

Caring for streams of the Canterbury Plains:

**a guide to riparian
management**

**Fresh Waters
of Canterbury**

Nga Wai o Waitaha



**Environment
Canterbury**
Your regional council

Foreword

This second annual information booklet on Canterbury's waters is published by Environment Canterbury to increase community awareness of our vital water resources.

This booklet provides some information on the values of streams on the Canterbury Plains. It looks briefly at cultural and environmental values, native animal and plant ecosystems, and water quality. It provides a guide to caring for our streams through riparian revegetation, weed control, monitoring and maintenance.

Through partnership with the community, Environment Canterbury seeks that the life-giving capacity of Canterbury's land, air and water be retained, enabling people to enjoy the rewards and special character of the region, confident that future generations can do the same. Vibrant fresh water streams are an important contributor to the capacity and character of Canterbury.

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Introduction

On the Canterbury Plains there are two stream types:

- **Braided streams**, originating from the mountains and having variable flows.
- **Single thread streams**, originating from springs and lakes, and having relatively constant flows throughout the year.

Past clearance of native vegetation and subsequent modification for farming have changed the character of many rural streams.

The development of pasture resulted in stock grazing to the water's edge. Trampling and erosion of stream banks by stock has become common.

Increased nutrients, sediment and chemicals in run-off degrade stream water quality and affect downstream users.

Streams and their riparian zones (the interface between land and water) are recognised as important ecosystems. The riparian area is naturally diverse and fragile. It may become degraded through neglect or poor management.

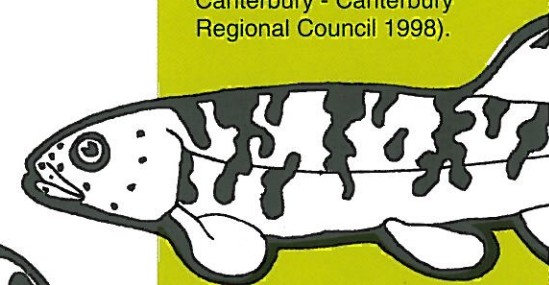
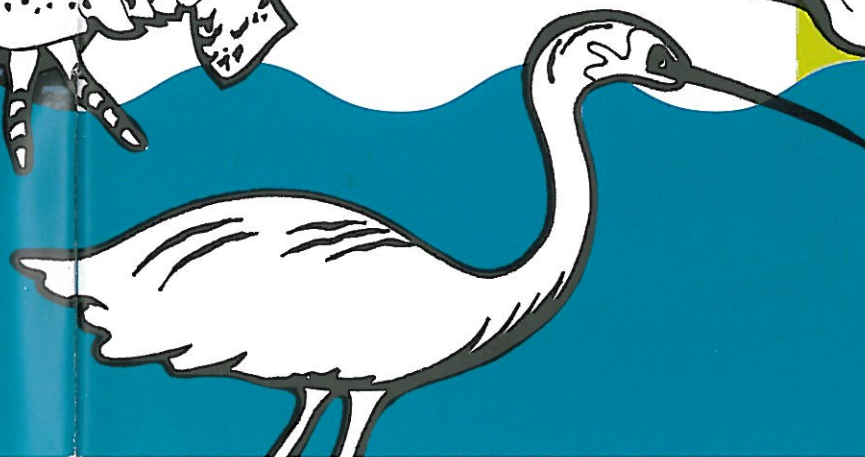
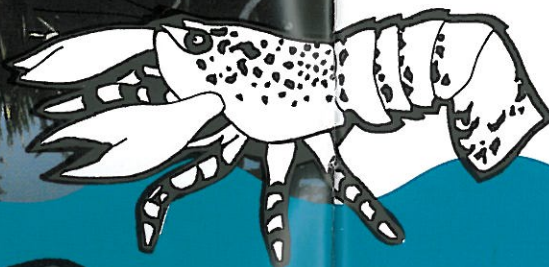
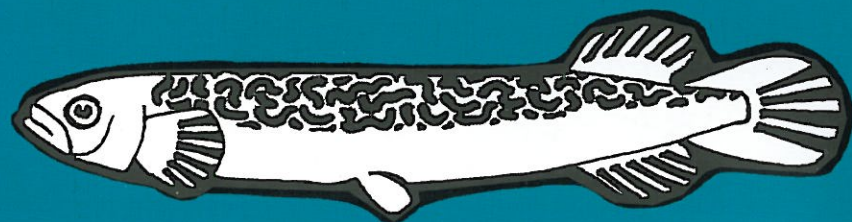
Community values are changing and there is now greater interest in the values of streams and what we can do collectively to care for them.

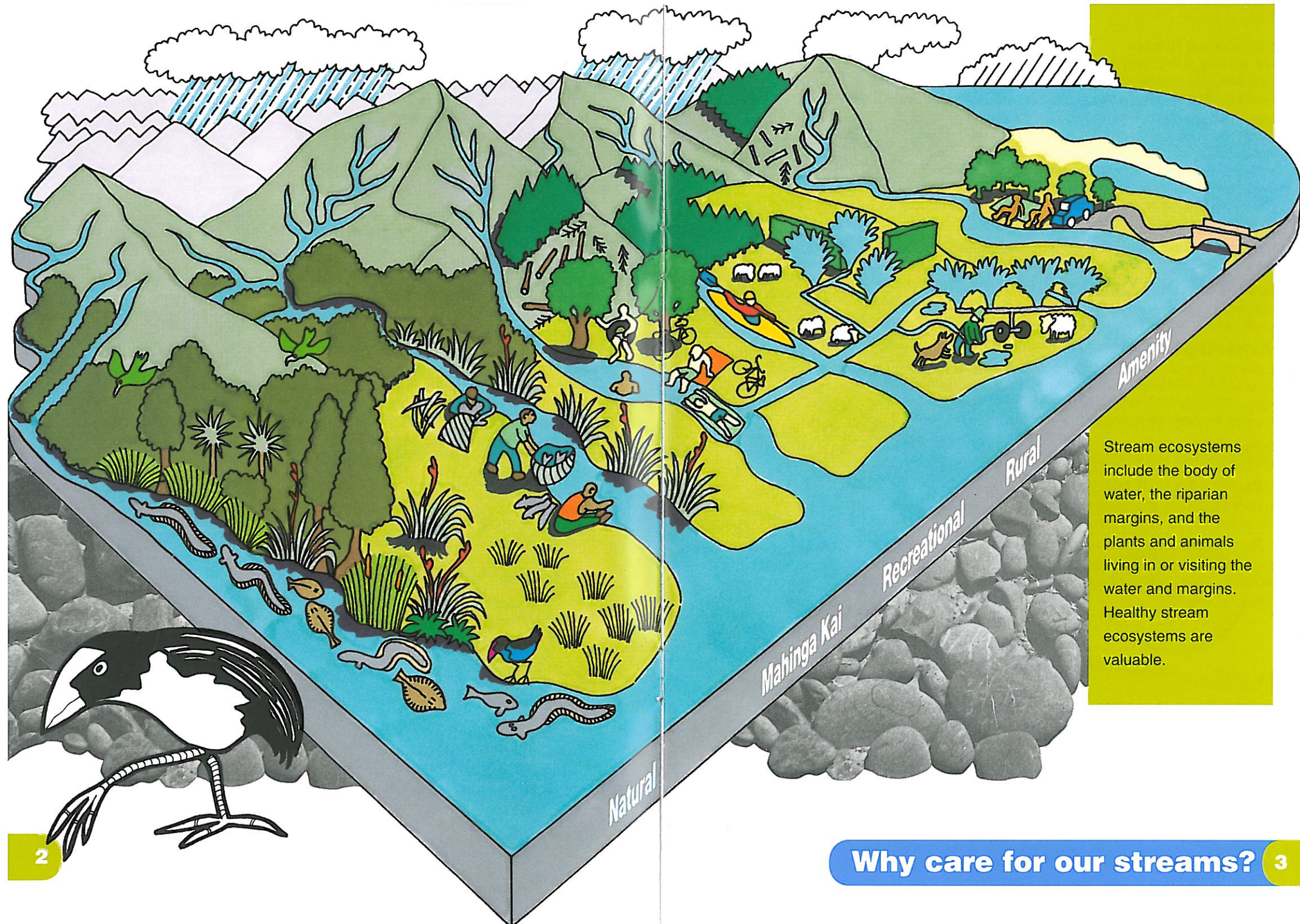
Improvements in water quality, natural habitat, and watercourse integrity will benefit present as well as future generations.



This guide looks at why and how the health of streams can be improved.

Caring for our streams through appropriate riparian management is an aim of the Resource Management Act (1991) and the Regional Policy Statement (Environment Canterbury - Canterbury Regional Council 1998).





Stream ecosystems include the body of water, the riparian margins, and the plants and animals living in or visiting the water and margins. Healthy stream ecosystems are valuable.

Corridors and Habitats

The streams of the Canterbury Plains provide important habitat links between upland and coastal waters for migratory species.

Native **fish** species commonly found in the plains' streams are short-finned eel, long-finned eel, common and upland bully, inanga, Canterbury galaxias, koaro, black flounder and lamprey. Where conditions are suitable, rarer species such as Canterbury mudfish and giant kokopu occur.

The very fast water in braided streams sometimes also has populations of torrent fish and blue-gilled bullies.

Native **birds** of the plains' streams include shoveller duck, scaup, grey teal, pukeko, white faced heron, kingfisher, black and pied shag.

Invertebrates in our streams include freshwater shrimps, freshwater crayfish, damselflies, caddisflies, mayflies, stoneflies, snails, worms, midge larvae, and riffle beetle and their larvae.

Remnant vegetation

Today the remnant vegetation along rural streams is neither abundant nor diverse. Some harakeke (flax), ti kouka (cabbage tree), kowhai, pukio (tussock sedge) and toe toe are still found. These species and others were once abundant. Replanting along our streams can improve the native biodiversity.

Cultural values

In-stream values and uses important to Tangata Whenua include:

- Mauri, the "life force" of water
- Wahi Tapu, sites of special significance, sacred and treasured sites, e.g. burial places, healing waters
- Mahinga Kai, food sources and their habitats.

These values need to be addressed in the planning and implementation of stream care. To find out more, contact your local runanga.

Active and passive recreation

Improved stream health will provide greater opportunities for recreational activities, including fishing, picnicking, swimming, kayaking, boating, bird watching, tramping and game-bird hunting where appropriate

Stock water

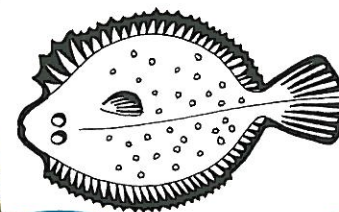
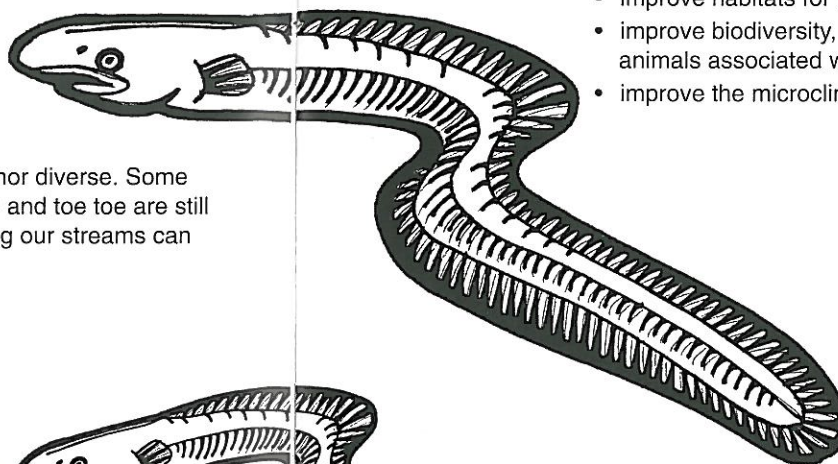
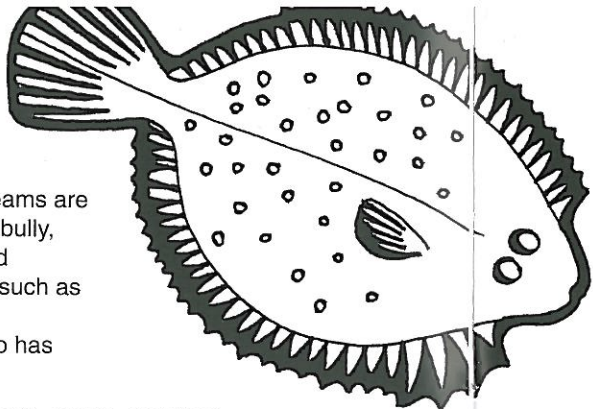
Access for stock to clean trough water sourced from a stream is desirable providing stream flows are not threatened.

Riparian care for our streams will:

- reduce bank erosion and silt deposition
- reduce surface run-off from nutrients, sediment and chemicals
- buffer flood flows
- improve habitats for riparian species
- improve biodiversity, particularly the variety of native plants and animals associated with a stream
- improve the microclimate, by providing shelter and shade

Riparian care means that in-stream values will be improved through:

- trapping sediments, chemicals and nutrients in dense riparian vegetation
- preventing clogging of streambeds with silt and clay
- improved water clarity and increased water quality
- reduction of harmful or toxic chemicals
- cooler temperatures through shading by vegetation



1996

1999

4

5

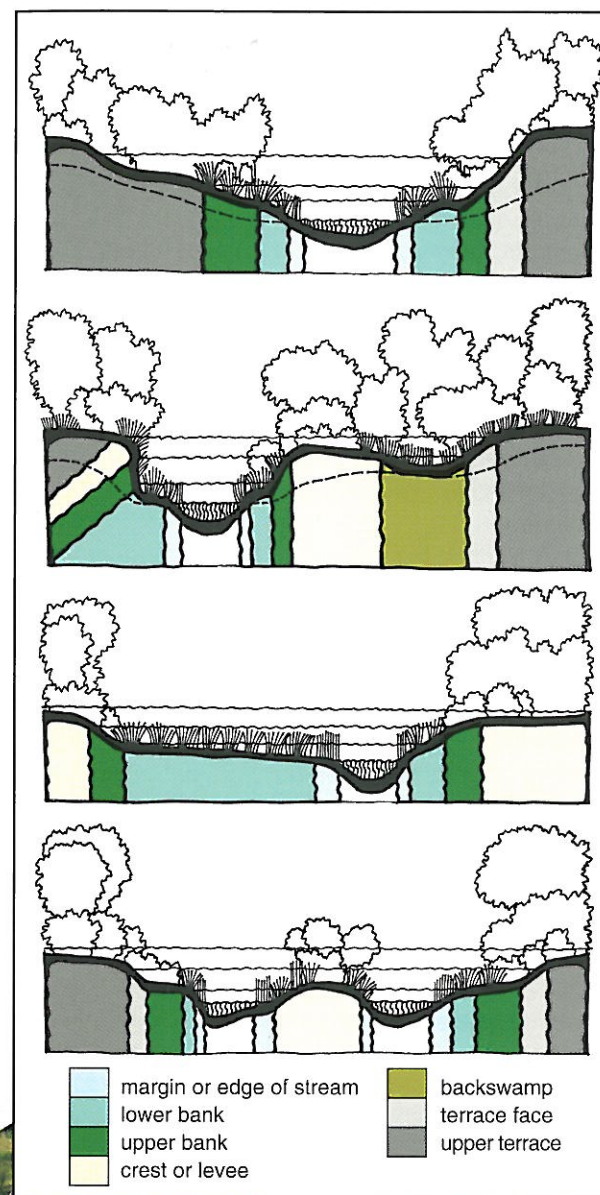
How to care for our streams

Many individuals, community and landcare groups are successfully restoring streams in various parts of Canterbury. You may like to contact others to find out what has worked well and what has failed.

Get to know your stream

It is important to know as much about the stream and surroundings as possible.

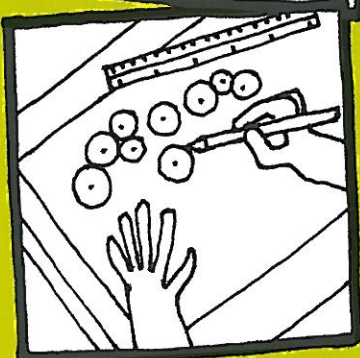
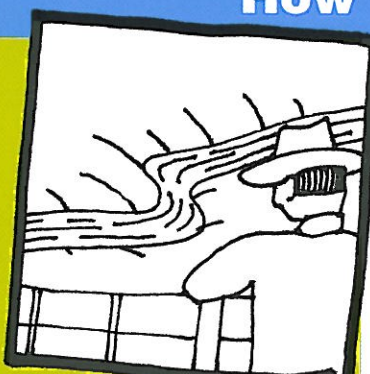
- Observe the stream over different seasons to identify seasonal change and flood patterns and see where there are opportunities for improvement.
- Look at the surrounding land use and identify impacts that could affect the stream and its margins eg sediment input from cultivation; nutrients from fertilisers; stock trampling of margins; contamination from stock faeces; increased stream temperature from loss of shading.
- Identify and map remaining native vegetation.
- List existing and potential weeds and nearby weed sources, both in the water and on the land.
- Identify the wildlife.
- Identify animal pests.
- Find out what the soil types are and what ecosystems they could support.
- Identify recreational opportunities, if any.
- Explore the cultural history. What associations do people have with the stream, and what has affected the stream in the past?
- Look for old and current photographs that may indicate changes over time. Aerial photographs can be obtained through Environment Canterbury and form a good base for broader mapping information.



- For further information contact Environment Canterbury – Resource Care Section. For design assistance see the yellow pages for the list of NZILA landscape architects.

Prepare a plan of how to care for your stream

- Follow natural cues, natural patterns and processes. Seek to reinstate the natural character of the stream, such as gentle banks and meanders, ponded areas and riffles.
- Identify the different potential vegetation zones of your stream as indicated in the cross-sections.
- Utilise existing vegetation cover, such as willows, as initial shelter for your plantings.
- Choose plants according to their zones, e.g. place the lower-growing, softer reeds and sedges in the margin at the water's edge. Woody trees and taller shrubs go on the upper banks – to maintain the open floodway.
- Excavation or other disturbance of a stream bed will require a resource consent from Environment Canterbury.





What to avoid

- Straightening stream channels
- Cultivating to the stream edge.
- Allowing stock to trample banks and enter the water to drink from the stream.

What you will need a resource consent for:

- Altering stream channels.
- Removing plants or planting in the stream bed.
- Spraying in the stream bed.
- If plantings are likely to restrict the flood-carrying capacity of the stream.

What time of the year to plant

Local experience should be a useful guide for suitable planting times. As a general guide, establish:

- Stream margin plants in summer when water levels are lower;
- Hardy plants in the autumn; and,
- Frost-tender plants in the spring.

How to implement the planting

- Fence out and exclude stock from the riparian area.
- Site fences above moderate flood levels.
- Grub the turf off from the surface of each planting site.
- Remove all animal pests and weeds and manage potential weed sources off-site. Check in the National Surveillance Plant Pests publication which is available from Environment Canterbury. You may be surprised at what species may be a threat.
- Take care when using chemicals for weed control. Note: If in-stream weeds need to be sprayed, a resource consent is required.

Plant supply and quality

- Ideally order plants one year ahead of planting, so that the nursery people can collect seed and propagate plants from those that belong naturally in your local area.
- Plant out small plants with well-developed root systems. Do not accept pot-bound plants.

How to plant

- Water plants well before planting.
- Prepare a hole that is bigger than the root plug.
- Set the plant into worked soil at the bottom of the hole, pack crumbled soil around the roots and avoid air gaps.
- Ensure porous potting mix is covered by 10-20mm of soil to prevent moisture being "wicked" away from the roots by the potting mix.

- The soil level of the root mass needs to be at ground level. Soil heaped up against the stem of a plant will suffocate, and the plant will die.
- On free-draining soils, dig a deep hole so that there is a hollow left around the stem to catch water.
- On heavy soils, or wet sites dig a shallower hole. The top of the root mass and soil should be at ground level. However, in saturated conditions the soil level should be slightly mounded.

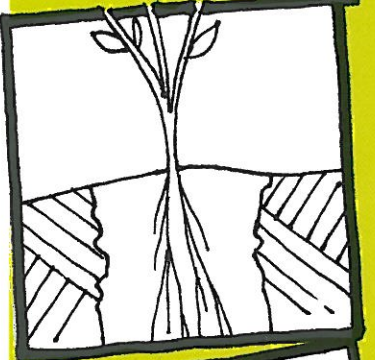
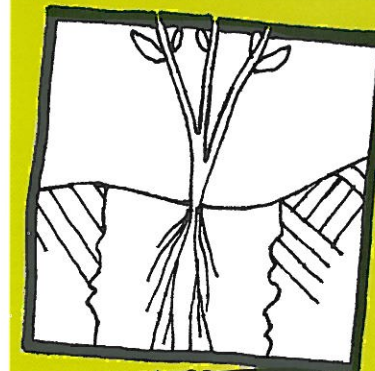
Staging

- Plant hardy species (refer to plant list) as "pioneer species" on open sites.
- Plant "secondary species" later once the pioneer species have provided shelter from sun, wind and frost.
- Where there is existing cover, secondary species can be inter-planted at the same time as the pioneer plants, e.g. under willow.

How to maintain plantings

The planting is the easy part. Maintenance is essential to achieve successful riparian management. Keep plants free from grass and weeds for at least three years.

- Mulch where practical to retain the moisture and suppress weeds. Steep slopes, or where the water table rises frequently, are not suitable for loose mulch.
- Check plants regularly. Weed around the base of the plants using a sharp grubber to avoid stress and competition.
- Take care if using chemicals to burn-off weeds. Use non-residual herbicides and protect desired plants from spray drift.
- Cutting grass and weeds with a scrub cutter is not very effective as it encourages renewed weed growth. It may be better to trample tall weed growth and utilise it as mulch.
- Water plants on dry banks during dry seasons.
- Apply slow release fertiliser on poor soils.
- Many of the potential weed species are light-demanding and will not invade in to the shade once the plants form a canopy.
- Remove or manage off-site potential weed sources.
- Establish the more tender secondary and long term species once the canopy has developed. Understorey plants that require shade, such as ferns, can then be introduced as well (refer to chart for species).



		Planting zones										Plant tolerances				
SHRUBS AND TREES common name	species name	Broad ecosystem			margin/edge	lower bank	upper bank	crest or levee	backswamp	terrace face	upper terrace	sun	shade	wet	dry	wind
		1	2	3												
akeake (x frost)	<i>Dodonea viscosa</i>	●	●										■			
akiraho, a tree daisy (shrub)	<i>Olearia avicenniifolia</i>		●													
golden akeake, akiraho (shrub)	<i>Olearia paniculata</i>	●	●													
a fragrant shrub daisy	<i>Olearia odorata</i>		●													
cabbage tree, ti kouka	<i>Cordyline australis</i>	●	●	●		■	■		■				■			
houhere, narrow-leaved lacebark	<i>Hoheria angustifolia</i>	●	●													
kanuka	<i>Kunzea ericoides</i>	●	●				■						■			
kapuka, broadleaf	<i>Griselinia littoralis</i>	●	●						■				■			
karamu (shining) (x frost)	<i>Coprosma robusta</i>	●	●	●			■		■				■			
kohuhu, black matipo, tawhiri	<i>Pittosporum tenuifolium</i>	●	●	●			■		■				■			
korokio (shrub)	<i>Corokia cotoneaster</i>	●	●										■			
koromiko (shrub)	<i>Hebe salicifolia</i>	●	●			■	■						■			
lemonwood, tarata	<i>Pittosporum eugenioides</i>	●	●										■			
makaka, NZ broom	<i>Carmichaelia "robusta"</i>		●													
manatu, lowland ribbonwood (dc)	<i>Plagianthus regius</i>	●	●	●					■				■			
manuka, tea tree	<i>Leptospermum scoparium</i>	●	●	●					■				■			
mapou	<i>Myrsine australis</i>	●	●										■			
matagouri	<i>Discaria toumatou</i>		●										■			
mikimiki (shrub)	<i>Coprosma propinqua</i>		●	●		■	■		■				■			
mikimiki (shrub)	<i>Coprosma aff. parviflora (sp.t)</i>	●	●			■	■		■				■			
mikimiki (shrub)	<i>Coprosma rubra, C. areolata</i>	●											■			
mikimiki, round leaved coprosma	<i>Coprosma rotundifolia</i>	●					■						■			
mikimiki (shrub)	<i>Coprosma virescens</i>	●	●										■			
mikimiki (shrub)	<i>Coprosma crassifolia</i>		●										■			
rohutu, NZ myrtle	<i>Lophomyrtus obcordata</i>	●	●										■			
South Island kowhai (dc, toxic)	<i>Sophora microphylla</i>	●	●										■			
yellow wood	<i>Coprosma linariifolia</i>	●					■						■			
shining karamu	<i>Coprosma lucida</i>						■						■			
SUCCESSIONAL PLANTS incl. ferns																
(plant below established canopy)																
five finger, whauwhaupaku	<i>Pseudopanax arboreus</i>	●	●				■						■			
	<i>Pseudopanax anomalous</i>	●	●										■			
hinau	<i>Elaeocarpus dentatus</i>	●											■			
horopito, peppertree (shrub)	<i>Pseudowintera colorata</i>	●	●						■				■			
hounds tongue fern	<i>Phymatosorus pustulatus</i>	●	●										■			
kahikatea, white pine	<i>Dacrycarpus dacrydioides</i>	●	●						■				■			
kaikomako	<i>Pennantia corymbosa</i>	●	●						■				■			
kakaha, bush lily	<i>Astelia fragrans</i>	●				■							■			
kiokio	<i>Blechnum chambersii</i>	●	●										■			
kiokio	<i>Blechnum fluviatile</i>	●	●										■			

		Planting zones										Plant tolerances				
		Broad ecosystem			margin/edge	lower bank	upper bank	crest or levee	backswamp	terrace face	upper terrace	sun	shade	wet	dry	wind
		1	2	3												
kiokio	<i>Blechnum minus</i>	●	●										■	■		
kotukutuku, tree fuchsia (dc)	<i>Fuchsia excorticata</i>	●					■						■	■		
lancewood, horoeka	<i>Pseudopanax crassifolius</i>	●	●										■	■		
mahoe, whiteywood (x frost)	<i>Melicytus ramiflorus</i>	●					■						■	■		
makomako, wineberry (dc)	<i>Aristotelia serrata</i>	●					■						■	■		
mata, water fern	<i>Histiopteris incisa</i>	●	●		■								■	■		
matai, black pine	<i>Prumnopitys taxifolia</i>	●	●	●									■	■		
pigeonwood (x frost)	<i>Hedycarya arborea</i>	●											■	■		
pikopiko	<i>Polystichum richardii</i>	●	●										■	■		
poataniwha (shrub)	<i>Melicope simplex</i>	●	●	●									■	■		
pokaka	<i>Elaeocarpus hookerianus</i>	●	●						■				■	■		
putaputaweta, marbleleaf	<i>Carpodetus serratus</i>	●					■						■	■		
rough pigfern	<i>Hypolepis ambigua</i>	●	●		■	■	■	■	■				■	■		
silver fern (x frost)	<i>Cyathea dealbata</i>	●						■	■				■	■		
titoki (x frost)	<i>Alectryon excelsum</i>	●					■						■	■		
totara	<i>Podocarpus totara</i>	●	●										■	■		
turepo, small leaved milk tree	<i>Streblus heterophyllus</i>	●	●				■		■				■	■		
weeping mapou (shrub)	<i>Myrsine divaricata</i>	●	●		■				■				■	■		
wheki, hard treefern (x frost)	<i>Dicksonia squarrosa</i>	●	●				■		■				■	■		
FERNS AND GROUND COVERS																
common name	species name															
bog rush	<i>Schoenus pauciflorus</i>				●				■				■	■		
harakeke, NZ flax	<i>Phormium tenax</i>	●	●	●	■				■				■	■		
kapungawhia, lake club rush	<i>Schoenoplectus validus</i>				●				■				■	■		
NZ iris, mikoikoi	<i>Libertia ixioides</i>	●	●										■	■		
spike-sedge	<i>Eleocharis acuta</i>				●								■	■		
silver tussock	<i>Poa cita</i>	●	●										■	■		
toetoe grass, toitoi	<i>Cortaderia richardii</i>	●	●	●	■	■			■				■	■		
tussock rushes	<i>Juncus gregiflorus, pallidus</i>	●	●		■				■				■	■		
umbrella sedge, upoko-tangata	<i>Cyperus ustulatus</i>	●	●		■								■	■		
wind grass, bamboo grass	<i>Anemanthele lessoniana</i>	●					■						■	■		
a sedge	<i>Carex secta, C. virgata</i>				●				■				■	■		
puniu, prickly shield fern	<i>Polystichum vestitum</i>	●	●		■				■				■	■		
KEY		Broad ecosystem				Plant tolerances										
1		rich, deep soils				■ tolerates or needs										
2		well drained soils				□ intolerant of										
3		poorly drained soils				▤ tolerant of some										
■		marginal planting zone				(dc) deciduous										
						(x frost) protect from frost										

KEY Broad ecosystem

1 rich, deep soils

2 well drained soils

3 poorly drained soils

■ marginal planting zone

Plant tolerances

■ tolerates or needs

□ intolerant of

▨ tolerant of some

(dc) deciduous

(x frost) protect from frost

How to monitor water quality

The following aspects can be used as indicators of stream health:

- Water velocity, pH, temperature, conductivity, clarity
- Composition of the stream bed
- Silt deposits
- Invertebrate types
- Algae types
- Stream bank vegetation

SHMAK (New Zealand Stream Health Monitoring and Assessment Kit) is a stream monitoring kit that allows you to measure stream health. It has been developed by the National Institute of Water and Atmospheric Research (NIWA) in partnership with Federated Farmers of New Zealand.

For help with setting up monitoring programmes and using **SHMAK** contact:

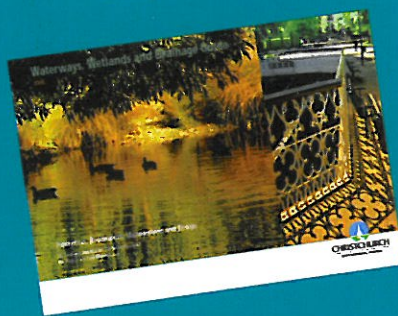
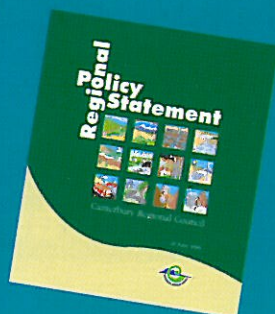
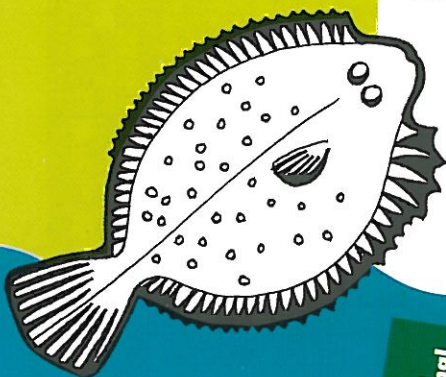
NZ Landcare Trust
PO Box 16 269, Christchurch
Phone (03) 349 2630
Fax (03) 349 2640
Email: info@landcare.org.nz

Waterwatch - Kaitiaki Wai is a hands on water quality monitoring and assessment kit designed for schools, administered by the International Centre for Nature Conservation, based at Lincoln University.

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How can you get involved?

- First, look at a stream on or near your place. Does it have good riparian care? Can you help?
- Adopt a stream that needs some care.
- Get together with interested people, e.g. neighbours or friends, to help make a stream healthy.
- Find out about stream care projects in your area.

Contacts:

- Environment Canterbury – Resource Care Section
- New Zealand Landcare Trust, PO Box 269 Christchurch Phone (03) 349 260, fax (03) 349 2640
- Local environment groups
- Schools – some schools are already involved in water quality monitoring

Acknowledgements

Environment Canterbury staff
Colin Meurk, plant ecologist,
Landcare Research
Manaaki Whenua, Lincoln
Photographic contributions by
Al Shearer

Booklet prepared by Lucas
Associates, Geraldine &
Christchurch, Ines Stäger,
Jeremy Head and Di Lucas
February 2001

Other information sources

Copies of relevant Environment Canterbury reports are available from:

Customer Services, Environment Canterbury, PO Box 345, Christchurch.
Freephone 0800 EC INFO, or fax (03) 365 3194 Website: www.ecan.govt.nz

Regional Policy Statement – Canterbury Regional Council. 26 June 1998. Christchurch.

The Natural Succession Option – Environment Canterbury

Using Native Plants in Canterbury – Environment Canterbury

Waterways and Wetlands Design Guide Water Services Unit, Christchurch City Council.
(available late 2001)

Streamside Planting Guide, Christchurch City Council. The internet site on which the guide can be found is www.ccc.govt.nz/WaterServices/Streamside/index.html

