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## *Irrigation Management Series*

# *Seasonal Allocations In NZ*

The Selwyn-Rakia review has seen many consent holders receiving letters outlining the details of the alterations of consents to the new Seasonal Allocation regime. I have had many clients ask what this means in terms of their operations and some with great concerns as to how it may affect them. My intention here is to not delve into the politics or details of the process, but look at what this may mean in terms of on farm irrigation management. Seasonal allocations are not just going to affect consent holders in the Selwyn-Rakaia area, but will in time affect many other parts of Canterbury and therefore many other farmers should be thinking ahead about how this may alter the way they farm.

Why do we have irrigation? Simple answer is insurance against periods when rainfall and soil water reserves do not meet the demand for water. During these times with no irrigation production would decrease. Characterising long term monthly average rainfall in Canterbury it is relatively even throughout the year with only a slight increase in winter months. Another characterisation is it can be highly variable as can be seen from the 20 year rainfall record for Winchmore in Figure 1.

With seasonal allocations you have a finite volume of water to use during the season. Use too much of your allocation in the spring and you may find yourself with no irrigation in the Autumn, a situation that may or may not be avoidable depending on the season and the terms of the consent, but a better understanding of the situation and some form of active planning and management will be required to reduce the risks of this situation developing.

Looking again at longer term averages for Rainfall minus Evapotranspiration at Winchmore (Figure 2) we can see the range the Deficits/Excess of water have fallen into in the last 20 years. Note: no one year has followed the Maximum or Minimum line, but these lines give some idea of the boundaries of the deficits that may need to be contended with on a monthly basis. The actual variability within the season can be quite marked as monthly data for the last 6 seasons indicates (Figure 3). As you are all aware some seasons can be more challenging. Looking at the Total Irrigation Season (October – March) season Deficit (Rainfall-ET) as shown in Table 1 you can see the variations across seasons.

Now if you have received advice from Ecan that you have been allocated X number of litres for the season and then extrapolated it to mm/ha and came up with a figure like 512 mm. If you where near Winchmore, you may look at Table 1 and see a maximum deficit of 401 mm in the last 6 seasons and feel comfortable in your position. Sorry, it is a little more complicated than that. These deficit calculations assume all rainfall will be available for use by the pasture or crop. This will most certainly not be the case as when rain falls in large events the soil water storage capacity of the soil will often be exceeded and the rainfall will be lost through

drainage to below the root system. So while from a management perspective we would not want rain falling continuously in small events, this would certainly increase our chances of being able to utilise all rain that fell through the season.

To get a better feeling for the true level of deficit an effective irrigation season rainfall needs to be calculated. Without going into detailed methods I have modelled soil retention of rainfall for a lower water holding capacity soil such as a Lismore stony silt loam. It is a basic model with many assumptions and in some years may over or under estimate effective rainfall, but with these constraints in mind the model illustrates the point that effective rainfall is much less than the actual and this has a marked effect on the seasonal deficit. Referring again to Table 1 the effective rainfall and the calculated modified deficit can be seen. Now with several years in the mid to high 400's you may not feel quite as relaxed about your allocation. Now if it had been a dry winter and you enter the spring with say a 40 mm deficit you could easily require your 512 mm of water to get through the season.

So what can we do to reduce the risks of having to stop irrigating as the season allocation is spent?

- Have a monitoring system to measure your soil moisture deficit so you apply the correct application.
- Where you have better water holding capacity soils try and manage your soil moisture deficit in the shoulder seasons to allow some rain to be retained, even after irrigation (i.e. control the soil moisture to below Field Capacity, but safely above refill or stress point).
- Consider if your irrigators allows you to apply smaller depth applications in the shoulder seasons or following rainfall to insure water is not wasted to drainage. Can your system put on less than 20 mm if that is required?
- Consider installing automatic shut offs on travellers so they do not sit for long periods at the end of runs overwatering one small area and using up valuable allocation.
- Make sure hydrants are properly closed as leaky hydrants can use more water than you think.

The key to success under the new regime will be managing an efficient application system well, by understanding the actual requirements for soil water and altering return periods and depth of applications to match this. A suitable soil moisture monitoring system will be by far the easiest and most efficient means to achieve this.

AQUAFLEX NZ are available to assist you with developing an irrigation management system for your operation, please feel free to contact them on 03 3848900 or visit www.aquaflex.co.nz

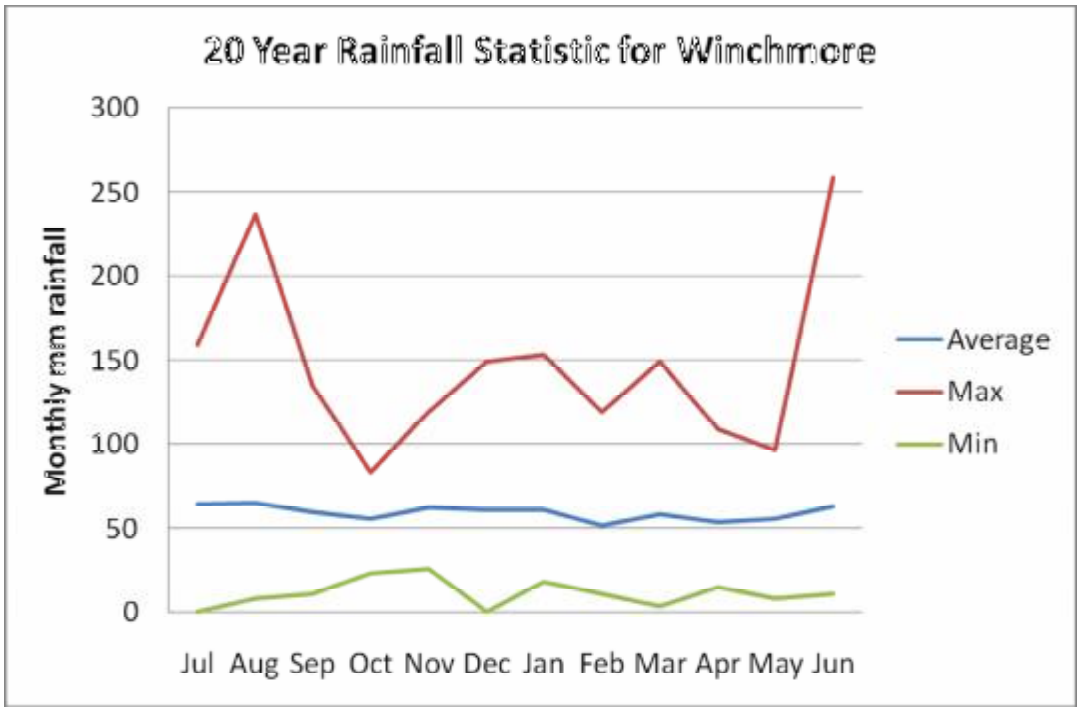


**Figure 1: 20 Year monthly rainfall statistics for Winchmore (Source: National Climate Database).**

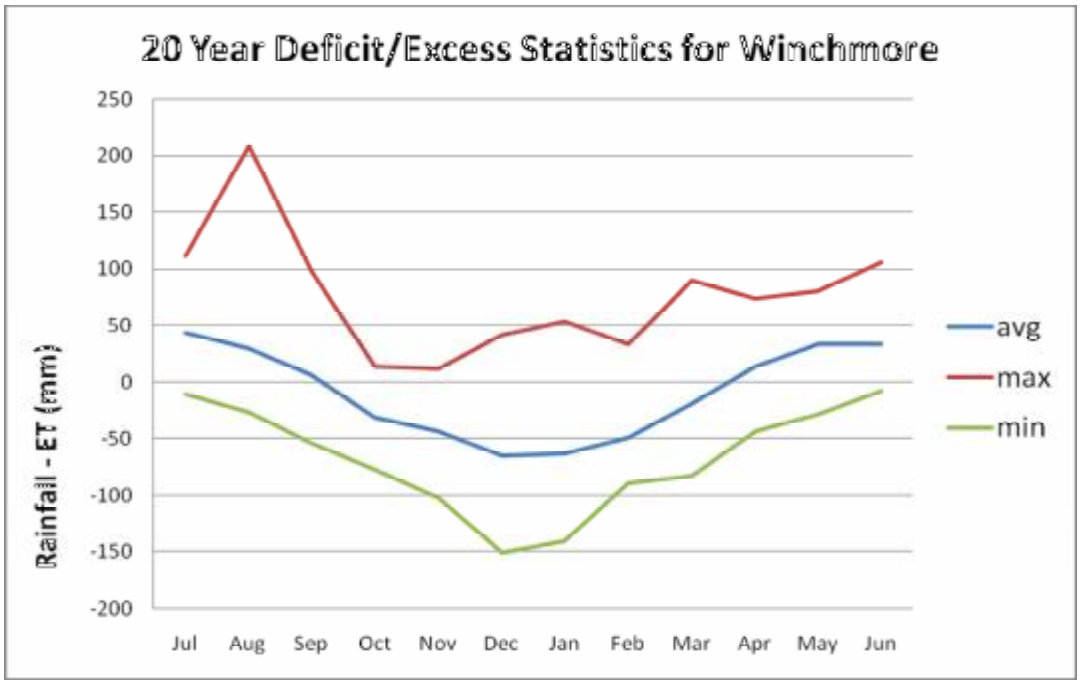


**Figure 2: Long term (20 year) Monthly Rainfall-Evapotanspiration Data from Winchmore (Source: National Climate Database).**

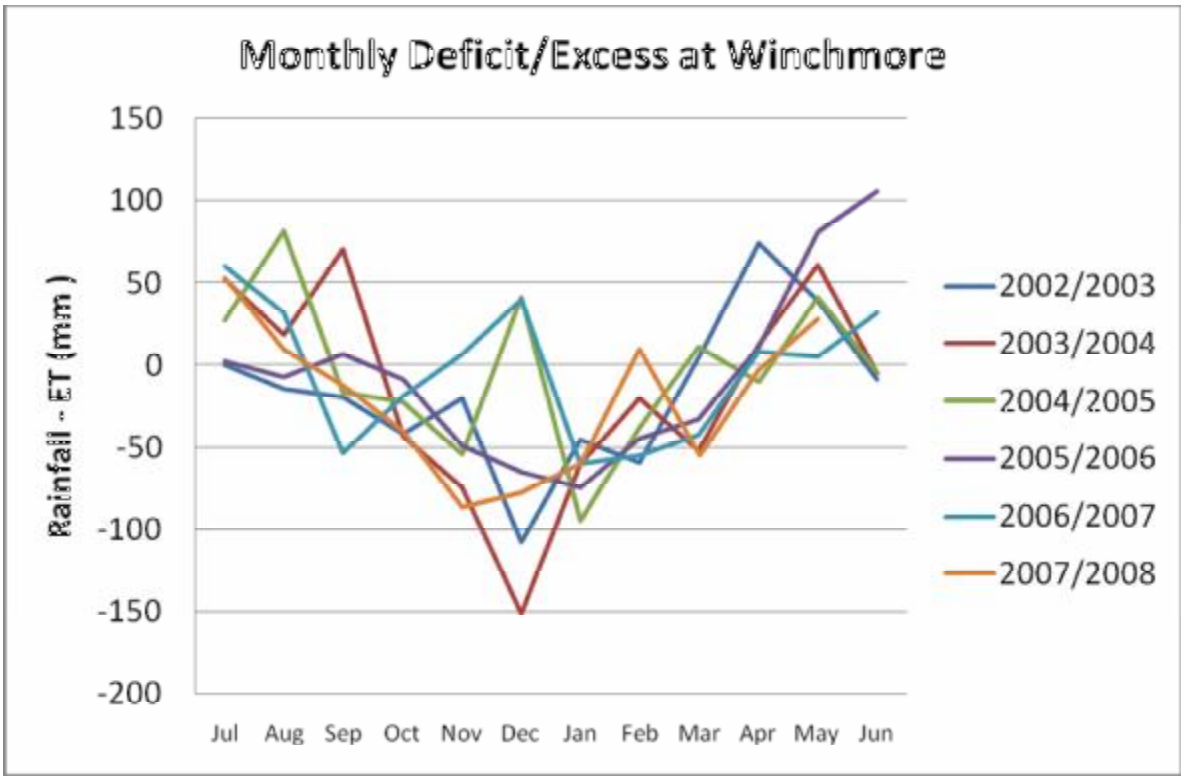


**Figure 3: Monthly Rainfall-Evapotanspiration Data from Winchmore 2003-2007 (Source: National Climate Database).**

| Year | Rain | Effective Rainfall | ET | Deficit | Modified Deficit |
|---|---|---|---|---|---|
| 2002/2003 | 384.8 | 220 | 653 | -268 | -432 |
| 2003/2004 | 283 | 220 | 684 | -401 | -464 |
| 2004/2005 | 445.4 | 278 | 602 | -157 | -324 |
| 2005/2006 | 326.8 | 245 | 603 | -276 | -358 |
| 2006/2007 | 455.2 | 280 | 584 | -129 | -304 |
| 2007/2008 | 320.6 | 222 | 694 | -373 | -472 |

**Table 1: Irrigation Season Deficit Calculation and Modified Deficit calculation that utilised estimated effective irrigation season rainfall.**