



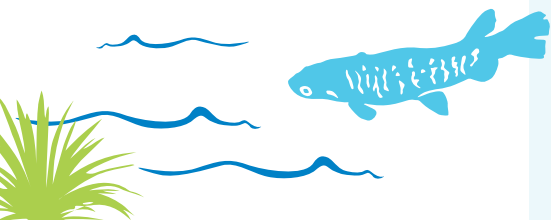
WATER QUALITY FENCING AND PLANTING





Protecting freshwater resources is important to all New Zealanders, and landowners have an important role to play in ensuring that activities undertaken on the land, do not have a negative impact on downstream rivers, wetlands, and seas.

Excluding animals of all kind from your stream or wetland, and planting with appropriate vegetation, will go a long way toward improving water quality both for human and for aquatic health.



HOW TO ASSESS THE HEALTH OF YOUR STREAM

To check whether your stream is in good health, look for:

- Low levels of fine sediment (you can assess this by shuffling your feet in the stream or by assessing how much of the stream bed contains sediment).
- A bank that does not have visible erosion.
- Plenty of habitat for macro-invertebrates and fish.
- Shade – especially on the northern side – with vegetation offering good diversity with a sizeable riparian buffer strip.
- A water course with pools, riffles, and meanders – fish like a range of conditions.

DOES FENCING AND PLANTING STREAMS BENEFIT THE ENVIRONMENT?



Improving water quality

- Where fences deny or restrict stock access, animal faeces and its associated pathogens such as *E.Coli* are partially eliminated from waterways.
- Damage to the bank is prevented reducing erosion. Dense ground cover on banks filters sediment, overflow nutrients, and faeces out of surface runoff. Sediment levels in waterways are thereby reduced.
- Swamp vegetation (such as rush or sedge) on or near streambanks helps remove nutrients, particularly nitrogen, from emerging groundwater before it enters streams.
- Tall-growing riparian vegetation (such as trees) minimises daily temperature fluctuations by reducing solar energy input to waterways. Water temperatures are kept cool, hold more oxygen for aquatic life, and less algal growth occurs.

Controlling streambank erosion

- Shrubs and trees with extensive fibrous root systems stabilise streambanks. Bank collapse is greatly reduced, and channel migration largely controlled, thereby protecting adjacent farmland and buildings.

- Dense vegetation, for instance rank grass or low shrub cover, traps silt and stores it temporarily on banks. Eventually, the build-up is scoured away and transported out to sea by a large flood.

Reducing flood impact

- Removal of inappropriate vegetation, like crack willows or blackberry, enables freer passage of water through floodplains. This reduces overbank flooding and siltation on adjacent river terraces.

Enhancing habitat

- Restoring riparian vegetation – whether indigenous or exotic – creates habitats for wildlife. Corridors for bird and fish migration can be formed from the mountains to the sea, if continuous riparian vegetation is restored. Food, shelter and seclusion are created for waterfowl, fish, crustaceans and insects.



DOES IT BENEFIT THE FARM?

Whatever is spent on it, riparian management gives a return on investment. Here are just some of the ways.

- Clean water brings fewer blockages in the pipes that draw water for stock, irrigation or dairy sheds, with less wear and tear on pumps and spray-lines.
- If cattle are not able to drink directly from the stream then they will not be exposed to liver fluke.
- Streambank fences enable easier stock control when mustering, keep sick stock out of streams, and reduce stock deaths by drowning, falling down steep banks, or getting bogged.
- Trees on banks, as well as shading and sheltering stock in the adjacent paddock, can provide timber or firewood for on-farm use.
- On sheep and beef properties, stock are in better health and have faster weight gain when water sources are no longer contaminated by pathogens. Processing plants are increasingly likely to pay a premium for produce from farms demonstrably managed in a way that doesn't damage the environment. In future years it will be easier for them to export it, now that overseas markets are starting to demand evidence that what's being purchased is contaminant-free and environment-friendly.

Planting your stream margins

There are some key steps in ensuring that you get the best results for the cost and effort of planting a riparian margin.

- Get to know your stream over different seasons
- Ensure that you know any rules about vegetation removal if needing to eliminate weed trees
- Prepare a planting and maintenance plan
- Order plants well in advance
- Prepare your site in advance and be prepared to maintain the area for 3–5 years until you achieve canopy closure
- Know the right time to plant – in Nelson, this is between May and August
- Lay out your site and plant your trees.



Phormium tenax



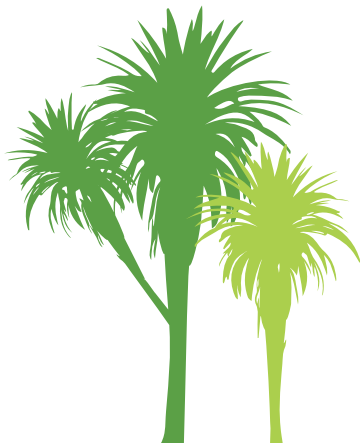
Carex secta – Purei



Cordyline australis

There are many plants that are suitable for planting in the riparian zone. Some reliable performers are:

- *Cortaderia richardii* / Toe toe
- *Coprosma robusta* / Karamu
- *Cordyline australis* / Cabbage Tree
- *Pittosporum tenuifolium* / Kohuhu
- *Pittosporum eugenioides* / Lemonwood
- *Plagianthus regius* / Ribbonwood
- *Phormium tenax* / Swamp flax



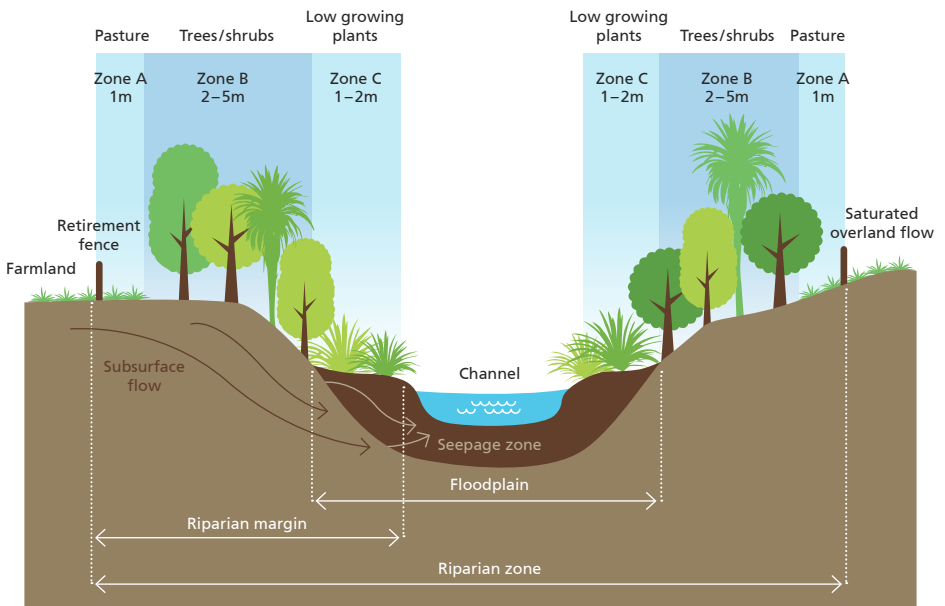
NEED HELP CHOOSING WHAT TO PLANT?

A *Streamside Planting Guide* is available from Nelson City Council that outlines these steps in detail. Dairy NZ has also produced a very comprehensive guide to planting waterways which can be found online at dairynz.co.nz/media/3960562/riparian-management-guide-top-of-the-south.pdf



The diagram below gives a good cross section of the elements of a stream and the types of plants that you might grow there.

Riparian cross section



MAINTAINING RIPARIAN VEGETATION

Bank vegetation needs to be maintained, in order to achieve the desired benefits. The three elements of maintenance are:

- Looking after the trees and shrubs that have been planted.
- Keeping the channel clear from obstructions.
- Managing stock.

Looking after your trees and shrubs

Post-planting maintenance can be crucial for tree survival, but may not be practical due to other demands on time. The options are to:

- Only plant what can be cared for.
- Plant at a higher density to allow for partial planting failure, and let nature take its course.
- Plant trees that are around one-metre high and less likely to suffer from competition.
- Use covers to protect the trees from animal pests and make it easier to spray around.
- Mulch around the trees.

Planting smaller areas which you are able to maintain well, will be more rewarding and motivating than planting large areas and then struggling to manage weed growth.

It is unrealistic to expect 100 percent success with any tree planting, but post-planting care and attention can greatly improve their chances. When good-quality seedlings are planted and protected, 70 to 80 percent usually survive. Where animal pests are present, they are the single largest cause of tree mortality, and much higher percentages may need to be replanted. If riparian margins aren't replanted when needed, the stream may eventually erode through gaps where soil isn't reinforced by tree roots, and undo any benefit from the surviving trees.

Weed control

When banks are retired and planted, at least one release spraying is necessary six to 12 months after planting. Extreme care is needed with knockdown herbicides such as glyphosate: use a funnel, spray wand or similar to direct spray away from seedling foliage.

Alternatively, clear rank grass and weeds by hand or slasher, to free seedlings that are small and slow-growing, and leave as a mulch around their stems to help suppress re-growth.

Another option is to cut half-metre diameter mats of permeable erosion control fabric and place these around each seedling. Heavy cardboard or old woollen carpet can serve the same purpose equally well.



A range of different tree-guards or protectors including non-plastic options can be used. As well as keeping seedlings free from choking by grass, these give some shelter from wind. If more substantial artificial shelter is needed on windy sites, peg shelter cloth to windward on wooden stakes or iron fencing standards, but use material that lasts at least three years. When banks are unfenced, maintaining a dense pasture sward helps to keep weeds in check, reducing the need to spray. If weeds appear, use standard pasture weed control sprays, but avoid spraying the stream or the water's edge. Remember that wetland plants aren't weeds – they trap silt from overland runoff, and extract dissolved nutrients from emerging groundwater.

For information on specific weeds and their control, go to weedbusters.org.nz.

Pest control

Protection of seedlings from goats, deer, rabbits, hares and possums is highly desirable. Shooting or poisoning will generally be needed for effective pest control. Consider using repellent chemicals to reduce damage by possums and rabbits. Smooth plastic sleeves also afford some protection for large seedlings and poles, so long as their growing tip is too high for the animals to reach from ground level.

Fenced-off riparian areas at least have the advantage that pests in them can be easily targeted.

Depending on the type of vegetation and when different animals feed on it, you may be able to hit them hard once a year, instead of having to spread effort.

Protecting trees from stock

In certain situations where trees are planted on banks that are still unfenced, they have to be protected from browsing and rubbing by stock. Keeping out stock for several months after planting is essential. Spelling the paddock guarantees a better strike rate, so less money has to be spent blanking (re-planting) gaps where trees have been killed or damaged.

When stock are let back in, trees need to be protected until foliage is beyond their reach. Seedlings are almost impossible to protect against stock nipping the tops, short of excluding them from the streambank for the first few years after planting. Poles and specimen trees, being larger, can be protected with a range of devices from dynex sleeves, through 44-gallon drums or timber frames, to electrified wire loops. Some species are grazed less frequently by stock (e.g. manuka, kanuka, totara).

“

Keeping out stock for several months after planting is essential.

”



KEEPING THE CHANNEL CLEAR FROM OBSTRUCTIONS

When a streambank is planted, the channel still needs to be managed so as to maintain its flood capacity. At this early stage, consider planting patterns that restore the natural flow path of floodwater. Existing trees that have fallen in may already

block the flow path, and will need to be removed. Self-sown willows, blackberry or gorse may also adversely influence flow path alignment. Any debris which has lodged in the bed needs to be removed if it is likely to impede passage of floodwater.

MANAGING STOCK – FENCING YOUR STREAM

Protection fencing is designed to permanently exclude livestock and create environmental protection areas for bush blocks, streambanks and wetland or estuary margins. Such areas around watercourses (sometimes called riparian retirements) are effective

buffers for intercepting runoff of sediment, nitrogen and phosphorus. Environmental protection areas also offer the opportunity to plant trees and shrubs for productive or aesthetic purposes, which help to intercept runoff and stabilise soils against erosion.

Layout

Selecting a good line for protection fences is necessary for the following reasons:

- **Function:** The fence line should fulfil the objective of protecting the area. Watercourse protection for example requires a streambank margin of around five to 10m to act as a buffer zone and maintain a canopy of native vegetation. Adjoining features such as wetlands or gully heads should be included within the fenceline.
- **Durability:** The fence line should be chosen for stability, allowing ease of construction and maintenance. Fence lines placed across short slopes adjacent to watercourses are usually in the flood way and are vulnerable to damage. More stable fencelines will be found along adjacent terraces or ridges.
- **Effectiveness:** Protection fences must remain stock proof, and fence lines should be selected to avoid potential stock problems such as sharp dips or bordering confined raceways.
- **Other issues:** Protection fence lines should also be located to minimise line preparation earthworks which themselves may create erosion problems. Meanwhile setting up new fence lines offers the opportunity to improve the layout of paddocks or other management units.

Fence type

Protection fences differ from conventional farm fences in the following ways:

- There is always vegetation (feed) on one side of the fence which creates constant stock pressure on posts and wires.
- It is not always possible to locate retirement fences on a good line.
- Protection fences tend to be a lower maintenance priority for many landowners.

Protection fences therefore require a high standard of materials and construction if they are to be effective, durable and trouble free.

Building a fence is a skilled job, and the use of an experienced fencer is strongly advised.



PROVIDING WATER FOR YOUR ANIMALS

When waterways are protected with riparian (streambank) retirement zones, alternative stock water provisions are required.

Components of a water supply system

SOURCE	INTAKE	STORAGE	RETICULATION	OUTLET
Springs, streams or bores	Powered by gravity or mechanical/ electrical means	Tanks or a dam of adequate capacity	Approximate pipe size and type	Troughs or other

Water Source

The most convenient source of water in many situations is the existing farm reticulation system, although larger supply pipes and extra reservoir capacity may be required. The limiting factor for extension of an existing system is usually related to the head (pressure) required to supply extra troughs. If this is insufficient a separate local supply may be required.

Streams

Permanent streams on the property are a common and accessible source of water, and will have good quality if protected by a riparian retirement. If the stream has insufficient fall to supply a gravity fed system there may still be enough fall and volume of flow to drive a water powered pumping system. There are several designs of water wheel for this purpose, or a device known as the

hydraulic ram. This device uses the energy of large flow under a small head to raise relatively small quantities of water to a greater head. All water powered pumping devices require careful design if they are to work correctly.

Pumped intakes enable delivery of water to a high point from which it can be gravity fed to troughs. If water powered pumping is not feasible, wind or diesel powered pumps are alternative options. Electric pumps are commonly used, but laying in a power supply can be expensive.

“

Building a fence is a skilled job, and the use of an experienced fencer is strongly advised.

”



Springs

Springs are often a preferred water supply because year round flow is reasonably constant, and unlike open water they are not susceptible to fouling. Springs at sufficient elevation will supply a gravity fed system. Springs can be tapped using a simple well point system, with a filter to prevent blockage of the outlet pipe.

Bores

Deep bores can provide a good supply of water, but are costly to install and usually require a submersible pump. The scale of capital investment involved generally exceeds the requirements of additional stock water, and is more appropriate for a whole farm water supply system.

Troughs

A wide range of troughs (and storage tanks) is currently available in both moulded polythene and precast concrete. Desirable features of a trough are:

- Valve protection — a cover to prevent stock access and a baffle to prevent operation by wave lap.
- A stop valve to isolate supply to trough for maintenance purposes.
- Sloping sides to prevent undermining of the trough.
- A step at one end to allow exit of lambs.
- Limited capacity to avoid stagnant water.
- Bottom water entry.