MODULE 09 - SUPPLEMENTARY NOTES

CCW Water Tools - Water Priority Worksheet & Water Budget Tool

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Updated as of 8 September 2008
CCW water tools:

- **Water priority worksheet**
  Assisting growers in prioritising available water and assessing the option of purchasing additional water.

- **Water budgeting tool**
  Assisting growers with the planning, management, and monitoring of their available water.


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Today's program:

- Background
- Water priority worksheet
- Water budgeting tool
- Examples in Excel (time permitting)

Questions at any time!

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Background

CCW Co-op. Ltd.
- Grape tracer in South Australia's Riverland
- Over 700 growers and nearly 9000 ha contracted
- Supplying mainly to CWAU

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Background

06-07 season: SA irrigation allocations were restricted to 50%

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Background

2006/2007 season CCW developed a Microsoft® Excel based water budgeting tool with the aims of:

- Calculating the amount of water available
- Calculating the amount of water required
- Rationing the water across the season
- Giving a simple guide to achieve the budget
- Monitor the water use across the season
Background

The following season (07/08) developed a Microsoft Excel based water priority worksheet to assist growers making decisions regarding:
- Where to use their available water.
- The viability of leasing additional water.

<table>
<thead>
<tr>
<th>South Australian irrigation allocations</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 2007</td>
</tr>
<tr>
<td>Aug 2007</td>
</tr>
<tr>
<td>Nov 2007</td>
</tr>
<tr>
<td>Jan 2008</td>
</tr>
<tr>
<td>Jun 2008</td>
</tr>
</tbody>
</table>

Grown training sessions

OUR EXPERIENCES
- Formal training sessions were held for growers and finance providers
- ~ 60 – 90 minutes long
- Held in a suitable computer suite
- Usually 15 – 20 growers

First things to know:

- The water priority worksheet will automatically do the calculations for you.
- Hold the mouse cursor over cells with a red triangle in the top right corner to view pop-up comment boxes.
- Don’t forget to save any changes that you make and want to keep!

CCW water priority worksheet

AIM: Assist growers making very tough decisions about
- Where to use their available water, and
- Is it viable to lease additional water?

Originally launched in the 07/08 season and made available to growers Australia wide through the GWRDC.
Opening the file – Macros

Two macros provide a function that are very useful, but not essential.

Possible to enable
Cannot be enabled

The different worksheets

Tip:
If the tabs ( ) are not visible but the water priority worksheet file is open, then the window needs maximising by clicking on the button.

CCW Water Priority Worksheet
- Consists of six tables
- Data only needs to be entered in the coloured areas
After Table 1 has been completed the unused rows in Tables 3, 4 and 5 can be hidden if macros are enabled.

The option of earmarking some of the available water for carry-over to the next season. (Assumes carry-over will be available)

Table 2: Water information

<table>
<thead>
<tr>
<th>Allocation name</th>
<th>High Sec.</th>
<th>Low Sec.</th>
<th>Water restriction</th>
<th>Total allocation</th>
<th>Available water</th>
<th>Set aside for next season</th>
<th>Total available water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tracked water</td>
<td>12,345</td>
<td>6,789</td>
<td>5%</td>
<td>18,901</td>
<td>10,234</td>
<td>5,000</td>
<td>15,234</td>
</tr>
</tbody>
</table>

Table 2: another example

<table>
<thead>
<tr>
<th>Allocation name</th>
<th>High Sec.</th>
<th>Low Sec.</th>
<th>Water restriction</th>
<th>Total allocation</th>
<th>Available water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tracked water</td>
<td>12,345</td>
<td>6,789</td>
<td>5%</td>
<td>18,901</td>
<td>10,234</td>
</tr>
</tbody>
</table>

Table 3: Normal season irrigation levels and yields (normal)

The yield in a normal season with ideal irrigation levels.
Minimum irrigation level to get a harvestable crop and the subsequent estimated yield.

Harvestable crop:
- Meet winery quality requirements
- Economically worth harvesting

$\text{Net Return} = \text{Income} - \text{Harvest Costs}$

Patch 4 Chardonnay: predicted price of $500/ha

Patch 4 Chardonnay: predicted price of $300/ha

Once a ML/ha is entered in Table 5, a predicted yield is calculated.
Adjust the working scenario (Table 5)

E.g. Giving NO water to the poorly performing patch # Chardonnay.

Any questions?

G rower training sessions

OUR EXPERIENCES

- Formal grower training sessions followed the initial introduction at informal grower meetings
- ~60-90 minutes long
- Held in a suitable computer suite
- Usually 15-20 growers
Water budgeting ... ... what’s it all about?

As an irrigator you have to consider your water supply, requirement and use situation.

How much water do you need?
Where are you going to use it?
When are you going to use it?
How much water do you have?
Will it be enough?

A water budget is a predicted plan that looks at these questions.

It will help you consider: Do I need to make and implement management decisions now?

The CCW water budgeting tool

Originally launched in the 06/07 season.
Made available to growers Australia wide in the 07/08 season by the GWRDC.

Available from www.ccwcoop.com.au

Opening the file – Macros

Three macros provide functions that are very useful, but not essential.

Tip: When starting on a very low (or even non) allocation a water budget is valuable.

Drought and water restrictions will magnify the importance of these questions and the management decisions that you have to make.

MODULE 09 - SUPPLEMENTARY NOTES  CCW Water Tools
The different worksheets

Tip:
If the labels are not visible but the water budget file is open, then the window needs maximizing by clicking on the button.

First things to know:
The water budget will automatically do the arithmetic for you. Don’t forget to save any changes that you make and want to keep!

Holding the mouse cursor over cells with a red triangle in the top right corner will bring up pop-up comment boxes.

There are four main parts to the tool:
1. Water SUPPLY information
2. Water USE information
3. Calculated irrigation GUIDE
4. MONITORING water usage

1. Water SUPPLY information
1. Water **SUPPLY** information

- For example: Murumbidgee high and general security restrictions
  - November 2007
  - December 2007
  - January 2008

Net traded water = ML traded in LESS ML traded out

**E.g.**
- Net traded water = 15 ML traded in − 5 ML traded out = 10 ML

2. Water **USE** information

- Allows areas that need to be irrigated at different frequencies to be separated.
- Things to consider include: irrigation method, soil type, level of water use, root zone depth, management options.

**E.g.**
- Drone
- Sprinkler
- Heavy soil
- Sandy soil
- Young vines
- Pulsing

**ENTER** a name.

**ENTER** the ideal number of days between irrigations for each month.

**MODULE 09 - SUPPLEMENTARY NOTES** CCW Water Tools
2. Water USE information

Calculating application rate:

- Change worksheets
- Change back to and enter the Appl. rate
- Complete the calculator

http://waterasdrile.gwrfc.com.au

2. Water USE information

TOTAL AVAILABLE WATER: 19.35ML

The total volume of water available. Compare the required volume to the available volume.

Water is allocated to each management unit. It must be a realistic estimate of the irrigator level required to achieve the desired result. There are many factors that need to be considered.

http://waterasdrile.gwrfc.com.au

2. Water USE information

If there is a Deficit

- Each option has risks
  - Economical
  - Production
  - Personal
- Changes to allocation restrictions are obviously the very big unknown

http://waterasdrile.gwrfc.com.au

3. Calculated irrigation GUIDE

A calculated GUIDE to help you meet the budget throughout the season.

For example:

Therefore in December irrigate for 6.0 hrs every 7 days to stick exactly to budget.
I.e. use 19.8% of the 35ML in Dec.

It is critical that vine health and soil moisture levels are monitored and weather events are accounted for.

http://waterasdrile.gwrfc.com.au
3. Calculated irrigation guide

Irrigation application depth vs. root zone depth

Irrigating too much
- Evaporation from soil surface
- Drainage past the root zone

Irrigating too little

Need to know your root zones!

4. MONITORING water use

Note:
- A meter reading must be entered in each month.
- Every meter must have a reading entered.

<table>
<thead>
<tr>
<th>Meter ID</th>
<th>START of July readings</th>
<th>MJ</th>
<th>W</th>
<th>Q</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>604000</td>
<td>67.46</td>
<td>RL</td>
<td>RL</td>
<td>RL</td>
<td>RL</td>
</tr>
<tr>
<td>60500</td>
<td>115.96</td>
<td>RL</td>
<td>RL</td>
<td>RL</td>
<td>RL</td>
</tr>
<tr>
<td>605000</td>
<td>0.00</td>
<td>RL</td>
<td>RL</td>
<td>RL</td>
<td>RL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Summary

Does not include the 14.65 ML surplus from when water was rationed to each patch.
The CCW water budgeting tool – with other crops

Practical example

Enter the example information supplied into the tool and play around with the numbers until you are happy with how to use it.

Help is provided to growers individually as required.

Practical example

An ‘example handout for training session’ can be found in the training guide.

Adapt to suit your region

Summary tables

A summarised guide to the required information and the meaning of each calculated value

<table>
<thead>
<tr>
<th>Source</th>
<th>Code</th>
<th>Description</th>
<th>UIN</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a</td>
<td>TSW</td>
<td>Total water supply</td>
<td>11</td>
<td>-</td>
</tr>
<tr>
<td>1b</td>
<td>WSP</td>
<td>% of the allocation</td>
<td>12</td>
<td>-</td>
</tr>
<tr>
<td>1c</td>
<td>CWH</td>
<td>Cumulative water hold</td>
<td>13</td>
<td>-</td>
</tr>
<tr>
<td>1d</td>
<td>TWW</td>
<td>Total water hold</td>
<td>14</td>
<td>-</td>
</tr>
</tbody>
</table>

Good luck!


If time permits can complete an example of each tool in Excel.

Have a go on the laptops in the next break.
NOTES FOR THE ‘TRAIN-THE-TRAINER’ POWERPOINT PRESENTATION

Slide 1 - Title page

Slide 2
• Module 9 of the ‘Water and vine - managing the challenge’ program is the development of resources to assist the uptake of two tools developed by CCW Co-operative Limited (CCW). These tools are the Water Priority Worksheet (WPW) and the Water Budgeting Tool (WBT), which are available from the CCW website: www.ccwcoop.com.au.

Slide 3
• The program for the training session.

Slide 4
• Brief background about CCW.

Slide 5
• Due to the extremely low rainfalls across the MDB in the 2006/07 season (see figure) allocations relied largely on water in storage and subsequently South Australian irrigation allocations were restricted to 60% of the entitlement. This was the most severe restrictions South Australian irrigators had faced.

Slide 6
• There was widespread concern about how and when to use the available water to get through the season with the restricted allocations. This prompted the development of the CCW WBT, which was first launched to CCW growers in November 2006. This had a number of aims, but a key one was to give growers a guide of how to achieve the budget and therefore confidence that they could get through the season, and do this in a simple and grower friendly format.

Slide 7
• At the start of the 2007/08 season water storages were very low resulting in the starting allocations also being very low, and only slowly increasing as inflows became available. Our growers were faced with issues including: where to use the small volume of available water and was it viable to lease in temporary water. This prompted the development of the WPW.

Slide 8
• Similar scenarios with allocations were happening across most of the southern MDB and through the GWRDC the CCW water tools were made available to growers Australia wide. Train the trainer sessions similar to todays were held in the Sunraysia and Riverland regions, resulting in an estimated 800 growers using these tools.

Slide 9
• First look at the WPW.

Slide 10
• Finance providers, such as bank managers, were involved so that they were familiar with the tool when growers approached them for finance for leasing water and had used the tool to show the benefits of additional water.
• Time length will depend on group size and how familiar they are with computers and Excel.
• We hold our sessions in the local high school computer room. We have found it important to be able to easily move between the growers/computers and they also need to have a good view of the presentation screen
• Group size will depend on the number of computers and instructors.
Slide 11
• At the start of the 2007/08 season irrigation allocations were very severely restricted in S.A with a very poor outlook for improvement.
• Many growers were unsure about:
  o Whether to purchase additional water or not.
  o Spreading their water across their property or focusing it on some selected areas.
  o Leasing out their available water and sacrificing their crop and potentially their vineyard asset.
• Led to the development of the WPW Excel tool by CCW viticultural staff to assist growers prioritising where to use their available water and was it viable to lease additional water.
• Also aimed to:
  o be simple to use,
  o require minimal computer skills,
  o be in an easy to view format,
  o & be suitable for any irrigated crop.
• Across much of the Murray Darling Basin irrigation allocations were also restricted and the tool was made available to growers Australia wide by GWRDC, with widespread uptake.

Slide 12
• The tool is Excel based and this allows corrections and adjustments to be made with no manual recalculating required. E.g. water restriction level, value of temporary water.
• Cells with a red triangle in the top right hand corner contain pop-up comment boxes which give some brief information about what is required in that cell.

Slide 13
• The WPW contains 2 macros (which are basically little programs embedded in the Excel file) to perform repetitive tasks at the click of a button.
• They are very useful but not essential. Will see later on what these macros do.
• When the WPW is opened a ‘Security Warning’ dialogue box may pop-up about the macros.
  The options will depend on the security level of the computer: medium can enable, high cannot enable.

Slide 14
• The macro security level can be changed if desired.
  Select the desired security level. It is up to the grower what security level they use.

Slide 11
• The WPW has three pages as shown on these tabs.
  Select the circled tab to get to the blank WPW.

Slide 16
• This was a reasonably common query from growers.

Slide 17
• The WPW consists of six tables. It does look like a lot of numbers but only the coloured areas require data to be entered. The remaining areas are locked and automatically perform the required calculations for you.
Slide 18

- **Table 1.** The property is broken into management units, e.g. patch/block and the required information is entered for each. There is room for 15 different patches.
  - **Patch:** A name or number to identify each management unit.
  - **Variety:** Not compulsory.
  - **Hectares:** The area of each management unit.
  - **Predicted $/tonne:** Important to speak with the purchaser of the fruit (e.g. winery) about this. As more concrete prices are established this column can be updated.

Slide 19

- These two buttons are the macros and can be used to hide and unhide the rows that are not used in tables 3, 4, and 5, IF macros are enabled.

Slide 20

- Rows that do not have an entry in the ‘patch’ column will be hidden. This compresses the tables, making them easier to view. If additional patches are then required, need to unhide the rows, enter the additional patch info in table 1 and then re-hide the unused rows.
- It is possible to temporarily lower the macro security level to ‘medium’, enable the macros, hide the unused lines and then change the security back to ‘high’ if desired.

Slide 21

- **Table 2.** Complete the required parts of this table.
  - **Allocation name:** This feature is only really required when two allocation types may have different restriction levels and therefore need to be kept separate.
  - **Total allocation:** The unrestricted water allocation for the property in ML.
  - **Water restriction:** The % of the allocation that the entitlement is restricted to. If this % changes during the season simply re-enter it into this cell.
  - **Carry-over water:** The ML of water available from the previous season.
  - **Traded water:** The volume (ML) and total value ($) of water already traded (leased) in and out THIS season.
  - **Set aside for next season:** Explained in the next slide.
  - **Price/ML of water ($):** The current market value to lease water.
  - **% of purchased water available:** E.g. if the leased water is completely available enter 100.

Slide 22

- This cell allows water currently available to be ‘put aside’, planning to have it remaining at the end of the year. It therefore decreases the available water volume for use during this season.

Slide 23

- Another example of Table 2 with two types of allocations and some water ‘set aside’ for the following season.
Slide 24

- **Table 3**
  - Table 3 is looking at the scenario of irrigation and yields levels in a normal year. i.e. how much water does each patch normally need and what yields do they normally grow?
  - First enter the normal ML/ha for each patch. Automatically the tool calculates the ML/patch, followed by the total water requirement in a normal season. This is compared to the water currently available, calculating a surplus or deficit.
  - Then enter the t/ha for each patch in a normal season. Historical averages are a good place to start. The predicted yield per patch is then automatically calculated.
  - The predicted gross returns per patch, ha and ML are then automatically calculated using the value of the fruit entered in table 1.
  - The total gross return for the property is calculated.
  - Any surplus or deficit is then valued using the current value of temporary water as entered in table 2.
  - If have a surplus assumes this volume is leased out.
  - If have a deficit assumes this volume is leased in.
  - The annual running costs are entered on a /ha basis. This example is just a nominal figure and it is up to each individual grower to enter the value for their enterprise. The costs on their tax return are a good place to start and rural financial advisors can provide assistance with these numbers. The important thing is to keep how this value is established uniform across this and the following tables. The property running costs are then automatically calculated.
  - The value of any water already traded this season is accounted for.
  - Ultimately the predicted net return is calculated for the property in this scenario where normal irrigation levels are used and any surplus of deficit of water is valued at the current temporary trading value.

Slide 25

- Table 4 Identical to Table 3 but requires the minimum irrigation level (ML/ha) and the subsequent yield (t/ha) for each patch, at which a harvestable crop can be grown.
- Basically, predicting that if a lower irrigation level is applied, the patch will not produce any income.
- The running costs/ha is also required. Whatever was included to get this value in the ‘normal’ scenario must be included when calculating this value for the ‘low’ scenario.

Slide 26

- ‘Harvestable crop’ means that the crop:
  - Meets winery quality standards (e.g. sunburn, berry size, salt levels, etc). E.g. in the photos the vines do have a crop but no winery would want this fruit.
  - Is economically worth harvesting, i.e. the value of the fruit is greater than the harvesting and transport costs (see graph).
- These values will often be an estimate and are influenced by vineyard factors such as variety, rootstock, soil type, management options and the local climate. Growers’ irrigation management skills and confidence can also influence the predicted minimum. Each grower will have the best knowledge of their vineyard and how individual patches are likely to respond to decreased irrigation levels.

Slide 27

- Table 5 - Use this table as a working scenario to try and work out the best outcome for your enterprise.
- Only the ML/ha for each patch and the running costs per hectare are entered in this table.
Slide 28

- The information in the columns outlined in blue are used to help decide how much water (ML/ha) is allocated to each patch in column G. Things to consider for each patch include:
  - **Is the patch to be at least ‘kept alive’?** If the patch is to be at least ‘kept alive’ then allocate an irrigation amount to the patch required for ‘mothballing’.
  - **Is it worth irrigating the patch to get the minimum crop?** Look at column C and relate the $/ML to the current value of water. If it is adequate then allocate the ‘Low ML/ha’ (column D) to the patch. If the patch is to be at least kept alive then it may not take much extra water to get it to the ‘Low’ level. Also consider the long term effects of low irrigation levels.
  - **Is it worth increasing the irrigation level to get a normal crop?** Look at column F - this is the net increase in return per hectare for every ML increase between the ‘Low’ and the ‘Normal’ scenarios - this is after taking into account the current value of water. (Make sure all understand this value.) All patches other than patch 4 Cha have good net $.
  - **What is the surplus/deficit of available water?** Also consider the magnitude of any deficit. Having to make up a deficit by leasing temporary water will often require extensive financing. The predicted yield levels carry many risks including frost, poor set, hail, etc. which need to be considered when spending these big $ on additional water.
  - If the deficit has to be reduced to compromise between increasing yields and lowering the associated risks, then the above factors can be used to prioritise the water to the patches that will give the best returns.
  - The values outlined in blue are influenced by the numbers entered in tables 1 - 4, including the irrigation levels, yields and predicted prices for each patch.
  - E.g. when the predicted price of the fruit from patch 4 is reduced from $500/t to $300/t the return /ML at the low irrigation level is well below the current value of water. Additionally, the net return per ML increase becomes negative.
    Red values indicate that the predicted increase in yield will be worth LESS THAN the extra water required to grow it.

Slide 29

- When an irrigation level is entered in table 5 a predicted yield is then calculated. This is based on the relationship established from the irrigation levels and yields entered in the normal and low scenarios, as demonstrated on the graph.
  - Irrigation level below ‘Low’ - predicts no yield.
  - Irrigation level between ‘Low’ and ‘Normal’ - predicts a linear relationship and yield is proportional to the irrigation level.
  - Irrigation level above ‘Normal’ - yield restricted to ‘Normal’ yield.

Slide 30

- This relationship for each patch can be viewed on the third worksheet. This does not consider the value of the fruit.

Slide 31

- The subsequent predicted gross incomes per patch, hectare and ML are then calculated, followed by the property gross and net returns in the same format as the previous two tables.

Slide 32

- Table 6 summarises the results from tables 3, 4 and 5. Compare the scenarios to see if the working scenario (table 5) has been able to decrease the value spent on water (and therefore the associated risk) whilst minimising any decrease in net return.
Slide 33
• Can then go back to the working scenario (table 5) and adjust the irrigation levels for each patch to look at numerous scenarios to see if any improvements can be made.
  o E.g. what happens if no water is allocated to the poorly performing patch 4? The water cost has decreased by around $9000 and the predicted net return has decreased by only around $2000, but also need to consider that these vines are ‘lost’. (Note: running cost still the same.)
  o Another scenario to look at is putting every patch into ‘survival’ mode and leasing out any surplus of water.
• Once decided how many ML/ha are to be allocated to each patch, can then copy these numbers to the ‘CCW water budgeting tool’.

Slide 34
• Any questions?

Slide 35
• Now look at the WBT

Slide 36
• The WBT was initially introduced to growers at informal grower barbecues to generate interest in it. These were followed by more formal training sessions with computers.

Slide 37
• As an introduction to water budgeting start by looking at why water budgets (WB) are important.
• These questions and their subsequent answers may vary with crop type, planting size, location, year, management, etc. but they are important when managing and planning seasonal water use as an irrigator.

Slide 38
• A WB is a predicted plan that looks at these questions and can be completed before or at the start of a season.
• WB are similar to a budget you give to your bank manager; they are a prediction of how much water is required and when it will be used, and what actually happens can and will vary to the plan - and this needs to be highlighted.
• With a computer based WB numerous possible scenarios can be studied with all the calculations automatically recalculated.

Slide 39
• WB will help with decision making in regards to water use.
• They can be used to plan how water will be used through the season to try to minimise any negative impacts of water stress (on yield, quality, etc) and ensure some water is available throughout the whole season.
• The earlier potential problems are highlighted, the more time to you will have to analyse the options and implement decisions. E.g. the decision to purchase additional water - If you get to a point that you urgently HAVE to purchase water you may have very little choice in price. However, if the realisation was made some months earlier, the water market could have been studied and hopefully water purchased at a cheaper price or your management changed to make what you have last longer.
• In addition, throughout the season water use can be monitored and compared to the planned water use.

Slide 40
• More likely to have water supply issues.
• Additionally, water is more valuable.
• Therefore it is more critical that the available water is managed well.
• When starting on a very low (or even zero) allocation a WB can still be very valuable. It is important to know where and when water will be used and to look at the options if allocations do not improve.
Slide 41
- In the 2006/07 season SA irrigation allocations were restricted to 60% - the lowest ever experienced.
- Led to the development of a WB tool by CCW viticultural staff for CCW growers. Aimed to:
  - be simple to use,
  - require minimal computer skills,
  - & be in an easy to view format.
- There was widespread uptake by CCW growers because it was a simple tool to help them manage their reduced water supply, giving them confidence that they could get through the season.
- In the 2007/08 season irrigation allocations were restricted over much of the Murray Darling Basin and the tool was made available to growers Australia wide by GWRDC.

Slide 42
- The WBT also has some macros that will only work if enabled - which will depend on the security level.

Slide 43
- The WBT has four pages as shown on these tabs. Select the circled tab to bet to a blank WB.

Slide 44
- Same as shown earlier.

Slide 45
- Zoomed out the blank WBT looks like this.
- Only coloured cells required information to be entered.
  - Green: Generally at the start of the season.
  - Tan: Throughout the season.
  - Blue: part of calculators.
  - The remaining cells are locked and cannot be selected. They perform all the required calculations for you automatically.

Slide 46
- Same as shown earlier.

Slide 47
- The WB spreadsheet has four main parts, plus some helpful calculators.

Slide 48
- The location of the water supply information.

Slide 49
- Enter the relevant information in each cell.
  - Total allocation: The unrestricted water allocation for the property in ML. Keep allocations that may have different restriction levels separate. E.g. once again keep high & general security allocations separate.
  - Water restriction: The % of the allocation that the entitlement is restricted to. If this % changes during the season simply re-enter it into this cell.
  - Carry-over: Enter the ML available of carry-over or carry-forward water from the previous season.
  - Net traded water: Accounts for annual leasing of water that has already occurred this season. Net traded water equals ML traded in LESS ML traded out.
Slide 50
• The location of the water use information.

Slide 51
• Water is rationed across the season by allocating a % of the annual water use to be used each month.
  • E.g. the suggested percentages for wine grapes in the Riverland as supplied and shown in the graph.
    Summer months when evaporation levels are high and the vines have a full canopy and crop obviously have the greatest water requirement.
  • Monthly % can be changed but the total must not exceed 100.
  • Below the WB is a ‘suggested % calculator’. This allows more region specific suggested % to be calculated. It requires average evaporation figures and monthly crop factors to be entered and then the calculated values can be copied to the rationed % row.

Slide 52
• This part of the water use info looks at the frequency of irrigations in each month.
  • Different parts of a property may need to be irrigated with different patterns and the WB can accommodate for three different patterns. Things to consider include irrigation method, soil type, level of water use, etc.
  • First enter a name for each pattern, followed by the ideals number of days between irrigation events for each month. E.g. entering a 2 means the ideal irrigation frequency is every 2nd day for that month.

Slide 53
• The next part of the water use information involves breaking the property into individual management units. May be broken down into patch, block, irrigation valve, irrigation shift, etc. If some areas have to be irrigated together and have identical irrigation systems they should be treated as a single unit. Some details about each unit are then entered, starting with a name or number in the ‘Patch No.’ column to identify each management unit.
  • Room for 20.
  • Once the required details are entered the unused lines can be hidden IF macros are enabled. All lines that do not have an entry in the ‘Patch No.’ column will be hidden. If further lines are then required, the ‘Click to show all lines’ button can be used.

Slide 54
• Enter the required information for each management unit.
  • Patch details: e.g. variety.
  • Area: in hectares.
  • Irrigation type: selected from a drop down list that relates to the irrigation type names entered previously (see slide 52).
  • It is suggested to not rely on design specifications for application rates but rather use the ‘application rate calculator’. E.g. in some cases two shifts had identical application rates on paper, but when checked using meter readings one was 50% higher than the other.

Slide 55
• Select the application rate calculator tab.
• To get the required information for the calculator:
  • Start the irrigation shift.
  • Once the system is fully pressurised, record the meter reading and the precise time.
  • Before the shift shuts down re-read and record the meter and the time.
  • Enter the meter readings into the calculator.
  • Calculate the minutes between the readings and the area being irrigated. Enter into the calculator.
Slide 56

• Rationed ML/ha: The level of irrigation that is being allocated to each unit. In the Riverland (SA) for wine grapes generally work in the range 4-8 ML/ha, but there are many factors to consider including the desired yield, canopy size, variety, rootstocks, soil type, irrigation method and efficiency, mid-row management, weed control, end use of grapes, salinity management, other stress factors (e.g. nematodes), future plans, mothballing, sunburn issues, winery requirements. **Have to be realistic when allocating water to each patch.**

• Historical records are an ideal place to start, but it is even better to have completed a WPW, because you will know how much water is to be rationed to each patch to get the best returns for your water.

• A critical point to highlight to growers that this is the hardest part of the WBT, but if a WPW has been completed then this column is also very easy.

• ML/patch: Calculated using the ‘hectares’ previously entered.

• Rationed total: The predicted total water requirement to get the results that the ‘rationed ML/ha’ were based on.

• Surplus/Deficit: Compares the predicted water requirement to the water volume available.

Slide 57

• Deficit: More water required than available.

• There are a number of options that can take:
  o Option 1: Must consider the economics of purchasing additional water and the possibility of restrictions easing.
  o Option 2: May be through management changes such as improving weed control, performing regulated deficit irrigation, decreasing the canopy size and yield and mothballing. Must consider the short and long term effects of these changes on production and cash flow.
  o Option 3: Must consider the likelihood of restrictions easing and how long is the currently available water expected to last? To help answer this can look at the ‘water rationed per month’ row.

• The months that have the predicted water requirement available have the rationed volume shown. This relates to the monthly rationed % of rationed total. E.g. November’s 7.07ML is 11% of the required 64.28ML.

• The month that the available water is expected to run out in displays ‘SHORT’.

• Due to the deficit some months may not have any water available to ration to them and display ‘NIL’.

• Therefore in this example (set in November), have four months until expect to run out of available water. Therefore there is no urgent need to purchase additional water immediately.

• Can look at when expect to run out of available water (‘SHORT’) and compare to critical points in the season (e.g. flowering and harvest). Strategies may be developed to ensure adequate water is secured to reach these points on some or all of the property.

• For example in December 07 restrictions did ease to 32%. Therefore rather than running out in March, now expect a small surplus.

• Surplus: More water available than required.

  Options include:
  o Redistributing the surplus across the patches.
  o Trading the surplus water out.
  o Saving the surplus for potential carry-over or use during heat waves etc. as required.

Slide 58

• When dealing with a deficit each of the options has risks. These may be:
  o Economical: What will happen to the price of water, what is the cost of implementing water saving management options, what are the effects on income?
  o Production: What are the effects on production in this season and next season?
  o Personal: Consider the potential for stress levels and the subsequent effects.

• Need to weigh up all of these factors when completing WB and WPW.

• Keep up to date with weather forecasts and drought and MDB reports that are regularly produced to keep best informed about the potential for improvements to restriction levels.
Slide 59

• Location of the calculated irrigation guide.

Slide 60

• For each management unit an irrigation guide is calculated.
• The calculated value is the number of hours to irrigate each irrigation shift at the irrigation frequency chosen in that particular month.
• E.g. in December irrigate patch 4 for 6.0 hours every 7 days to use the budgeted amount for the month.
• This number is influenced by: monthly %, irrigation frequency, application rate and the rationed ML/ha.
• When first creating a WB take note of the calculated irrigation guide hours and compare them to irrigation practices in the past. E.g. If the guide suggests to irrigate for a lot longer than in past seasons, then the ‘rationed ML/ha’ may be too high, the irrigation frequency may be too far apart or the application rate may be incorrect (too low) & vice versa.
• It is a guide only so growers need to monitor vine health and soil moisture levels with other tools available. If vines are constantly struggling may need to reconsider the rationed amount, or be prepared to sacrifice some production.
• Use weather forecasts to prepare for heat waves and if substantial rain falls there is the opportunity to ‘save’ water.

Slide 61

• Need to consider the ‘depth’ of water to be applied and relate this to the root zone.
• E.g. If the guide was suggesting irrigate for 10 hours every 10 days and it was known that this volume of water would result in too much moving past the root zone, the frequency may be increased, e.g. to every 7 days, resulting in shorter irrigation lengths that target the root zone, e.g. 7 hours.
• In most cases do not irrigate for very short periods as much of the water applied will be lost through evaporation (especially full cover).
• E.g. Patch 4 in June has 1.3 hours rationed. This could be combined with May’s 3.4 hours to make it more effective.

Slide 62

• Location of the monitoring water use parts.

Slide 63

• Enter the meter outlet number or block name to identify each meter.
• Look on statements from the water supplier or contact them to get the ‘Start of July reading’.

Slide 64

• The ‘Meter ID’ is carried down from above.
• Throughout the season enter an end of month meter reading for each meter.
• If no irrigation occurred during a month an entry is still required and the last known reading should be used.
• The ‘Actual water use per month is calculated when:
  1 A meter reading is entered for every meter.
  2 Each meter reading is greater than or equal to the previous month’s.
• This calculated value can be compared to the rationed monthly volume.
• Part way through a month meter readings can be entered to assess how much water has been used so far. These are then replaced by the end of the month readings later on.
• The cumulative water use for the season is calculated and compared to the cumulative rationed water volume in the ‘cumulative surplus/deficit’ row. This value is saying ‘x’ amount of water has been used above (deficit) or below (surplus) what was rationed to be used up to this point in time.
Slide 65
• Note: The ‘cumulative surplus/deficit’ does not include any surplus that may be present in cell G42.

Slide 66
• Summary: The WB has four parts.
  o Water supply information.
  o Water use information.
  o Calculated irrigation guide. (A lot of growers find it useful to print the WB and stick it in the pump shed.)
  o Monitoring water use.
  o Only coloured cells require data to be entered.
  o Any changes made will be automatically recalculated.
  o Doing the next year’s water budget is easy and only takes a few minutes. Simply re-save under a new name and delete the meter readings and if required make any other changes (these will generally only be minor).

Slide 67
• Not surprisingly different crops have different water use patterns across the season. E.g. the grapevines and citrus as shown on the graph.
• Trying to take this into account when producing a WB can create headaches. A second WB tool developed by CCW allows for up to four different water use patterns across the season, making this process simple. Different crops that our growers have used the budget for include citrus, almonds, olives, avocado, Lucerne, etc. It is basically the same as the single crop WB with only two main differences.
• The monthly rationed % now has four different options.
• Enter a name for each crop type as required and then their corresponding monthly %.
• In addition to separating crop types, single crops can be split into groups that have different patterns of water use. E.g. early harvested white wine grape varieties versus red varieties that receive regulated deficit irrigation.
• Suggested monthly % are included for wine grapes, citrus and stone fruit and the calculator can be used to calculate suggested % for any crop with monthly crop factors (with evaporation data).
• There is a new column called ‘crop type’. For each management unit a crop type must be selected from the drop down list, which is linked to the crop type names entered above.

Slide 68
• Any questions?

Slide 69
• During grower training sessions held by CCW the growers complete a practical example on individual computers for each tool.
• Growers enter the information themselves and individual assistance is provided as required.

Slide 70
• This is an example of a handout for growers to use for the practical example.

Slide 71
• Summary tables are provided in the training manual for both tools.

Slide 72
• The drought program has been made possible thanks to the Australian government.

Slide 73
• Good Luck!
WATER PRIORITY WORKSHEET - SUMMARY TABLES
(UOM = unit of measurement)

Table 1: Patch information DATA ENTRY

<table>
<thead>
<tr>
<th>Cell Name</th>
<th>Cell reference</th>
<th>Information required</th>
<th>UOM</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patch</td>
<td>Column A</td>
<td>A name or number to identify each patch.</td>
<td>-</td>
<td>Divide the property into management units.</td>
</tr>
<tr>
<td>Variety</td>
<td>Column B</td>
<td>The variety of each patch.</td>
<td>-</td>
<td>Not compulsory.</td>
</tr>
<tr>
<td>Hectares</td>
<td>Column C</td>
<td>The area of each patch.</td>
<td>ha</td>
<td></td>
</tr>
<tr>
<td>Predicted $/tonne</td>
<td>Column D</td>
<td>The predicted value of the crop from each patch.</td>
<td>$/tonne</td>
<td>Consult with the purchaser (e.g. winery) about the future crop value.</td>
</tr>
</tbody>
</table>

Table 2: Water information DATA ENTRY

<table>
<thead>
<tr>
<th>Cell Name</th>
<th>Cell reference</th>
<th>Information required</th>
<th>UOM</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allocation name</td>
<td>H7 &amp; I7</td>
<td>A name to identify different allocation types.</td>
<td>-</td>
<td>Allocation types that may have different restriction levels during the season should be kept separate. E.g. High and low reliability allocations or allocations from different states.</td>
</tr>
<tr>
<td>Total allocation</td>
<td>H8 &amp; I8</td>
<td>The total unrestricted allocation.</td>
<td>Megalitres</td>
<td></td>
</tr>
<tr>
<td>Water restriction</td>
<td>H9 &amp; I9</td>
<td>The % of the allocation available (% restricted to).</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Carry-over water</td>
<td>H11 &amp; I11</td>
<td>The volume of carry-over water available from the previous year.</td>
<td>Megalitres</td>
<td></td>
</tr>
<tr>
<td>Traded water - IN</td>
<td>H14</td>
<td>The total available volume of water already traded (leased) IN this season.</td>
<td>Megalitres</td>
<td>Allows temporary water already purchased this season be accounted for. If more water is purchased these cells can be updated.</td>
</tr>
<tr>
<td>Total value of water - IN</td>
<td>H15</td>
<td>The total value of water already traded (leased) IN this season.</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Traded water - OUT</td>
<td>I14</td>
<td>The total available volume of water already traded (leased) OUT this season.</td>
<td>Megalitres</td>
<td>Allows water already leased out from your allocation this season to be accounted for. In many cases no water will be traded out and these cells can be left blank.</td>
</tr>
<tr>
<td>Total value of water - OUT</td>
<td>I15</td>
<td>The total value of water already traded (leased) OUT this season.</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Set aside for next season</td>
<td>I17</td>
<td>The volume of water that is planned to be remaining at the end of the season for carry-over to next season.</td>
<td>Megalitres</td>
<td>Earmarking this water for the next season assumes carry-over will be an option and decreases the volume of water available for this season.</td>
</tr>
<tr>
<td>Price/ML of water</td>
<td>I22</td>
<td>The current market value of temporary (this season only) water allocations.</td>
<td>$</td>
<td>Should include all associated fees and charges.</td>
</tr>
<tr>
<td>% of purchased water available</td>
<td>I23</td>
<td>The percentage of the water available.</td>
<td>%</td>
<td>E.g. if the water is completely available enter 100(%).</td>
</tr>
</tbody>
</table>
### Table 3: Normal scenario DATA ENTRY

<table>
<thead>
<tr>
<th>Cell Name</th>
<th>Cell reference</th>
<th>Information required</th>
<th>UOM</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML/ha</td>
<td>Column C</td>
<td>The irrigation level required by each patch for normal production.</td>
<td>ML/ha</td>
<td>Historical averages of water use and yields are a suitable starting point.</td>
</tr>
<tr>
<td>t/ha</td>
<td>Column E</td>
<td>The expected yield of each patch when receiving the normal irrigation level.</td>
<td>t/ha</td>
<td></td>
</tr>
<tr>
<td>Running costs</td>
<td>E52</td>
<td>The annual costs per hectare.</td>
<td>$/ha</td>
<td>It is important to keep how this is calculated uniform across each of the scenarios.</td>
</tr>
</tbody>
</table>

### Table 4: Low scenario DATA ENTRY

<table>
<thead>
<tr>
<th>Cell Name</th>
<th>Cell reference</th>
<th>Information required</th>
<th>UOM</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML/ha</td>
<td>Column C</td>
<td>The minimum irrigation level required by each patch to produce a useable crop.</td>
<td>ML/ha</td>
<td>To be ‘useable’ the crop must meet the quality requirements of the purchaser and be worthwhile harvesting. Have to be realistic when predicting these values.</td>
</tr>
<tr>
<td>t/ha</td>
<td>Column E</td>
<td>The predicted yield at this low irrigation level.</td>
<td>t/ha</td>
<td></td>
</tr>
<tr>
<td>Running costs</td>
<td>E82</td>
<td>The annual costs per hectare.</td>
<td>$/ha</td>
<td>It is important to keep how this is calculated uniform across each of the scenarios.</td>
</tr>
</tbody>
</table>

### Table 5: Working scenario DATA ENTRY

<table>
<thead>
<tr>
<th>Cell Name</th>
<th>Cell reference</th>
<th>Information required</th>
<th>UOM</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML/ha</td>
<td>Column G</td>
<td>The chosen irrigation level to be allocated to each patch.</td>
<td>ML/ha</td>
<td>This irrigation level is used to predict a yield based on the data entered in tables 3 and 4. Can change these values at any stage to observe the effect on the predicted returns in the working scenario.</td>
</tr>
<tr>
<td>Running costs</td>
<td>I117</td>
<td>The annual costs per hectare.</td>
<td>$/ha</td>
<td>It is important to keep how this is calculated uniform across each of the scenarios.</td>
</tr>
</tbody>
</table>
Water Priority Worksheet – practical example handout

Account Information (Outlet 1045)

<table>
<thead>
<tr>
<th>Detail</th>
<th>(ML)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanent Allocation 1 July</td>
<td>59.270</td>
</tr>
<tr>
<td>Temporary Trade</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Account Information (Outlet 2651)

<table>
<thead>
<tr>
<th>Detail</th>
<th>(ML)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanent Allocation 1 July</td>
<td>87.840</td>
</tr>
<tr>
<td>Temporary Trade</td>
<td>12.000</td>
</tr>
</tbody>
</table>

Total allocation: $59.27 + 87.84 = 147.11 ML

Current restriction = 16%

Carry-over water = 8.32 ML available

Water traded IN = 12 ML for $6000

Use the current market value of temporary water allocations.

Use your choice for the running costs per hectare.

Patch information:

<table>
<thead>
<tr>
<th>Patch</th>
<th>Variety</th>
<th>Rootstock</th>
<th>Area (ha)</th>
<th>Normal ML/ha</th>
<th>Normal t/ha</th>
<th>Predicted Low ML/ha</th>
<th>Predicted Low t/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chard</td>
<td>Ramsey</td>
<td>2.33</td>
<td>7</td>
<td>27</td>
<td>4.5</td>
<td>13</td>
</tr>
<tr>
<td>2</td>
<td>Cab S</td>
<td>Own</td>
<td>1.90</td>
<td>6.5</td>
<td>18</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>Semillon</td>
<td>Ramsey</td>
<td>3.06</td>
<td>7.5</td>
<td>32</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>4</td>
<td>Shiraz</td>
<td>Own</td>
<td>2.61</td>
<td>6</td>
<td>18</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>Shiraz</td>
<td>Paulsen</td>
<td>2.88</td>
<td>5.5</td>
<td>20</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>12.78</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Once completed the water priority worksheet:

<table>
<thead>
<tr>
<th>Patch</th>
<th>Final ML/ha in working scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>
## Water Budgeting Tool - summary tables

(UOM = unit of measurement)

### Table 1: Water SUPPLY information DATA ENTRY

<table>
<thead>
<tr>
<th>Cell Name</th>
<th>Cell reference</th>
<th>Information required</th>
<th>UOM</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total allocation</td>
<td>G1/H1</td>
<td>The total unrestricted water allocation for the property. Different allocation types should be kept separate.</td>
<td>Megalitres</td>
<td>If separate allocations for different properties are inter-changeable then the properties can be combined on a single water budget.</td>
</tr>
<tr>
<td>Water restriction</td>
<td>G2/H2</td>
<td>The % of the allocation available (i.e. the % restricted to).</td>
<td>%</td>
<td>May be very low at the start of the season but as restrictions ease can simply re-enter the new % available.</td>
</tr>
<tr>
<td>Carry-over water</td>
<td>G4</td>
<td>The volume of carry-over water available from the previous year.</td>
<td>Megalitres</td>
<td></td>
</tr>
<tr>
<td>Net traded water</td>
<td>G5</td>
<td>The net volume of available water traded in and out for the season.</td>
<td>Megalitres</td>
<td>Equals the available water traded in less the available water traded out.</td>
</tr>
</tbody>
</table>

### Table 2: Water SUPPLY information CALCULATED VALUES

<table>
<thead>
<tr>
<th>Cell Name</th>
<th>Cell reference</th>
<th>Information calculated</th>
<th>UOM</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available water</td>
<td>G3/H3</td>
<td>The volume of water of the total allocation that is available.</td>
<td>Megalitres</td>
<td></td>
</tr>
<tr>
<td>TOTAL AVAILABLE WATER</td>
<td>G6</td>
<td>The volume of water in total that is available to the property.</td>
<td>Megalitres</td>
<td>Includes any carry-over water and the net volume of traded water.</td>
</tr>
</tbody>
</table>

### Table 3: Water USE information DATA ENTRY

<table>
<thead>
<tr>
<th>Cell Name</th>
<th>Cell reference</th>
<th>Information required</th>
<th>UOM</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated % of rationed amount used / month</td>
<td>Row 11</td>
<td>The % of the annual water requirement that is estimated to be used in each month. The ‘Season Total’ (T11) cannot exceed 100.</td>
<td>%</td>
<td>The water allocated to each patch is rationed across the season according to these %. Suggested monthly % supplied are based on Loxton data, but more localised suggested % can be calculated below the water budget.</td>
</tr>
</tbody>
</table>
| Desired irrigation frequency | G15 – 17 Rows 15 - 17 | • A name for each irrigation type/ pattern/ frequency.  
• The ideal number of days between irrigations for each month. | Days    | This allows the separation of different parts of the property that may require different irrigation patterns. E.g. due to soil type, irrigation type, management options. |
| Patch No.               | Column A       | A name/number to identify the management unit.                                    | -       | If no entry then the row will be hidden if the ‘hide unused lines’ macro is used. |
| Patch details           | Column B       | Some further identification. E.g. variety.                                       | -       | Not compulsory or used for anything further.                             |
| Area                    | Column C       | The area of each management unit.                                                 | Hectares| Be as accurate as possible.                                              |
| Application rate        | Column D       | The application rate during a normal irrigation event.                            | mm/hour | Calculate using the application rate calculator (blue tab).              |
| Irrigation type         | Column E       | Select from the drop down list.                                                   | -       | Click on the cell and then click on the grey box to view the drop down list. |
| Rationed amount /ha     | Column F       | The irrigation rate allocated to each management unit.                            | ML/hectare | See the notes for slide 22.a for an extensive list of factors to consider. |
### Table 4: Water USE information CALCULATED VALUES

<table>
<thead>
<tr>
<th>Cell Name</th>
<th>Cell reference</th>
<th>Information calculated</th>
<th>UOM</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rationed amount / patch</td>
<td>Column G</td>
<td>The volume of water rationed to each patch (management unit).</td>
<td>Megalitres</td>
<td>Requires an area and rationed amount ML/ha to be entered.</td>
</tr>
<tr>
<td>Rationed total</td>
<td>G41</td>
<td>The sum of the rationed amounts per patch.</td>
<td>Megalitres</td>
<td>The predicted water requirement for the property.</td>
</tr>
<tr>
<td>Surplus / Deficit</td>
<td>G42</td>
<td>The difference between the ‘rationed total’ volume and the ‘total available water’.</td>
<td>Megalitres</td>
<td>See the notes for slides 22.d and 23 for suggested options for both surpluses and deficits.</td>
</tr>
<tr>
<td>Total water rationed per month</td>
<td>Row 44</td>
<td>The water is rationed out for what is estimated is required in each month until the available water is used up.</td>
<td>Megalitres</td>
<td>Value: Water is available to meet the estimated need for this month. SHORT: Expect to use up available water. NIL: No available water left for this month.</td>
</tr>
</tbody>
</table>

### Table 5: Calculated irrigation GUIDE CALCULATED VALUES

<table>
<thead>
<tr>
<th>Cell Name</th>
<th>Cell reference</th>
<th>Information calculated</th>
<th>UOM</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of each irrigation</td>
<td>H21 - S40</td>
<td>The calculated irrigation length at the specified frequency, (with the entered application rate,) to use the rationed percentage of the rationed amount.</td>
<td>Hours</td>
<td>Requires a valid entry in parts 2a, 2b, 2e, 2f, 2g and 2h.</td>
</tr>
</tbody>
</table>

### Table 6: MONITORING water use DATA ENTRY

<table>
<thead>
<tr>
<th>Cell Name</th>
<th>Cell reference</th>
<th>Information required</th>
<th>UOM</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meter ID</td>
<td>L2 - L8</td>
<td>Identification for each meter.</td>
<td>-</td>
<td>E.g. Outlet number or block name. There is room for seven meters.</td>
</tr>
<tr>
<td>START of July reading</td>
<td>N2 - N8</td>
<td>The reading for each meter at the start of the season.</td>
<td>Megalitres</td>
<td>Look on statements from the supplier or contact the supplier directly.</td>
</tr>
<tr>
<td>Monthly meter readings</td>
<td>Rows 57 - 53</td>
<td>The reading for each meter at the end of each month.</td>
<td>Megalitres</td>
<td>A reading must be entered for every meter even if no irrigation took place (e.g. use the last known reading).</td>
</tr>
</tbody>
</table>

### Table 7: MONITORING water use CALCULATED VALUES

<table>
<thead>
<tr>
<th>Cell Name</th>
<th>Cell reference</th>
<th>Information calculated</th>
<th>UOM</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual water use / month</td>
<td>Row 54</td>
<td>The volume of water used in that month.</td>
<td>Megalitres</td>
<td>Requires an entry that is greater than or equal to the previous month before it will be calculated. This can be compared to the rationed monthly volume.</td>
</tr>
<tr>
<td>Cumulative RATIONED water use</td>
<td>Row 56</td>
<td>The volume of water rationed to be used up to this month.</td>
<td>Megalitres</td>
<td></td>
</tr>
<tr>
<td>Cumulative ACTUAL water use</td>
<td>Row 57</td>
<td>The actual volume of water that has been used up to this month.</td>
<td>Megalitres</td>
<td>If the precise value is required look at the season total of the actual water use / month (T54).</td>
</tr>
<tr>
<td>Cumulative SURPLUS/DEFICIT</td>
<td>Row 58</td>
<td>This amount of water has been used above (deficit) or below (surplus) what was rationed to be used up to this point in time.</td>
<td>Megalitres</td>
<td>Does not include any surplus from G42 (if present).</td>
</tr>
</tbody>
</table>
Water Budgeting Tool - practical example handout

Account Information (Outlet 1045)  
<table>
<thead>
<tr>
<th>Detail</th>
<th>(ML)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanent Allocation 1 July</td>
<td>59.270</td>
</tr>
<tr>
<td>Temporary Trade</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Account Information (Outlet 2651)  
<table>
<thead>
<tr>
<th>Detail</th>
<th>(ML)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanent Allocation 1 July</td>
<td>87.840</td>
</tr>
<tr>
<td>Temporary Trade</td>
<td>12.000</td>
</tr>
</tbody>
</table>

Total allocation:  
\[59.27 + 87.84 = 147.11\] ML  
Current restriction  
\[= \frac{147.11}{100} = 16\%\]  
Carry-over water  
\[= 8.32\] ML available  
Water traded IN  
\[= 12\] ML for $6000

Meter Readings (Outlet 1045)  
<table>
<thead>
<tr>
<th>Date</th>
<th>Meter reading (ML)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5th July 2006</td>
<td>392.487</td>
</tr>
<tr>
<td>30th July 2006</td>
<td>392.487</td>
</tr>
<tr>
<td>31st August 2006</td>
<td>394.265</td>
</tr>
<tr>
<td>28th September 2006</td>
<td>397.114</td>
</tr>
<tr>
<td>27th October 2006</td>
<td>403.513</td>
</tr>
<tr>
<td>30th November 2006</td>
<td>408.162</td>
</tr>
</tbody>
</table>

Meter Readings (Outlet 2651)  
<table>
<thead>
<tr>
<th>Date</th>
<th>Meter reading (ML)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st July 2006</td>
<td>10.779</td>
</tr>
<tr>
<td>30th July 2006</td>
<td>10.779</td>
</tr>
<tr>
<td>31st August 2006</td>
<td>11.608</td>
</tr>
<tr>
<td>4th October 2006</td>
<td>12.691</td>
</tr>
<tr>
<td>27th October 2006</td>
<td>15.257</td>
</tr>
<tr>
<td>30th November 2006</td>
<td>18.945</td>
</tr>
</tbody>
</table>

Patch information:  
<table>
<thead>
<tr>
<th>Patch</th>
<th>Variety</th>
<th>Rootstock</th>
<th>Area (ha)</th>
<th>App Rate (mm/hr)</th>
<th>Irrigation type</th>
<th>Example Rationed amount (ML/ha) (can be altered)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chard</td>
<td>Ramsey</td>
<td>2.33</td>
<td>4.2</td>
<td>Sprinklers</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>Cab S</td>
<td>Own</td>
<td>1.90</td>
<td></td>
<td>Sprinklers</td>
<td>6.5</td>
</tr>
<tr>
<td>3</td>
<td>Semillon</td>
<td>Ramsey</td>
<td>3.06</td>
<td></td>
<td>Drippers</td>
<td>7.5</td>
</tr>
<tr>
<td>4</td>
<td>Shiraz</td>
<td>Own</td>
<td>2.61</td>
<td>1.2</td>
<td>Drippers</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>Shiraz</td>
<td>Paulsen</td>
<td>2.88</td>
<td>1.1</td>
<td>Drippers</td>
<td>5.5</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12.78</td>
</tr>
</tbody>
</table>

Calculating the Application Rate: Use the application rate calculator (blue tab)  

Patch 2:  
Start reading = 11.383 ML,  
Finish reading = 11.432 ML,  
Minutes run = 31

Patch 3:  
Start reading = 393.713 ML,  
Finish reading = 393.739 ML,  
Minutes run = 45

Example irrigation frequencies:

<table>
<thead>
<tr>
<th>Irrigation type</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sprinklers</td>
<td>31</td>
<td>31</td>
<td>30</td>
<td>15</td>
<td>10</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>10</td>
<td>15</td>
<td>31</td>
</tr>
<tr>
<td>Drippers</td>
<td>31</td>
<td>31</td>
<td>10</td>
<td>7</td>
<td>3</td>
<td>2</td>
<td>1.5</td>
<td>2</td>
<td>2.5</td>
<td>5</td>
<td>15</td>
<td>30</td>
</tr>
</tbody>
</table>