

Key planting guidelines, planting zone 'F': Riparian Kowhai-Ribbonwood forest

Allow 3-5 metre spacings for large canopy trees, 1-2 metres for small trees, and 1 metre for shrubs and large tussocks (e.g. toe toe). An intuitive proportional mixture of the above listed growth forms will result in an average planting density of around 4000/ha.

Choose species marked with an F on the species selector table. Ensure that planting stock seed is sourced from adult populations as close as possible to the restoration areas, but certainly within the Southland Plains/Catlins regions. Refer to 'planting stage' column in the species selector table to assess which mix of species should be planted according to the remnant (if any) native vegetation cover; for example:

1. If vegetation consists of open pasture, then aim to create ground cover as soon as possible by planting fast growing 'colonist' species.
2. If a remnant tall kowhai-ribbonwood canopy persists but is not dense enough to reduce grass vigour then aim to establish a sub-canopy cover with 'colonist' or 'open canopy' species.
3. If either a kowhai-ribbonwood canopy and/or a small tree and shrub canopy persists that is dense enough to prevent grass growth then plant minimally with 'open canopy' and 'full canopy' species to fill in gaps.

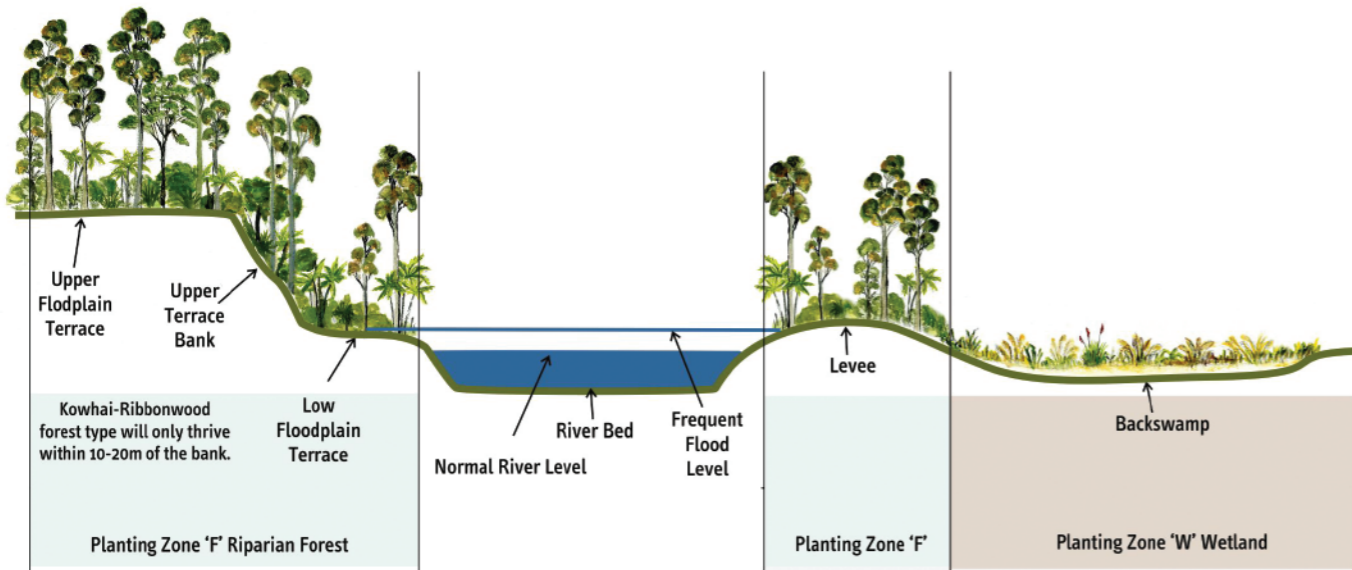
Key planting guidelines, planting zone 'W': for restoration to Tussockland-Rushland- Shrubland fertile wetland, including the transition to forest

Choose species marked with a W on the species selector table.

Allow spacings of 1 metre for tussock forming species and 1.5 metres for shrub species. A 75% bias in terms of numbers towards tussocks will result in an average plantings density of around 8500/ha.

Ensure that planting stock seed is sourced from adult populations as close as possible to the restoration areas, but certainly within the Southland Plains/Catlins regions.

Schematic diagram illustrating how the two riparian planting zones relate to floodplain landform



Entire riparian zone illustrated. This naturally occurs over less than 100 metres and grades into other habitats further from the river

Riparian habitats are primarily defined by landform & relationship with the river.
Potential planting areas need to be assessed for whether they fall into the Forest Zone ('F') or the Wetland Zone ('W').

Importance of the Waikawa Valley riparian forests

The Waikawa Valley is situated in a diverse and rich environment. The range of landforms present and the relative lack of development means that the catchment has good examples of all the main forest types of the Catlins region. The kowhai-ribbonwood riparian forest is of particular importance because it is the best known example of this rare habitat in the Southland Region in terms of condition and extent. The riparian forest and associated shrublands contain significant populations of several threatened plant species. Collectively, the health of the riparian forest and wetland ecosystem strongly influences the health of the river, and in turn that of the estuary, and all the wildlife they can contain.

Issues & options

Fencing:
A pragmatic approach to planting locations should take into account the costs of fencing, likelihood of flood damage, need for stock crossings and fishing access.

Plant propagation:
A decision should be made about how the project should source its plants. The choice will affect project costs and strategy; ask yourself:
• How much in-kind labour is available?
• What are the potential sources of funding for unavoidable costs such as chemical and plant-raising consumables, and for discretionary costs associated with commercially sourcing plants?

Bank stabilisation:
Native plantings offer a long-term solution to bank stabilisation; research by Chris Phillips of Landcare Research suggests that the best species are ribbonwood, lemonwood and cabbage tree.



The two different planting zones - F (forest) & W (wetland) - are seen adjacent to each other in this picture; they respectively occupy the levee and backswamp landform elements of the floodplain.

Common name	Scientific name	Lifeform & max. Height	Planting zone	Planting stage	Planting ratio	Notes (preferences, growth rates, rooting structure)
*= nationally threatened species			W=Riparian Wetland F=Riparian Forest	● = full canopy ● = open canopy ● = colonising	* = plant occasionally * = plant commonly	
a tree daisy	<i>Olearia limata*</i>	Small tree (8m)	F	●	*	For forest margins. Threat status = declining.
bloodwood	<i>Coprosma wallii*</i>	Shrub (3m)	F/W	●	*	Forest fringe & wet areas. Threat status = declining.
broadleaf/kapuka	<i>Grielinia littoralis</i>	Tree (15m)	F	● ● ●	*	Intolerant of animal browse; mod. growth
cabbage tree	<i>Cordyline australis</i>	Tree (15m)	W/F	●	*	Robust. Fast growth. Bank stabiliser.
flax, harakeke	<i>Phormium tenax</i>	Tussock (2.5m)	W	● ● ●	*	Robust species.
fragrant tree daisy	<i>Olearia fragrantissima*</i>	Small tree (8m)	F	●	*	Threat status = declining; forest margins.
green coprosma	<i>Coprosma virens</i>	Shrub (3m)	F	●	*	Fast growing wind tolerant coloniser.
hall's totara	<i>Podocarpus hallii</i>	Tree (20m)	F	● ● ●	*	Put where plantings extend away from river.
interlacing mahoe	<i>Meliclytus flecosus*</i>	Shrub (5m)	F	●	*	Put in forest margin zones. Threat status = 'declining'.
kaikomako	<i>Pennantia corymbosa</i>	Tree (12m)	F	● ● ●	*	Slow growing; for damper areas of forest.
kohuhu / black matipo	<i>Pittosporum tenuifolium</i>	Tree (10m)	F	● ● ●	*	Moderate growth rate. Versatile species.
koromiko	<i>Hebe salicifolia</i>	Shrub (3m)	F	● ● ●	*	Moderate growth rate. Good filler species.
kowhai	<i>Sapora microphylla</i>	Tree (10m)	F	● ● ● ● ●	*	Key canopy component of mature riparian forest.
lancewood	<i>Pseudopanax crassifolius</i>	Tree (12m)	F	● ● ● ● ●	*	Moderate growth rate.
lemonwood	<i>Pittosporum engelmoides</i>	Tree (12m)	F	● ● ● ● ●	*	Good root structure. Fast growth.
lowland ribbonwood	<i>Plagianthus regius</i>	Tree (15m)	F	● ● ● ● ●	*	Fast growing. Good bank stabiliser. Key canopy species.
makomako, wineberry	<i>Aristotelia serrata</i>	Tree (8m)	F	● ● ● ● ●	*	Fast growing. Wind intolerant.
manuka	<i>Leptospermum scoparium</i>	Small tree (8m)	F/W	● ● ● ● ●	*	Fast growing. Versatile. Good to establish shelter.
marbleleaf / putaputaweta	<i>Carpodetus serratus</i>	Tree (10m)	F	● ● ● ● ●	*	Moderate growth rate.
mikimiki / mingimiki	<i>Coprosma propinqua</i>	Shrub (7m)	F/W	● ● ● ● ●	* (F) * (W)	Versatile and robust. Good filler species.
narrow leaved mahoe	<i>Meliclytus lanceolatus</i>	Small tree (4m)	F	● ● ● ● ●	*	
native jasmine	<i>Parsonsia heterophylla</i>	Vine (10m)	F	● ● ● ● ●	*	Plant after shrub/tree cover is established.
pepper tree / horopito	<i>Pseudowintera colorata</i>	Small tree (10m)	F	● ● ● ● ●	*	Slow growth rate. Browse tolerant.
pōtaniwha	<i>Melicope simplex</i>	Shrub (4m)	F	● ● ● ● ●	*	Slow growth rate; plant to increase diversity.
pūrei / pedicelled sedge	<i>Carex secta</i>	Tussock (2.0m)	W	● ● ● ● ●	*	Attractive species. Fast growth.
red matipo	<i>Myrsine australis</i>	Shrub (7m)	F	● ● ● ● ●	*	Moderate growth rate.
red tussock	<i>Chionochloa rubra</i>	Tussock (1.5m)	W	● ● ● ● ●	*	3-5 years to fill a gap.
rōhutu	<i>Lophomyrtus obscurata</i>	Shrub (5m)	F	● ● ● ● ●	*	Moderate growth rate. To increase diversity.
seven-finger / pate	<i>Schefflera digitata</i>	Small tree (6m)	F	● ● ● ● ●	*	Fast growth rate. Good on banks. Wind intolerant.
shining karamu / kakaramu	<i>Coprosma lucida</i>	Small tree (5m)	F	● ● ● ● ●	*	Moderate growth rate.
swamp sedge / pūkio	<i>Carex virgata</i>	Tussock (1m)	W	● ● ● ● ●	*	Fast growing; to re-establish native wetland cover.
thin leaved coprosma	<i>Coprosma arolata</i>	Small tree (4m)	F	● ● ● ● ●	*	Likes moister areas; understorey species to increase diversity.
three finger / orihu	<i>Pseudopanax colensoi</i>	Small tree (5m)	F	● ● ● ● ●	*	Moderate growth rate.
toe toe	<i>Cortaderia richardii</i>	Tussock (1.5m)	F	● ● ● ● ●	*	Robust colonist species. Fast growth to establish shelter.
tree fuchsia / kotukutuku	<i>Fuchsia exaristata</i>	Tree (12m)	F	● ● ● ● ●	*	Intolerant of animal browse. Fast growth.
weeping matipo	<i>Myrsine divaricata</i>	Shrub (3m)	F	● ● ● ● ●	*	Slow growth; good for banks.
yellow flowered clematis	<i>Clematis foetida</i>	Vine (10m)	F	● ● ● ● ●	*	For plant diversity.

Costs

Plants:
Plants cost between \$1 and \$3 per plant depending on the quality, rarity and size of the plants. \$1 cost is roughly the production cost of raising a strong plant from seed in terms of consumables, whereas \$3 is the cost to purchase a good root-trainer from a nursery.
A simple plant nursery with the capacity to produce 2500 plants per annum would have a capital cost of \$10-12K. A cost effective alternative for the production of some plants would be to use space in the Southland Community Nursery run by Chris Rance in Otatara.

Weed control:
Releasing plants from weed competition to ensure maximum survival and growth rates will cost time and money. Experience has shown chemical control to be the cheapest & easiest method in similar environments. Assuming twice annual (spring and autumn) releasing, per annum per hectare costs are 2 person days labour and \$720 per hectare

Pest control: As a guideline contractor costs to control possums, rats, stoats and ferrets would be approximately \$4 per hectare, per year.

After the plants go in...

To ensure maximum plant establishment significant maintenance work is required.

Pest control:
Rabbits and hares can graze young plants heavily so they need to be controlled for the first 2-5 years after planting. Possums graze young plants as well as the canopies of mature plants and selectively graze on key species such as mistletoe; they should be kept at low numbers on an ongoing basis.

Weed control:
Effective weed control (up to twice annual chemical release of young plants for 2-5 years after planting) increases plant survival per year by 30% and plant growth rates by 30%; these two factors combined mean that overall increase in vegetation cover is at least 50% higher than without weed control.

Plant monitoring:
It is well worth keeping a photographic and field-note record of planting mixes, densities and timings. These notes can then be used to evaluate the success of plantings. Every restoration project is unique, and the best teacher is the specific natural environment of each restoration effort.

Check fences:
After floods and strong wind events ensure fences remain stock proof to avoid plant loss.

For more information

To find out more about practical restoration techniques such as weed control you can download the comprehensive guide published by DOC at: <http://www.doc.govt.nz/publications/conservation/protecting-and-restoring-our-natural-heritage-a-practical-guide/>