RESEARCH PAPERS : WATER SAVINGS FROM WILLOW REMOVAL

Quantifying water savings from willow removal in creeks in south central NSW

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Research scope

This research was conducted to assess the potential water saving from willow removal from streams in the irrigation areas of south central NSW. To achieve this a desk-top study was undertaken to estimate the water savings that might result from reduced evapotranspiration (ET) in response to the removal of willows from Yanco Creek. The estimates were then compared to the results of a field study which directly measured water use of willows and natural riparian vegetation (river red gums) along Yanco Creek.

The Yanco Creek Management Plan seeks to identify current water losses from the system which can potentially be returned to the river, otherwise irrigators may be forced to reduce their water allocations. This study was therefore important as it investigated whether removing willows could potentially return water to the system.

Results to date

The results of the desktop study predicted mean annual evapotranspiration per hectare of willow crown projected area, ranged from 12.5 to 19 ML ha^{-1} $year^{-1}$. The potential mid range net water saving from willow removal was predicated to be 2-4 ML ha^{-1} $year^{-1}$ of willow crown projected area.

The results of the field study indicated a large difference in transpiration between willows in the stream bed and those along the drier stream bank. Total evapotranspiration of the red gums and bank willows of 5.5 and 5.6 ML ha^{-1} respectively was similar for a 12 month period, while total ET of the willows in the stream bed was considerably higher at 19.9 ML ha^{-1} due to their very high rates of transpiration. Total ET from open water was calculated using pan evapotranspiration and totalled 16.4 ML ha^{-1} for the same period. These results indicate a potential net saving of 3.5 ML ha^{-1} is possible based on the difference in total ET between willows in the creek and open water.

Implications for management

Our research indicates that there is a potential for water savings of 3-4 ML ha^{-1} if the willows situated in the stream bed with permanent access to water were to be removed. Such removal might also improve stream flow rates and reduce the stream width for a given flow rate, which will result in lower evaporation rates from the stream surface. A likely goal of the research would be to restore natural vegetation to the creek banks, with no net change in water loss.

Further work needed / gaps

Water use measurements have continued along the creek this summer (06/07) in order to increase the certainty around the potential water savings however the drought and record low creek levels have had an impact on the results. Further measurements will therefore be required in order to develop a relationship between willow water use and creek water levels.

Carry out similar field studies in other parts of south east Australia, in different climatic zones to allow decisions about willow water use and removal to be made, based on sound site specific science.

Related publications

T.M.Doody, R.G.Benyon and T.Theiveyanathan (2006). Quantifying water savings from willow removal in creeks in south central NSW. http://www.riversymposium.com/index.php?page=papers – Tanya Doody

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