Azolla

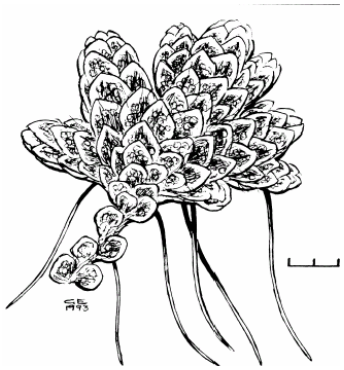
Integrated control approaches

What is that red stuff floating on the dam?
Azolla (*Azolla filiculoides*) is one of Tasmania's more common aquatic plants – and the source of great concern for many land owners.

More often than not the presence of azolla is a symptom of a greater problem – high nutrient levels in still or slowly moving water.

Azolla is a native plant. It is a fern not a flowering plant, which means it reproduces and spreads by almost microscopic spores rather than seeds. Azolla can also spread when bits of the floating plant break off.

Azolla is not poisonous. In fact, it is used throughout the world as a food for livestock (especially pigs and poultry) and also as a human supplement. In addition it is an essential part of much of the world's rice production, resulting in increased yields of up to 150 per cent. It can be used very effectively as a garden fertiliser or mulch. It is even used to control mosquitos.



Azolla absorbs nutrients from the water – which is why it is such a good fertiliser, and why rapid growth is an indicator of excessive nutrients. Runoff from orchards, gardens and animal grazing areas can fuel spectacular azolla growth, especially in warm weather when water evaporation increases nutrient concentrations. Stock access to dams and waterways can make the problem worse.

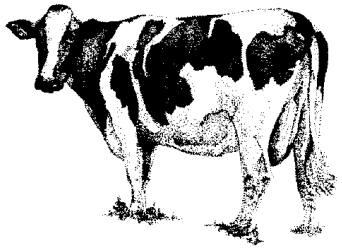
During summer the azolla plants become more stressed because of nutrient overload and rising temperatures and they often begin to turn pink or red and to start spore production. Eventually the azolla population will naturally collapse, although continued water enrichment will prolong this process.

What does azolla do to the water?
Concerns over azolla usually relate to water quality, smell, safety, irrigation problems, the risk of spread, and aesthetics.

Dense infestations of azolla will reduce light levels and cause the death of aquatic plants and animals through the reduction of available oxygen. This in turn can reduce the capacity of a water body to absorb nutrients, making the problem worse in the following growth season. However, for the azolla infestation to get to the density for this to occur there are almost certainly *already* water quality conditions which are not healthy for many aquatic plants and animals. Attempts to control dense infestations by spraying can cause much more serious consequences for water quality than natural death because they result in a very large rotting mass to enter the water.

Rotting azolla does smell, but often the smell is also due to other rotting vegetation and the death of other aquatic plants and animals. Again, sudden death will make the problem worse.

While azolla can look serious it will only grow where the conditions suit it. It is not unusual to see two dams in one paddock, only one of which has azolla. Inevitably the affected dam will be that which receives the most enriched water.



Azolla can be serious for aquatic plant or animal production (eg trout farming) but again, it is a symptom of a water quality problem with potentially serious growth and disease implications. In fact, healthy trout will eat azolla if they get the chance.

Azolla can be a nuisance to irrigators, but because it is free floating and does not have long roots it is usually possible to get an inlet pipe below the level of the azolla.

Perhaps the most serious aspect of azolla infestation is that of safety. Livestock, especially cattle, drown each year because they mistake the floating mat of azolla for a solid surface. Tragically, children have also died in Australia in this way. Because azolla spreads by tiny spores and plant fragments it is almost impossible to control its spread – the key is to avoid creating conditions that favour it.

How can azolla be controlled?
Long-term control of azolla requires changing the conditions that favour it, and particularly reducing water nutrient levels. This can be done by:

- Excluding livestock from dams
- Establishing deep-rooted perennial vegetation on the up-slope from dams
- Reducing/diverting run-off

If a dam is pipe-fed then increasing the height from which water enters the dam will increase wave action. This will also help slow azolla growth as it does not tolerate moving water.
Short-term "control" may be necessary for safety reasons, or where the azolla poses a risk to a particular activity. However, it is unlikely to do anything other than temporarily reduce the amount of azolla. Mechanical removal (scoops, beams and nets, for example) allow the azolla to be productively used elsewhere.

Herbicide options are limited to either suitably registered glyphosate products (eg Roundup Biactive®, Weedmaster Duo®) or diquat (Reglone®). Australian experience suggests glyphosate can be effective but repeat applications are required and are less effective once the azolla has tuned red and spores have been released. Diquat is a contact herbicide and tends to burn off the azolla without killing it. If the plants become submerged herbicides will become much less effective.

All herbicides registered for use on or near waterways have legal restrictions on how and when they can be used, and how long before the sprayed water can be used for other purposes. These restrictions are contained on the herbicide label and users *must* read, understand and follow these instructions.

The use of herbicides should be carefully considered as undesirable off-target damage and the consequences of a sudden accumulation of rotting plant material can be more detrimental to agriculture and the environment than the living azolla.

Timing is very important, whether manual or herbicide options are being used. Colour can give some indication of plant maturity: azolla plants that have turned pink or red are probably already producing spores, which means there will be a more azolla appearing in subsequent seasons. Not all azolla turns pink before producing spores, though, so control should be undertaken in spring, and certainly when the azolla plants are still green. Unusually warm weather will bring on spore production, so it is important to consider the seasonal conditions when planning control.

And remember, while the water conditions continue to favour azolla growth it will almost certainly appear year after year. It is only by changing these conditions and taking an integrated approach to the management of this plant that azolla can be effectively managed.

Is it Azolla?
Before undertaking any control, make sure the plant you have *is* azolla.

The “leaves” of azolla appear to be made up of overlapping scales, rather than a flat leaf. The roots are simple and relatively short.

Other pondweeds have simple flat leaves, while algae are made up of strands of cells and do not have leaves.