proceedings of the Second Forest Erosion Workshop. May 1999, In Croke J and Lane P (eds). CRC for Catchment Hydrology, Report 99/6, pp 99-108.

Zhang Lu, Vertessey R, Walker G, Gilfedder M and Hairsine P. (2007) Afforestation in a catchment context: understanding the impacts on water yield and salinity. Industry report 1/07. eWater CRC, Melbourne Australia.

Attachments:

Seasonal Reductions in Water Yield due to Intensive Logging and Regeneration
Notes prepared for the South Coast Water Management Committee by Mick Harewood, February 2000.

(Part of) Submission on Plantations and Reafforestation Act and Code Review.
Mick Harewood, July, 2005-07-22.