APPENDIX D - ECONOMIC ANALYSIS

D.1 SECTOR AND DISTRICT TRADE BEHAVIOUR DURING AND AFTER THE 2002/03 DROUGHT

The following charts were generated using PIRVic data. They demonstrate the trade behaviour of different industry sectors within the main irrigation districts of GMW. Trade data for the three years between 2002/03 and 2004/05 is analysed to understand trade patterns during the 2002/03 drought and during returns to more normal allocations.

The charts show total net import and export trades by district by sector. Both net imports and exports are shown on the same pie chart. Whether the sector imported or exported temporary trade is depicted by a ‘plus’ or ‘minus’ sign (i.e. minus indicates exports).

![Pie charts showing trade behaviour by sector and district during 2002/03, 2003/04, and 2004/05 for Torrumbarry (Kerang and Cohuna).]

In the three years depicted above, Torrumbarry has imported the highest volume of temporary water, with 13,768 ML in 2002/03, 52,998 ML in 2003/04 and 51,192 ML in 2004/05. The main buyer of temporary water is the dairy sector, followed by grazing. Few industries exported temporary water in Torrumbarry.
Central Goulburn was the second largest importer of temporary water over this timeframe, with 32,783 ML in 2002/03, 23,051 ML in 2003/04 and 8,062 ML in 2004/05. In Central Goulburn the dairy industry was the dominant net importer of water, noting that during the 2002/03 drought year, horticulture was also a significant net importer.

Rochester imported 4,434 ML of temporary water in 2002/03, 8,817 ML in 2003/04 and 13,451 ML in 2004/05. The dominate importer of temporary water was the dairy industry. In the 2002/03 drought year, mixed farmers and cropping also imported water.
Shepparton exported the largest volume of temporary water of any GMW district in 2003/04 (-17,859 ML) and 2004/05 (-15,589 ML). In these years, the only industry purchasing temporary water was the dairy industry. In the drought year of 2002/03 Shepparton was a net importer of temporary water. Central Goulburn and Shepparton behaved in a similar way during 2002/03, with horticulture purchasing larger volumes of water than in other years. The main seller of temporary water in Shepparton was the mixed farming sector.

Murray Valley imported 10,697 ML of temporary water in 2002/03, 19,545 ML in 2003/04 and 21,190/ML in 2004/05. The dairy sector was the main importer.
Pyramid Hill and Boort are adjacent to each other but are quite different in terms of land use and trade.\(^1\)

Pyramid Hill was a net exporter of temporary water between the years 1994/95 – 2004/05. In Pyramid Hill the only importer of temporary water was the dairy sector, while the mixed farming and grazing sectors were significant sellers.

\(^1\) For Pyramid Boort Irrigation District (as classified by GMW), DSE’s data can not be separated into separate components for Pyramid Hill and Boort. The sample data from PIRVic (from which these charts are based) does report on Boort and Pyramid Hill separately. The two datasets are used to provide the total net trade by district (DSE) and the sample data (PIRVic) is used to understand the trade behaviour of industry sectors within districts.
Boort was a net temporary exporter of water. In 2003/04 and 2004/05 the largest exporter of temporary water was horticulture, which as a sector, behaved in a similar way to Sunraysia (which also has a relatively large horticulture area). During the 2002/03 drought, horticulture in Boort behaved in the same way as horticulture in Shepparton and Central Goulburn and imported water while mixed farmers exported temporary water, reflecting the higher opportunity cost of traded water. In Boort, horticulture is mainly represented by a single olive plantation.
D.2 DAIRY PROFITS IN THE 2002/03 DROUGHT

Despite the fact that milk yields did not decrease significantly, increased water and feed costs and a sharp decline in the value of milk on the world market led to significant loses in dairy income in 2002/03.

![Change in dairy prices (ABARE)](image)

**Figure 1 - Change in milk and milk product prices (using 2001 butter as a base)**

Incomes were also negatively affected by a large increase in the cost of purchased fodder, with average farm expenditure increasing by over 300% per farm in Victoria.

The price of temporary water on the Goulburn System peaked in late October 2002 and again in early January 2003 at $500/ML during the drought. Despite the increased cost of traded water, ABARE estimated that for the average dairy farm, water costs accounted for only 4% of total farm costs compared to purchased feed, which accounted for about 38% in 2003 (Topp, V, & Shafron, W 2006: 15).
D.3 PERMANENT TRADE AND THE 4% DISTRICT RULE

For many years Victoria imposed a ‘2% rule’ that no more than a net 2% of permanent entitlement can trade out of a district in a year. Once the limit is reached, further trade out of a district is suspended. No such cap occurs with temporary water. In NSW and SA, the irrigation corporations/trusts imposed a 0% limit, ie. no net permanent trade out.

The National Water Initiative contained an agreement that jurisdictions allow at least 4% net trade out each year. On 1 July 2006 Victoria implemented this by increasing the limit to 4%.

Table 1 shows the irrigation districts that reached the 2% cap in the last three irrigation seasons. It is worth noting that each year the number of districts that reached the limit increased.

<table>
<thead>
<tr>
<th>Irrigation Season</th>
<th>2003/04</th>
<th>2004/05</th>
<th>2005/06</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Goulburn, Dec 03</td>
<td>Central Goulburn, Dec 04</td>
<td>Central Goulburn, Jun 05</td>
<td></td>
</tr>
<tr>
<td>Rochester, June 04</td>
<td>Rochester, Feb 05</td>
<td>Rochester, Mar 06</td>
<td></td>
</tr>
<tr>
<td>Pyramid Boort, July 03</td>
<td>Pyramid Boort, Dec 04</td>
<td>Pyramid Boort, Aug 05</td>
<td></td>
</tr>
<tr>
<td>-</td>
<td>Torrumbarry, Oct 04</td>
<td>Torrumbarry, Jul 05</td>
<td></td>
</tr>
<tr>
<td>-</td>
<td>Campaspe, Dec 04</td>
<td>Campaspe, Jan 06</td>
<td></td>
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<tr>
<td>-</td>
<td>-</td>
<td>Shepparton, May 06</td>
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</tr>
</tbody>
</table>

Most of the districts consistently reached the 2% limit either at the end of the previous year’s irrigation season or close to the beginning of the current season (an irrigation season normally runs from August to May). This indicates that the demand to export permanent water from these districts was greater than what was permitted. It is not possible to determine how much permanent water would have been exported had the rule not been imposed.

GMW’s new tariff structures (casual users pay approximately four times the use fee of entitlement or ‘delivery share’ holders) may change the rate of export from districts in future seasons. With these tariffs, net trade out of water has no impact on payments for delivery infrastructure.
D.4 ECONOMIC MODELLING PARAMETERS AND ASSUMPTIONS

D.4.1 THE WATER POLICY MODEL (WPM)

In the mid-1990s a model was developed by the former Department of Natural Resources and Environment to understand the economic welfare implications of changing water use in the southern Murray Darling Basin.

Known as the Water Policy Model (WPM), it is a spatial equilibrium model that uses net social welfare as the objective. The key model parameters include enterprise yields, water use requirements and variable costs. The WPM provides an estimate of the first round (farm gate) economic impacts of water trade at district level. The advantage of the WPM is its ability to mimic the major activities of major irrigation districts in the Southern Murray Darling Basin. It is not able however, to account for flow-on impacts.

The model includes the Murrumbidgee and Murray Valleys in NSW, the Riverland and Murray Valley in SA and the Goulburn and Murray Valleys in Victoria. A number of physical constraints are included to reflect the capacity of rivers and irrigation channels and water losses associated with transporting water to different parts of the irrigation system. Trade scenarios are evaluated under the assumption that all institutional restrictions on trade are removed (no trading rules). Whilst this does not occur in reality, it provides us with an understanding of the scale and significance of economic impacts under different scenarios.

Underlying the analysis is the assumption that the marginal value of water in alternative enterprises is the principal factor which determines where and how water is utilised. This is a simple assumption given that many other factors influence irrigators’ decisions. These include:

- economic factors such as fixed costs and the need for specialised equipment and skills;
- operational constraints such as the rules of irrigation authorities; and
- social factors such as personal objectives (NRE, DOA NSW, ABARE 1999: 1).

The model generated short-run estimates so there is an implicit assumption that enterprises which currently characterise the irrigation industry within these regions, will not change substantially in the short to medium term (Eigenraam, M 1999: vi).

Land and water use data for Victoria (generated by the PIRVic Data Integration Project in 2006) was used to update the Water Policy Model (WPM). At this stage, the model includes Shepparton, Central Goulburn, Rochester, Campaspe District, Pyramid Hill, Boort and Murray Valley.

Given that the model is under development, the results at this stage are preliminary. It was conducted as an internal investigation tool to assist DSE’s understanding of the scale and significance of trade in northern Victoria under different allocation scenarios.

The WPM cannot model how different sectors of the economy adjust to changes in irrigated agriculture and trade.

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3 The WPM includes permanent horticulture (Victoria regions only), summer and winter crops, livestock enterprises, hay making for on-farm use or sale, water buying and selling, pasture transfers, labour hire and reconciliations for pasture, labour, water recharge and irrigation run-off.
Appendix E - BIBLIOGRAPHY


Department of Primary Industries 2005, *Catchment and Agricultural Services* (brochure), DPI, Melbourne.


Saturn Corporate Resources 2006, *Socio Economic Profiles of Victorian Irrigation Districts - Final Version*, Saturn Corporate Resources Pty Ltd, October
