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The ABC of Riparian Plants : the importance of native, regional aquatic plants in stream rehabilitation

Robert (Bob) Myers

ABSTRACT: In attempting to achieve successful stream rehabilitation, landholders and managers need to know their ABC. This ABC is the basic understanding of the look of and the role of native aquatic *Gramineae* (grasses) e.g. common reed, *Typhaceae* (bulrush, cumbungi), *Cyperaceae* (sedges) and *Juncaceae* (rushes). Of course other native plant species are communal with them, but first things first on the layperson's riparian learning curve. This paper will detail how the author has simplified this learning process for landholder workshops since 1989.

The ABC I refer to is:

A. Recognise the look of emergent aquatic plants (species identification) and their chosen, natural placement in riparian zones.
B. Recognise their role in the physical processes of streams (how they reduce water velocity, trap sediments....)
C. Recognise the interdependencies with aquatic animals and insects.

1. INTRODUCTION

Our aquatic and semi-aquatic zones are much changed since the arrival of settlers from the United Kingdom and Europe. It is not the purpose of this paper to examine these impacts but it is important to recollect that as the land was quickly dominated and ordered, so to speak, it was only our great grand parents who saw streams and wetlands in so-called pristine condition. It has been difficult to re-create a vision of regional riparian landscapes for landholders to use as models in the watercourse rehabilitation process.

What we do know in much of southern Australia is that ephemeral streams and seasonal-flow streams meandered through flat or narrow valley floors, often lined with river red gums (*Eucalyptus camaldulensis*) and were defined by the extent of the cover of sedges, rushes, reed and bulrush. The billabongs and chains of ponds were marked by thickets of tea tree, river bottlebrush and wattles. Flooding was natural, common and necessary.

Work on the author's property and on many Adelaide hills watercourses since the early 1990s has focussed on the role of emergent aquatic plants (often referred to as macrophytes) as natural, native rehabilitation "tools".

2. THE RIPARIAN ZONE

The watercourse learning process relies on landholders recognizing the component areas of the riparian zone, this zone loosely understood as the stream, the banks and the adjacent flats (Fig. 1).

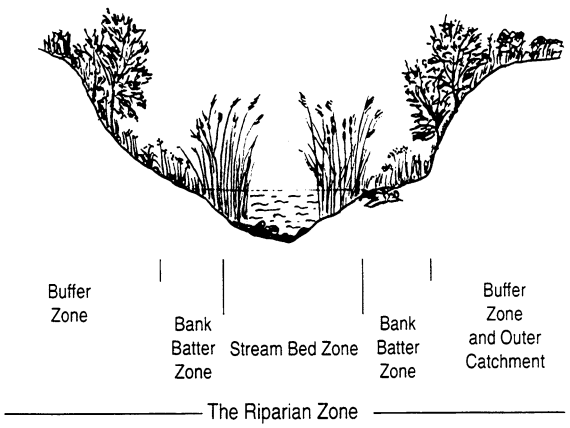

Figure 1. The riparian zone.

3. STEP A : THE LOOK

The principal families of these emergent watercourse plants are:

Typhaceae — Bulrushes, sometimes called cumbungi. They are tall (1-2m) with erect stems, topped with brown cylindrical heads amongst masses of strappy leaves (Fig. 2). They line the water's edge to depths of around .5m.

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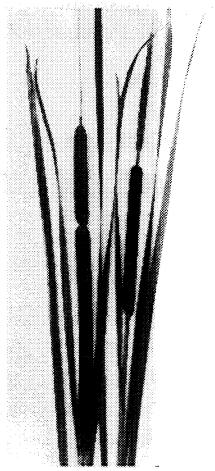


Figure 2. *Typha domingensis*

Gramineae Grasses, common reed is an aquatic grass. They are tall (2-3m) with a tassel top seed head and broad pointed leaves up a cane-like stem (Fig. 3). They mass along the water's edge, into deep water (approximately 2m) and high up the bank. Other semi-aquatic grasses are not discussed in this paper.

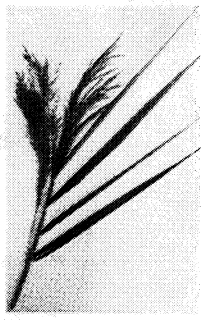
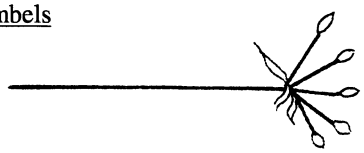


Figure 3 : *Phragmites australis*

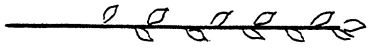
Cyperaceae Sedges (many of which have confusing common names like bog-rush, twig-rush…). They are mostly perennial grass-like or rush-like herbs, their flower heads being in 6 distinctive forms (see drawings : Fig. 4).

panicles

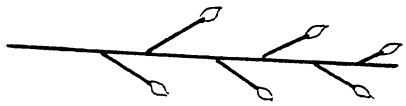
umbels



spikes (no stalks)



spikes (with stalks)



solitary spikelets

capitate

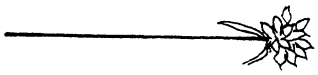


Figure 4.

The seed is held in flat spikes on stalks or in clustered spikes against the stem. The stems may be round or triangular and solid or hollow. They range from the water's edge to the adjacent flats.

Juncaceae Rushes – only one, *Luzula*, a wood rush, is not called Juncus. Most rushes have branching or loose panicle flower heads (see drawings : Fig 5 a and b).

Branching panicle (Fig. 5a)

Loose or compact panicle (Fig. 5b)

Tiny seeds are contained in capsules on the end of the branches. Most tall Juncus are leafless with smooth waxy stems, but a few small rushes have flat or cylindrical leaves. They range from the water's edge to the adjacent flats.

Colour illustrations of all of the above are in the handy identifier (Myers, 95a).

TOP TIP

As a shortcut to distinguishing between the sedge and rush families, become quickly familiar with the branching (cymose) heads and compact or loose panicle heads of the rushes. Most of the other waxy-stemmed or grass-like plants with their quite different head forms will be from the sedge family.

4. STEP B : THEIR ROLE

Once the landholder realises that watercourses are living entities made up of many interdependent parts, the apparent obstacles to rehabilitation become clear. It is natural for water and sediments to be moved most efficiently through a meandering system, with outside banks sustaining some erosion and inside banks receiving deposits. Many high water flows now occur within the dramatically widened banks of a deepened meandering channel, not spilling over the banks onto the flood plain as in the past.

Apart from the natural control structures – the big pools and rock riffles – the other energy dissipaters are the aquatic plants.

They have woody creeping rootstocks, powerful rhizomatous roots and masses of fibrous tendrils. They have flexible, waxy stems. They are perfectly evolved to withstand flooding and periods of drought. They are adapted to trap sedimentary muds, gravels and stones.

Some examples: *Phragmites australis* (common reed) will tie up the bank soils like weldmesh (Fig 6).

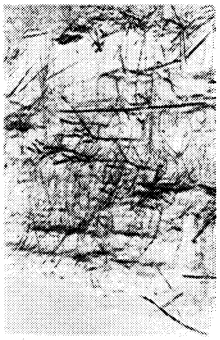


Figure 6 : Phragmites australis roots

Fields of *Eleocharis acuta* (the sedge, spike-rush) will lock up the fine muds at the water's edge as will clumps of *Isolepis cernua* (the sedge, nodding club rush). Although *Typha domingensis* (bulrush/cumbungi), with its vigorous rhizomes, masses of fibrous roots and loads of leaf and stem litter, will quickly invade pools and small dams, in large watercourses this plant can be a vital rehabilitation tool.

The ability of most families of plants listed to reduce water velocity and decrease the erosive force of water confirms their role in stabilisation and erosion works.

5. STEP C : THE INTERDEPENDENCIES

This is a paper in itself. However, based upon the plants discussed, most landholders will be happy to understand some key relationships without wanting to become biological monitoring experts. Once again, lets look at the long and short of it.

The tall masses of bulrush and reed beds are vital habitat to migrating, clamorous reed-warblers. The reed-warblers weave their conical-shaped nests to bulrush and reed stems, lining them with last season's fluffy bulrush florets (Fig. 7). Dusky Moorhens require last season's dead bulrush leaves for their floating nests.

Figure 7 : Reed warbler nest.

Purple swamphens range the muddy fringes of bulrush beds, digging down and shredding the succulent rhizome tips.

A number of human weavers (adult groups and even school students) use bulrush and several of the tall sedge species for decorative and functional purposes (Fig. 8).

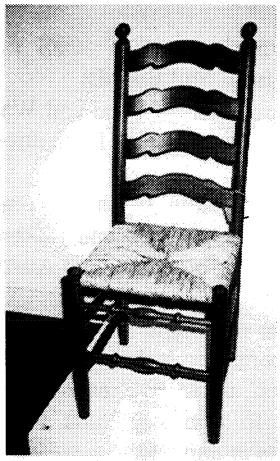


Figure 8 : Seat woven from native sedge (Schoenoplectus validus) by Beth McMillen.

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Bits of dead cylindrical stem of Juncus and Cyperus species are important to some species of Caddisfly, the larval stage inhabiting these stem bits.

The pupa cases of dragon and damselflies are commonly found just above the waterline and on the stems and leaves of many of the plants discussed.

If the ecological balances in your riparian rehabilitation program are important to you, these are just a few of the beneficial interdependencies in the complex web of life on the watercourse.

How to establish … in brief

Even in a heavily abused catchment, many aquatic and semi-aquatic species will re-establish quickly and naturally once stock have been removed and/or weeds suppressed. Sedges, common reed, rushes and bulrush do this mainly by increasing their clump size. They also disperse thousands of potentially viable seeds into muds, gravels and rock crevices. **All this takes place without our intervention.**

Clumps of these plants can be subdivided and transplanted into degraded areas at most times of the year, though autumn and spring are preferred.

Seeds from all but common reed are easily germinated in tubs or tubes of moist, muddy sands or your favourite potting mixes (kept moist). The seeds can also be direct seeded/scattered onto the muddy edges of streams. Harvest the seed heads in mid to late summer.

The most useful information on propagation of aquatic plants for the layperson are Nick Romanowski's books.

CONCLUSION

Since 1993, this ABC approach to watercourse rehabilitation has:

- Formed a part of small farms courses run by regional Soil Boards;
- Been a part of Land and Water Management and Environment and Recreation courses at tertiary levels.
- Been a beginning stage in many stream, dam and wetland projects undertaken by community and school groups in South Australia.

It can be as simple and straightforward as you have just experienced it through this paper or at each level, A, B or C, it can be expanded to suit the audience. It is well to remember that most landholders aren't scientists or engineers.

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