

A companion guide to  
**MANAGING WATERWAYS  
ON CANTERBURY FARMS**

# **HILL COUNTRY STREAMS**

- Key approaches to hill country streams
- Special features of hill country streams
- Priorities for management
  - Keeping stock out
  - Leaving a long grass margin
  - Planting stream banks

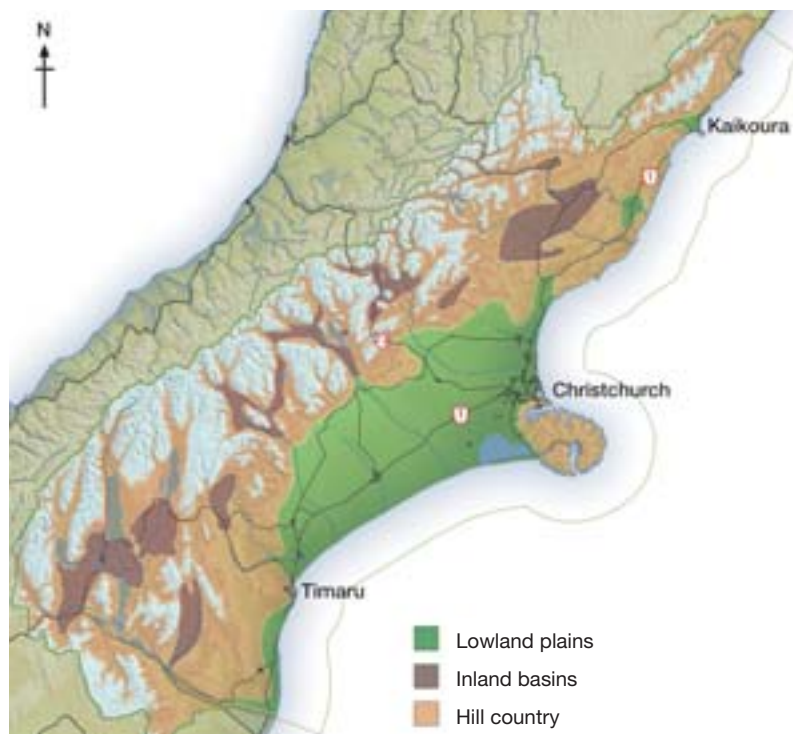


## The three key approaches to managing hill country streams:

- **1st priority:** Keep stock out of streams.  
Where stock can't be fenced out in V-shaped valleys run lower stocking rates and/or exclude cattle on land adjoining streams.
- **2nd priority:** Leave a long grass margin.
- **3rd priority:** Plant shrubs and trees in the riparian margin.

This booklet is a companion to the main document: "A GUIDE TO MANAGING WATERWAYS ON CANTERBURY FARMS". If you read through the main document first, you will gain a good understanding of the basic principles for each of the approaches listed above.

**This booklet focuses on the specific management needs for waterways in Canterbury's hill country.**



**FIGURE 1**  
Location of hill  
country streams  
in Canterbury.

## What's special about hill country streams?

The streams flowing through Canterbury's hill country can be split into two types: V-shaped valleys and U-shaped valleys. V-shaped valley streams are steep and tightly confined between the sides of the valley. U-shaped valley streams are gently sloping with a distinct valley floor, which acts as a flood plain. The stream often meanders across this flood plain. V-shaped valley streams sometimes change to U-shaped valley streams in the lower part of the catchment.

V-shaped valley streams are characteristic of places such as:

- North Canterbury coastal hill country
- the upper sections of the Banks Peninsula valleys.

U-shaped valley streams are characteristic of places such as:

- the Timaru downlands
- the middle and lower sections of the Banks Peninsula valleys
- middle sections of larger North Canterbury hill country catchments such as the Waipara.

Hill country streams are steeper and more powerful than plains and inland basin streams. During heavy rain, run-off can flow directly into the stream from steeper slopes, increasing stream flow and resulting in bank erosion. In the wider, U-shaped valley streams farmers have sometimes responded to this by straightening the stream, but this often leads to ongoing channel erosion both locally and downstream of the straightened reach.

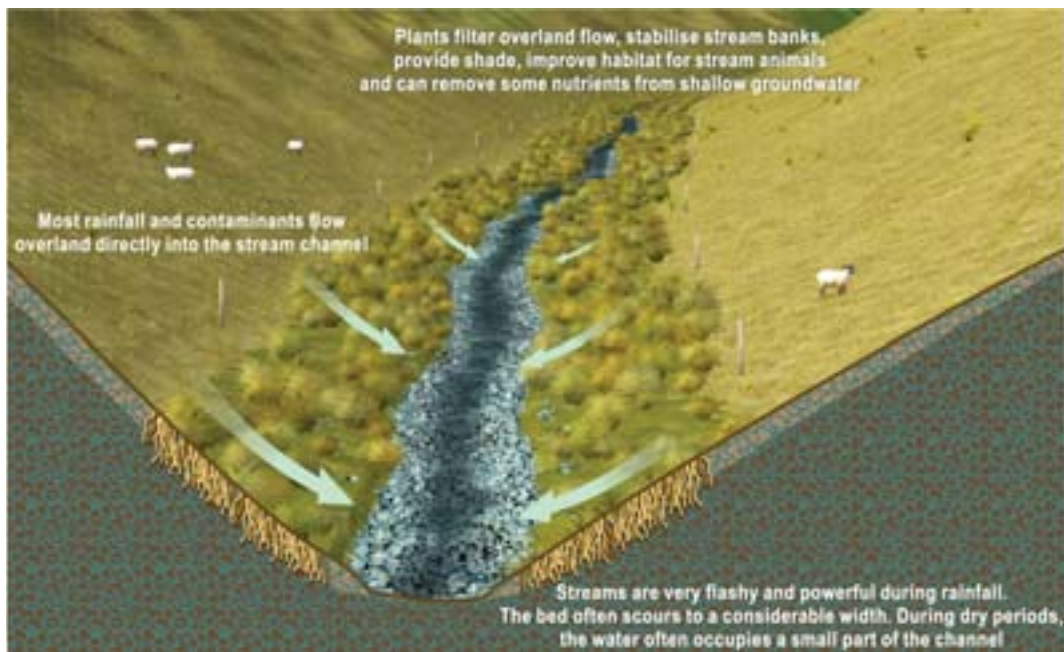


**PHOTO 1**

In undeveloped hill country streams, the stream water is generally very clear and low in nutrients, and most streams have a gravel bed. These streams often provide habitat for trout and native fish, such as eels, banded kokopu (near the coast) or common river galaxias (inland).

## How do hill country streams 'behave'?

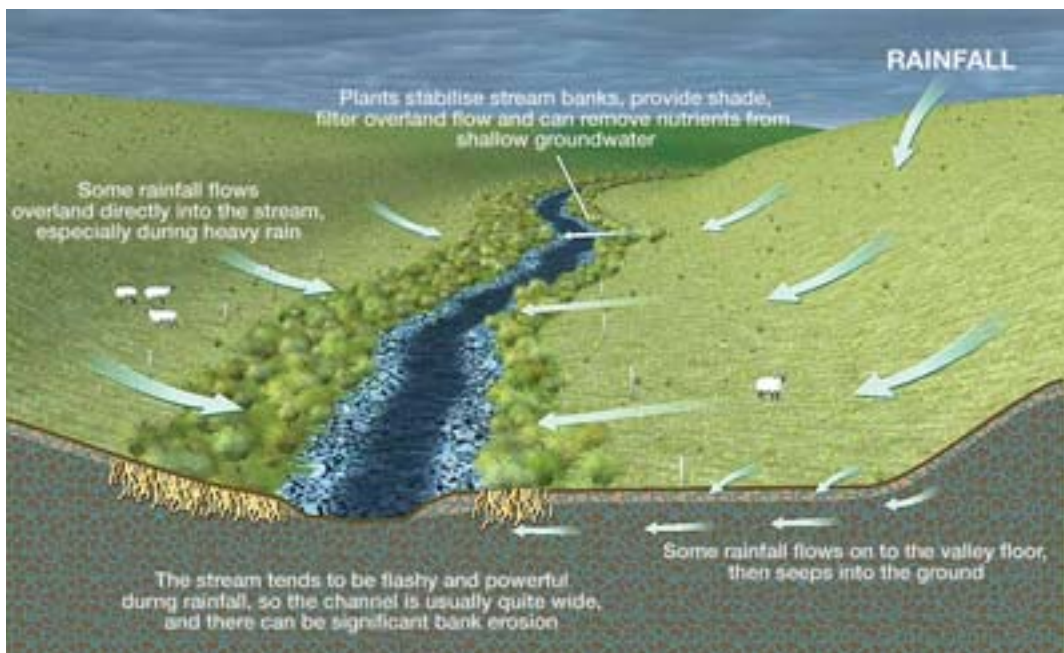
The figures below show the important functions of the riparian margin that influence stream health in V-shaped and U-shaped valleys.



**FIGURE 2**

### V-shaped valley streams.

The most important functions of the riparian margin in the steeper, V-shaped valley streams are filtering run-off, particularly to remove sediment, and bank stabilisation.



**FIGURE 3**

### U-shaped valley streams.

The most important functions of the riparian margin in U-shaped valley streams are filtering run-off, bank stabilisation and shade, especially in smaller streams.

# Priorities for managing riparian margins on hill country streams

## 1st priority: Keeping stock out

The sloping banks of hill country streams are particularly vulnerable to erosion. Stock damage to stream banks and to protective vegetation along the stream margin will increase the risk of erosion. Eroding banks release fine sediment into the channel making the water murkier, smothering the stream bed and reducing the habitat for fish and insects. This sediment eventually finds its way down to the streams on the flats and into lakes and estuaries. Salmon, trout and some native fish spawn in river gravels and cobbles of many hill country streams, so it's important that the stream bed is kept clean.

### What sort of fence

- Set permanent fencing far enough back to allow for bank erosion or for changing stream meanders, particularly in the wide flood plains of U-shaped valley streams.
- Fencing off springs is particularly important – if stock defecate into the source of the stream, the water quality of the whole stream is affected.
- Use temporary electric fences to protect waterways at critical times, such as during winter and wet periods, or during the spawning season.
- If fencing steep, V-shaped valley stream banks is not practical, encourage regeneration of riparian vegetation and light grazing regimes. Cattle should be excluded from land adjoining unfenced streams.
- Putting in troughs will attract stock away from streams.

Section 5 of the overview book provides detailed advice on stream fencing and stock water options.

## 2nd Priority: Leaving a long grass margin

While fencing alongside the stream is valuable to keep stock out, you will get greater benefits for water quality by leaving an ungrazed grass margin between the fence and the stream. Filtering run-off is an important function of riparian margins for hill country streams and long, dense grass provides the most effective filter.

### How wide?

The required width of margin depends on the length and angle of slope of the adjacent land.

**Steeper slopes require wider grass margins to filter run-off effectively.**

- Where a stream is on the flood plain of a U-shaped valley, a four to five metre-width margin will generally be sufficient.
- Set the fence back at least five metres where the stream is at the foot of a steeper, V-shaped slope.
- Allow wider grass margin (say 10 metres) at low points where paddock run-off enters the stream (Figure 4).

**FIGURE 4**  
Using grass margins to filter channelled run-off from low points in paddock.



### 3rd Priority: Planting stream banks

The climate of the hill country streams gets progressively cooler as you get further inland and further south. Many hill country catchments are also prone to drought, although not as dramatically as on the plains. The combination of cool temperatures and dry conditions provides the greatest obstacle to getting plants established.

Banks Peninsula and North Canterbury coastal hill country both have a warmer climate than the inland hill country areas and receive more rain. Their soils are generally more fertile and better drained. This allows for a longer planting period, and for a wider range of species that can be used in riparian plantings.



#### PHOTO 7

This well-vegetated gully provides a well-functioning riparian margin.

### What species to plant?

We recommend you begin planting with some of the hardy primary species, listed in the following table on page 7, which are particularly adapted to establishing quickly in the hill country conditions and carry out the key riparian functions of providing shade, bank stability, nutrient uptake and filtering run-off.

It is important to retain a margin or understorey of long grass in association with any planting of taller shrubs and trees to provide for the ongoing filtering of run-off. Planting too densely can shade out grasses and other ground cover.

Once these initial plantings have established, they will provide shelter to establish some of the less hardy, secondary species listed. The table indicates where each species should be planted within the riparian margin to enhance the waterway environment.

All of the primary species recommended in the table are tolerant of frost and are best planted in spring when soil moisture levels are high, although the warmer coastal climate in Banks Peninsula and North Canterbury means plants can be successfully planted in autumn at these places. However, if there are very wet areas beside the stream these should be planted when water levels are lowest (usually late summer). The table shows which species are suitable for planting in coastal (C) or inland (I) hill country.

### Weed and pest control

All weeds listed on Page 18 of the overview book are likely to be found along hill country streams. Rabbits and hares are most likely to be a problem in the free-draining hills inland of Kaikoura and possums may be a problem on Banks Peninsula and the inland hills.

See the overview book for general guidance on planting and maintenance, and for weed and pest control.

## Hill country streams planting table

Species name			Planting zone				Tolerant of						Suitable for				Growth rate	Recommended spacing (metres)	
Scientific name	Common name	Plant type	Margin	Lower bank	Upper bank	Wetlands	Heavy frost	Light frost	Boggy soils	Flood currents	Periodic flooding	Dry soils	Full sun	Coastal zones	Coastal / inland hills	Bank stability			Wildlife value
<b>Primary species</b>																			
<i>Carex secta</i>	Tussock sedge	Grass	•			•	•	•	•	•	•		•	•	C/I	•	Seed	Med	0.5-1
<i>Chionochloa rubra</i>	Red tussock	Grass		•	•	•	•	•	•	•	•		•		I	•	Seed	Med	
<i>Cortaderia richardii</i>	Toetoe	Grass		•	•		•	•				•	•	•	C/I	•	Seed	Med	1-1.5
<i>Phormium tenax</i>	Flax; harakeke	Flax		•	•	•	•	•	•		•		•	•	C/I	•	Nectar	Med	1.5-2
<i>Coprosma propinqua</i>	Mingimingi	Shrub		•	•	•	•	•	•		•	•	•		C/I		Berries	Med	1.5-2
<i>Coprosma repens</i>	Taupata	Shrub			•							•	•	•	C		Berries	Med	1.5-2
<i>Corokia cotoneaster</i>	Korokio	Shrub			•		•	•				•	•		I		Berries	Med	1.5-2
<i>Hebe salicifolia</i>	Koromiko	Shrub			•		•	•					•		I	•	Nectar	Fast	1.5-2
<i>Olearia bullata</i>		Shrub		•	•	•	•	•	•		•	•	•		I		Nectar	Med	1.5-2
<i>Aristotelia serrata</i>	Wineberry	Small tree			•										C	•	Berries	Fast	1.5-2
<i>Coprosma robusta</i>	Karamu	Small tree			•			•			•	•	•		C	•	Berries	Fast	1.5-2
<i>Cordyline australis</i>	Cabbage tree	Small tree		•	•		•	•	•		•	•	•	•	C/I	•	Berries	Med	1.5-2
<i>Dodonea viscosa</i>	Akeake	Small tree			•							•	•	•	C			Fast	1.5-2
<i>Myoporum laetum</i>	Ngaio	Small tree			•							•	•	•	C		Berries	Med	1.5-2
<i>Olearia paniculata</i>	Akiraho	Small tree			•			•				•	•	•	C		Nectar	Med	1.5-2
<i>Solanum laciniatum</i>	Poroporo	Small tree		•	•			•				•	•	•	C		Berries	Fast	1.5-2
<i>Hoheria angustifolia</i>	Lacebark	Tree			•			•					•		C/I	•	Nectar	Med.	1.5-2
<i>Kunzea ericoides</i>	Kanuka	Tree			•		•	•				•	•		C/I	•	Nectar	Med	1.5-2
<i>Pittosporum eugenioides</i>	Lemonwood	Tree			•			•					•		C/I			Fast	1.5-2
<i>Pittosporum tenuifolium</i>	Kohuhu	Tree			•		•	•				•	•	•	C/I			Fast	1.5-2
<i>Plagianthus regius</i>	Ribbonwood	Tree			•		•	•					•	•	C/I	•		Med	1.5-2
<i>Sophora microphylla</i>	Kowhai	Tree		•			•	•					•		C		Nectar	Med	1.5-2
<i>Populus spp.</i>	Poplar	Tree			•		•	•				•	•		C/I			Fast	2-10
<b>Secondary species</b>																			
<i>Carpodetus serratus</i>	Marbleleaf	Tree			•										C		Nectar, berries	Med	1.5-2
<i>Dacrycarpus dactyloides</i>	Kahikatea	Tall tree			•	•	•	•			•				C/I		Berries	Slow	2
<i>Elaeocarpus hookerianus</i>	Pokaka	Tree			•	•	•	•			•				C/I		Berries	Slow	2
<i>Griselinia littoralis</i>	Broadleaf	Tree			•		•	•				•	•		I		Berries	Med	1.5-2
<i>Nothofagus fusca</i>	Red beech	Tall tree			•		•	•							C/I			Med	2
<i>Nothofagus solandri</i>	Black beech	Tall tree			•		•	•							C/I		Honeydew	Med	2
<i>Pennantia corymbosa</i>	Kaikomako	Tree			•										C		Berries	Med	1.5-2
<i>Podocarpus totara</i>	Totara	Tall tree			•		•	•							C/I		Berries	Med	2
<i>Pseudopanax crassifolius</i>	Lancewood	Tree			•		•	•							C		Berries	Med	1.5-2
<i>Sophora microphylla</i>	Kowhai	Tree		•			•	•					•		I		Nectar	Med	1.5-2
<b>Rare species</b>																			
<i>Carex tenuiculmis</i>		Grass	•			•	•	•			•				I		Seed	Med	0.5-1
<i>Carmichaelia torulosa</i>	Canterbury broom	Shrub			•		•	•				•	•		I		Nectar	Med	1.5-2
<i>Carmichaelia kirkii</i>	Climbing broom	Shrub			•		•	•				•	•		I		Nectar	Med	1.5-2
<i>Coprosma wallii</i>		Shrub			•			•							C		Berries	Med	1.5-2
<i>Muehlenbeckia astonii</i>	Shrub pohuehue	Shrub			•			•				•	•	•	C		Berries	Med	1.5-2
<i>Teucrium parviflorum</i>	NZ verbena	Shrub			•			•							C		Nectar	Med	1.5-2
<i>Olearia hectori</i>		Small tree			•		•	•							I		Nectar	Med	1.5-2
<i>Pseudopanax ferox</i>	Fierce lancewood	Tree			•		•	•							C		Berries	Med	1.5-2

- 1 If planting exotic trees such as poplar along large or medium-sized streams, it is vital that these are planted at least five metres away from the stream as large trees can become a problem very quickly when planted too close.
- 2 Poplar cultivars can be planted at a variety of spacings depending on desired outcomes:
  - Poplars at 10m spacings allow trees to develop a natural crown. This form will allow access to the stream for maintenance and retain a dense grass cover to filter sediments/pollutants.
  - Poplars planted at 2-3m spacings will have less crown development, grow less vigorously and will not become as tall.
- 3 Don't plant anything within 1.5m of a fence.
- 4 'Wildlife value' identifies fruits or flowers for attracting birds, insects and lizards. 'Berries' is a general term for fleshy fruits eaten by birds and lizards. Flowers are also visited by insects for pollen and nectar.
- 5 Species listed as 'suitable for coastal zones' are tolerant of salt spray and coastal exposure.



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