

The Problem with Willows and why we need to manage them?

Willows are now regarded as one of Australia's most serious riparian and wetland weeds and, in 1999, were listed as one of Australia's 20 Weeds of National Significance (WoNS)¹. They currently infest thousands of kilometers of waterways across south-east Australia and cause substantial social, economic and environmental impacts, including:

Increased erosion and flooding

Although willows were originally planted along waterways to combat bank instability, in many situations, such stability tends to be only temporary. Willows can grow in continually wet sediment and hence encroach towards the centre of waterways. Fallen debris and the dense mats of willow roots then trap silt, build up the level of the stream bed and divert water flow into the banks, thereby increasing erosion and flooding.

On narrow rivers like the Mongarlowe, as willows grow into the stream channel, they tend to become wider and shallower, the willows growing in mid stream divert water against the bank, leading to increased flooding and erosion behind the willows until the channels have expanded. Long overhanging branches or numerous trunks growing in the water encourage the collection of silt and debris, which can lead to complete blockages of the stream. Eventually, waterways may change course to flow around willows, creating 'braided' streams with mid-stream islands.

Reduced water quality and flow of water

In contrast to native evergreens, willows are deciduous². Dense shade in spring and summer and heavy leaf fall in autumn and winter suppress indigenous vegetation and river fauna. The massive leaf drop, rapid break down of these leaves and extreme variation in leaf cover across the year can alter the temperature and oxygen content of the water. As a result, water quality is significantly reduced and sensitive aquatic life can be killed. Depleted oxygen levels in rivers with low autumn flows and leaf drop have been known to result in fish kills.

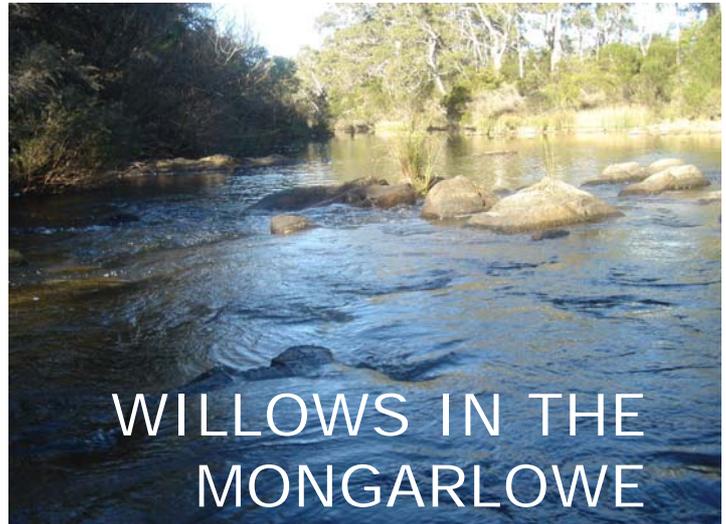
Obstructing access to streams for fishing and aquatic activities

Willows form dense root mats and stems that encroach into the river and can block access for speedboats, canoes and rafts. Along narrow streams, willows can mat completely across the stream, blocking access along the stream.

Damage to nearby infrastructure

Willow wood is lighter than native Australian woods. Whereas native woods tend to sink where they fall, locking in the river bed and banks, willow wood floats and can easily drift and take root downstream or accumulate and cause damage to downstream infrastructure.

¹ Except *S. babylonica*, *S. x calodendron* and *S. x reichardtii*



a guide to ISSUES, IDENTIFICATION & MANAGEMENT

Reduced availability of water

Willows are water guzzlers. When they extend their roots into the waterway, they can consume significant amounts of water and dry out small streams and swamps. In a recent study near Jerilderie, New South Wales, initiated by local irrigators, it was estimated that if willows situated in the stream bed with permanent access to water were removed and replaced with native eucalypts on the river bank, there would be potential water savings of 3-4 megalitres per hectare per year. This is equivalent to approximately 1-1.5 olympic-sized swimming pools full of water!

"This country was originally bare with the creek actually running consistently. Thanks to the willows it's now called Mandurama Ponds now. Where the willows are, we have no water left. Where the willows have been cleared the creek has started to run again." Local Landholder Central NSW

Less habitat available for fish, birds, frogs, insects mammals and reptiles

Willows can spread prolifically, either by fragments or by seed. As such, they are highly invasive and can dominate rivers, streams and wetlands while spreading to other intact areas. This leads to a marked reduction in the natural diversity of flora and

² The Chilean pencil willow (*S. chilensis*- also known as *S. humboldtiana*) is an exception, as it is only semi-deciduous, retaining some of its leaves all year round.

fauna and the habitat or conservation values of an area. Willows are poor habitat for hollow-dependent mammals and birds, and snag-dependent fish. Many native fish rely on in-stream snags for habitat. Bare banks beneath willows provide little to no protection for frogs, water rats, snakes and lizards. The mat-forming roots of willows can smother and fill all available rock crevices, thereby destroying critical habitats for endangered aquatic animals, such as frogs. Fewer insects in the canopy mean fewer insectivorous birds and fewer insects to drop into the water to provide food for fish and other animals. The composition of invertebrates in the leaf litter is altered, as willow leaves are softer and thinner and break down more quickly than native leaves.

The widespread planting of willows has come back to bite us – we need to manage willows to protect the social economic and environmental values of Australian waterways, swamps, wetlands and national parks

Why are my Willows looking sick? – Willow Sawfly

In 2004-05 landowners and riparian managers noticed willows were starting to lose their leaves over summer. Upon investigation they found the Willow Sawfly larvae was eating the leaves.



Biological control for Willows was rejected in the late 1990's because it was difficult to predict what effect the repeated defoliations would have on the thousands of kilometers of willows planted for bank stabilization in the post war period. However in the years before 2004 sawfly had found its way to Australia probably from New Zealand where it had been for a number of years. The Saw fly is from Europe and in the photo below you can see they prefer Crack willows on the left and has left the weeping willow on the far right



Which invasive willow species do we have in the Mongarlowe Catchment?

Crack Willows (*S fragilis*)

As the name suggest the branches and twigs on the Crack Willows snap off the plant very easily when brushed by animals, blown in the wind or dragged off during increased flows and the live debris will start rooting within days if it lands in water or on a moist surface. The most distinguishing features of the crack willows and hybrid crack willows are that it is a multi-stemmed tree willow most other tree willows are single stemmed and it has red or pink roots. Whilst other willows mainly have white roots. The crack willow has only male plants in Australia however it has hybridized with at least two other taxa Golden and weeping in the near by Upper Murrumbidgee catchment. So there are now male and female plants in these hybrids to produce wind blown seed to spread between catchments.



Black willows (*S nigra*)

As the name suggests the black willow has darker bark than the other willows however its main distinguishing features are that it is a single stem upright willow and looks a lot like a eucalypt, when it is young, except the leaves are lime green through spring and summer and yellow in late autumn. It sprouts later than the other willows in Spring and loses its leaves later than the crack willows but generally before the weepers in May. It has red twigs and shoots whereas the cracks and weepers have green twigs and shoots and the golden willows have yellow twigs. Its leaves are the same colour green on both sides and are mainly larger than crack willows although crack willow shoots can sometimes have very large leaves. Black Willows spread by wind blown seed which sets onto exposed moist sand or gravel beds. Although they can also grow from twigs of branches that fall into the water or on a moist surface

