A companion guide to
MANAGING WATERWAYS ON CANTERBURY FARMS

INLAND BASIN STREAMS

- **Key approaches to inland basin streams**
- **Special features of inland basin streams**
- **Priorities for management**
  - **Keeping stock out**
  - **Leaving a long grass margin**
  - **Manage and protect wetlands**
  - **Planting stream banks**

Living Streams

Environment Canterbury
Your regional council

The key approaches to managing waterways in undeveloped inland basins:

- **1st priority:** Where practical, keep stock out of streams.

  Where stock can't be excluded, only allow extensive sheep grazing adjacent to streams rather than deer and cattle.

- **2nd priority:** Manage and protect wetlands.

- **3rd priority:** Fence and plant riparian margins in sensitive areas.

For developed inland basins:

(Use an approach similar to lowland plains)

- **1st priority:** Fence stock out of streams and wetlands and avoid cultivating right to the stream edge.

- **2nd priority:** Leave a long grass margin.

- **3rd priority:** Plant riparian margins.

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 inland basins.

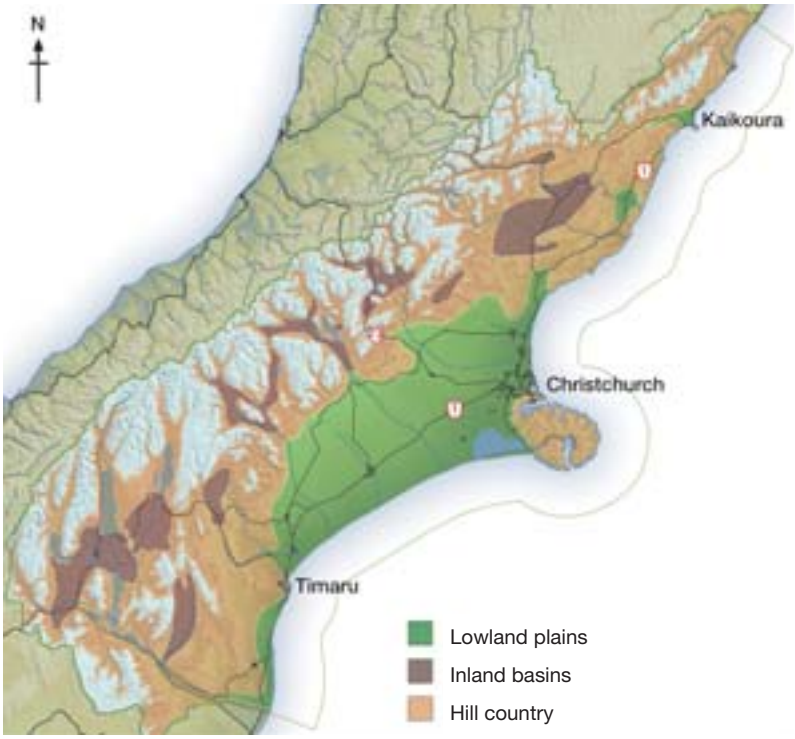

FIGURE 1
Location of inland basin streams in Canterbury.

What's special about inland basin waterways?

Inland basin streams often arise from springs and wetlands, so they have a relatively steady flow. In undeveloped areas, stream water is generally very clear and naturally low in nutrients, and most streams have a gravel bed. Water temperatures are usually cool, provided the stream is kept shaded. All of this makes inland basin streams good for stream life and fish spawning, since fish lay their eggs beneath the streambed gravels or cobbles, and the eggs need cool temperatures to hatch.

Land development has the potential to negatively impact on these streams. Because inland basin streams are on fairly flat land, they don't have a lot of 'power'. This means that any sediment getting into the stream from disturbance of the bank or adjacent land will tend to settle onto the stream bed, which can smother fish eggs and the habitat of small stream animals. So keeping fine sediment out of these gravel-bed streams is especially important to maintain good conditions for fish and insects.

PHOTO 1
Undeveloped inland basin stream.

PHOTO 2
Unprotected stream in developed inland basin area.

Because agriculture in the inland basins has traditionally been extensive rather than intensive, water quality is generally high. However, some of Canterbury's inland basins, such as Ashwick Flat and the Amuri Basin, have been more intensively developed in recent years. In these areas, removal of riparian vegetation, direct stock access to streams, and irrigation discharges have contributed to poor water quality and sedimentation of the stream beds. So, **if you want to intensify your farming operation, pay special attention to stock access to streams, and the management of riparian margins and wetlands**.

How do inland basin waterways ‘behave’?

The way that land use affects the stream depends on the soil type: free-draining soils affect streams very differently to poorly-drained soils. This is illustrated in Figures 2 and 3.

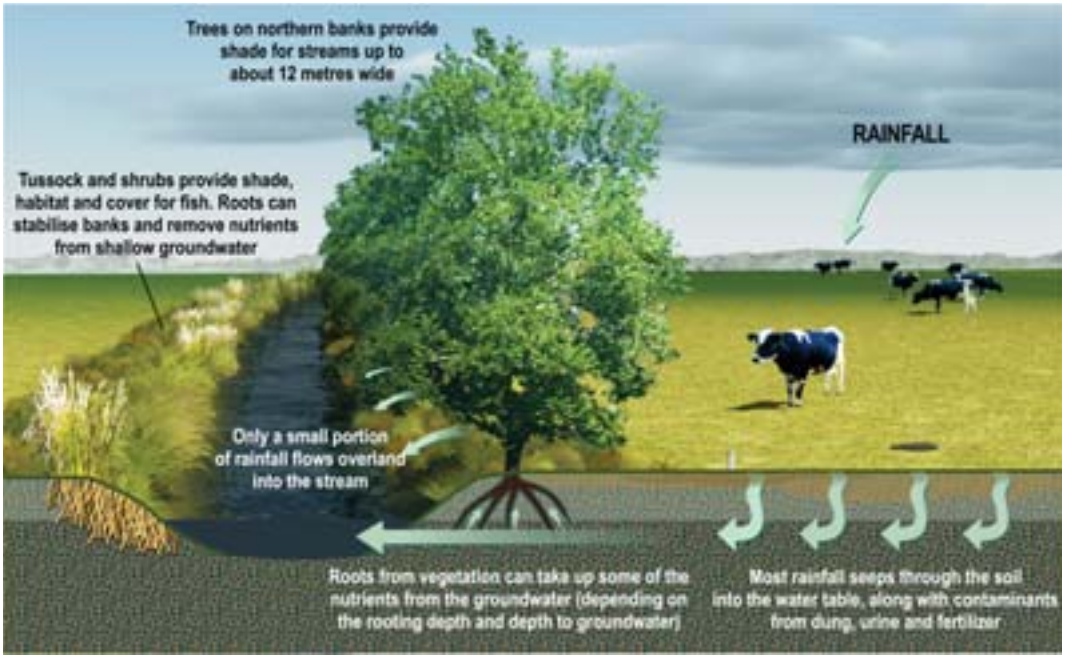

FIGURE 2
How inland basin streams behave: free-draining soils.

In free-draining soils most water will move through the soil and into the groundwater where it will carry any nutrients through into the waterway. The roots of riparian plants can help remove nutrients from shallow groundwater before it reaches the stream.

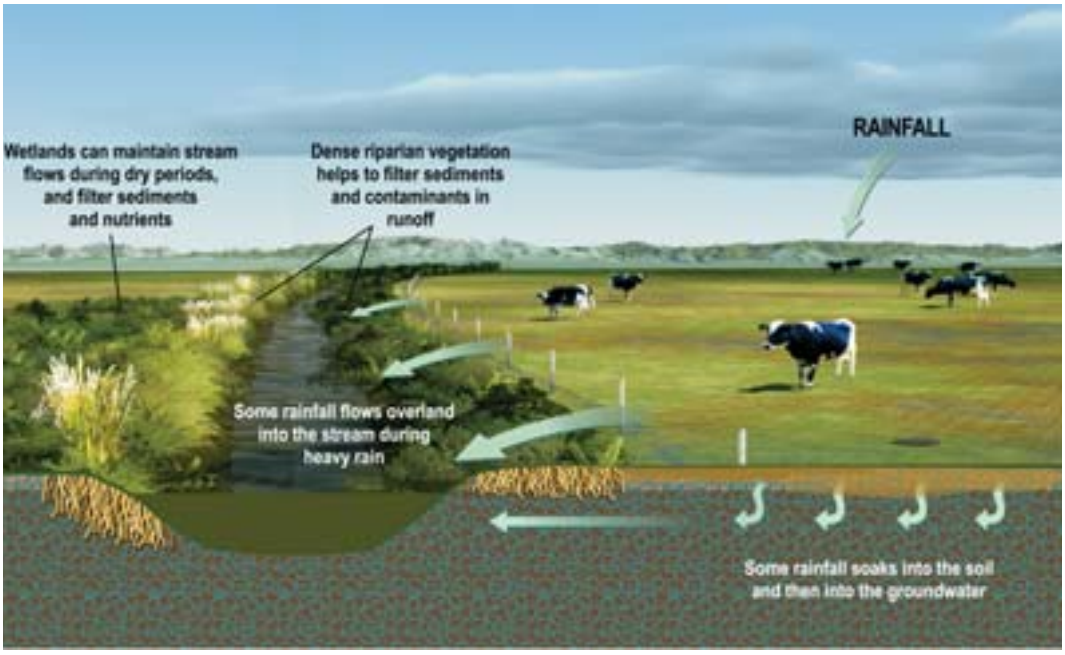

FIGURE 3
How inland basin streams behave: poorly-drained soils.

On poorly-drained soils, most water will flow over the surface of the ground, carrying soil and nutrients directly into the stream. A dense grass sward along the stream margin will be most effective in capturing sediment before it reaches the stream.

Priorities for managing riparian margins along inland basin streams

Ist priority: Keeping stock out (developed and undeveloped inland basins)

Stream banks are vulnerable to damage from stock. Eroding banks release fine sediment into the channel where it accumulates and smothers the stream bed, reducing the habitat for fish and insects. Salmon, trout and native fish depend on clean, clear water for feeding and spawning, so it's important that the stream bed is kept free from silt build-up.

PHOTO 3
Stock access to this stream has caused bank erosion and water pollution.

PHOTO 4
Fencing has kept out stock and allowed riparian vegetation to grow.

What sort of fence

- Fencing is the surest way to keep stock out of streams in developed parts of inland basins. If you want to intensify your farming operation, then fencing streams will be a priority.
- If fencing just isn't an option in undeveloped inland basin areas, then try to allow only light grazing (for example, with sheep) in paddocks adjacent to the stream.
- Use temporary electric fences to protect streams at critical times, such as winter and wet periods, or during the spawning season.
- Putting in troughs away from streams and wetlands will help keep stock away from waterways.

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

2nd priority (developed areas): Leaving a long grass margin

Maintaining the low nutrient status of inland basin streams, should be a focus for management of the riparian margin, particularly where farming operations are being intensified. 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. Long grass margins provide the most effective filter for overland run-off.

How wide?

- Where soils are free-draining and flat, a two to three metre margin will generally be sufficient for bank stabilisation and shade.
- Where soils are heavy, a four to five metre grass margin will be needed to filter any run-off before it reaches the stream.
- Greater widths might be needed where there is sloping land beside the stream. Section 5 of the overview booklet provides detailed advice on the best options for stream fencing.
- When cultivating leave a two to three metre uncultivated margin beside the stream to filter sediment and nutrients from run-off and provide some shade for small streams.

2nd priority (undeveloped areas): Managing wetlands

Some of the best wetlands left in the Canterbury region are found in the inland basins. It's important to protect these wetlands because they provide specialised habitat for many rare native birds and fish. They also help to filter water and maintain steady stream flows during dry periods.

If you're planning to intensify your farm, fencing off wetlands to prevent stock damage will allow wetlands to function effectively as filters, improving water quality in nearby springs, lakes and streams. It will also reduce costly stock losses caused by bogged animals.

While it may not be practical to fence off extensive areas of wetlands, fencing smaller wetlands should be seen as a priority.

Two-wire electric fences to exclude cattle, but permit sheep access, may be appropriate in some situations. Total exclusion of grazing will be best in others (such as naturally infertile rain-fed bogs).

PHOTO 5
This damaged wetland has resulted from stock having access to it.

PHOTO 6
Stock have been permanently excluded from this wetland (centre left of photo), allowing vegetation and birdlife to flourish.

3rd priority: Planting stream banks

(developed and undeveloped inland basins)

Inland basins are a particularly harsh environment for establishing vegetation due to very low minimum temperatures, which are most extreme in the Mackenzie Basin. These areas are also prone to drought. Stock can cause serious damage to sensitive areas such as wet and peaty soils. These areas will be a priority to fence and plant where practical.

What species to plant?

We recommend you begin with some of the hardy species listed in the primary species section of the following table, all of which grow well in the inland basins conditions and fulfil the key riparian functions of providing shade and protecting the instream habitat.

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

All of the primary species recommended are tolerant of frost and are best planted in spring. However, if there are very wet areas beside the stream these should be planted when water levels are lowest (usually late summer).

Weed and pest control

Most weeds listed on Page 18 of the overview book are likely to be found along inland basin streams.

Rank grasses, especially cocksfoot, can smother new plantings and need to be removed around the immediate planting area until plants are established.

Rabbits and hares are likely to be the most troublesome animal pests in the inland basins.

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

Inland basins planting table

Species name			Planting zone				Tolerant of							Suitable for			
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	Bank stability	Wildlife value	Growth rate	Recommended spacing (metres)
Primary species																	
Carex secta	Tussock sedge	Grass	•			•	•	•	•	•	•		•	•	Grain	Med	0.5-1
Chionochloa rubra	Red tussock	Grass		•	•	•	•	•	•	•	•		•	•	Grain	Med	0.5-1
Cortaderia richardii	Toetoe	Grass		•	•		•	•				•	•	•	Grain	Med	1-1.5
Phormium tenax	Flax; harakeke	Flax		•	•	•	•	•	•		•		•	•	Nectar	Med	1.5-2
Coprosma propinqua	Mingimingi	Shrub		•	•	•	•	•	•		•	•	•		Berries	Med	1.5-2
Corokia cotoneaster	Korokio	Shrub			•		•	•				•	•		Berries	Med	1.5-2
Hebe salicifolia	Koromiko	Shrub			•		•	•					•	•	Nectar	Fast	1.5-2
Olearia bullata		Shrub		•	•	•	•	•	•		•	•	•		Nectar	Med	
Ozothamnus leptophylla	Tauhinu	Shrub			•		•	•				•	•		Nectar	Med	1.5-2
Cordyline australis	Cabbage tree	Small tree		•	•	•	•	•	•		•	•	•	•	Berries	Med	1.5-2
Leptospermum scoparium	Manuka	Small tree		•	•	•	•	•	•		•	•	•	•	Nectar	Fast	1.5-2
Pittosporum tehuifolium	Kohuhu	Small tree			•		•	•				•	•		Resin	Med	1.5-2
Kunzea ericoides	Kanuka	Tree			•		•	•				•	•	•	Nectar	Med	1.5-2
Populus spp.	Poplars	Tree			•		•	•				•	•			Fast	2-10
Secondary species																	
Aristotelia fruticosa	Mountain wineberry	Shrub			•		•	•				•	•		Berries	Slow	1.5-2
Discaria toumatou	Matagouri	Shrub			•		•	•				•	•		Nectar, pollen	Slow	1.5-2
Sophora prostrata	Prostrate kowhai	Shrub			•		•	•				•	•		Nectar	Slow	1.5-2
Griselinia littoralis	Broadleaf	Tree			•		•	•				•	•	•	Berries	Med	1.5-2
Nothofagus solandri	Black/mountain beech	Tree			•		•	•							Honeydew	Med	2
Podocarpus hallii	Mountain totara	Tree			•		•	•							Berries	Med	2
Sophora microphylla	Kowhai	Tree		•			•	•					•		Nectar	Med	1.5-2
Rare species																	
Carex tenuiculmis		Grass	•			•	•	•			•				Grain	Med	0.5-1
Coprosma intertexta		Shrub			•		•	•				•	•		Berries	Med	1.5-2
Hebe cupressoides	Whipcord hebe	Shrub			•		•	•				•	•		Nectar	Med	1.5-2
Olearia hectori		Small tree			•		•	•					•		Nectar	Med	1.5-2
Pittosporum patulum		Small tree			•		•	•							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.

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Printed on recycled paper E05/15 July 05