

Riparian facts

We can all be part of protecting, restoring and connecting Auckland's biodiversity.

Piha Stream – Ngaire Tyson

Streamside planting guide

A practical guide for protecting, enhancing and restoring riparian areas in the Auckland region.

The Auckland region has an extensive coastline, three large harbours, numerous estuaries, many lakes and wetlands, and an extensive network of small streams. In the past, native forest and wetlands once flanked sparkling streams. Today, due to land clearance and urban development, only 19 per cent of our 10,000km long stream network passes through native forest. Our unique native fish need healthy waterways and clear, undisturbed passage between the open sea and catchment headwaters. The healthiest streams are those with forest buffers, which shade the water, filter run-off and stabilise the stream banks.

What is a “Riparian zone”?

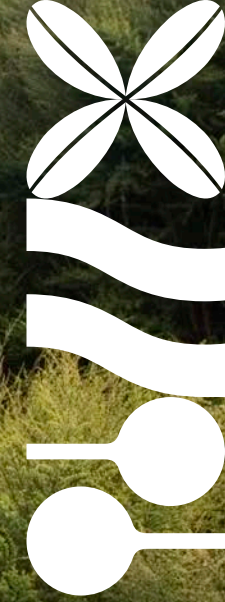
The “riparian zone” is the area of direct interactions between land and water ecosystems.

Many terms are used to describe riparian areas including:

- Streambanks
- Wetlands
- Buffer zones
- Estuary margins

The riparian zone is an important zone for land and water interactions. Most runoff must pass over or through the soil and vegetation of this zone before it reaches the adjacent water body. Riparian areas therefore have a crucial influence on water quality – especially light and temperature, as well as flows. Riparian zones act as buffers which moderate the adverse effects of adjacent land uses on stream, lake or estuarine systems.

Protect. Restore. Connect.



The buffer effect of riparian vegetation also works like a sponge by holding back the water and helping to protect the land from flood damage. Riparian zones also provide important habitat and stepping stones for wildlife both in the streams and on the land (e.g.: fish, birds and insects).

Some key facts:

- There are about 10,000km of permanently flowing streams in the Auckland region.
- Forest clearance and land development over the past 150 years has severely affected riparian vegetation.
- It is estimated that only 19 per cent of the total length of large streams and rivers in the Auckland region now flow through native forest or scrublands.
- Less than 10 per cent of the region's original wetlands remain.
- Less than 30 per cent of the region's native forest remains, and a large proportion of this is in the Hunua and Waitakere Ranges.

What are the benefits of riparian vegetation?

- Improved water flows and water quality. Vegetation and the soil it grows on act like a kidney and filter pollutants. A vegetated buffer also acts like a sponge by controlling flood flows (reducing peaks and prolonging flows)
- Reduced water temperatures and increased oxygen levels in the water
- Increased water clarity
- Stream channel shape and structure are maintained
- Improved terrestrial habitat diversity in the catchment as a whole
- Greater ecological quality and biodiversity in both the water (aquatic) and land (terrestrial) environments.

Effects of loss of riparian vegetation

When stream bank vegetation is removed, there is a loss of:

- habitat quality (aquatic and terrestrial)
- biodiversity – trees, insects, whitebait, eels, birds
- wind protection
- connected corridors (hills to sea)
- amenity values (recreation)
- aesthetic values (visual landscape)
- public awareness
- sense of a typically New Zealand place.

How can we make up for past losses?

It is almost impossible to turn the clock back, so it is not really practical to restore all of the freshwater and riparian habitat the region has lost. However, by restoring riparian buffers where possible, significant environmental benefits can be obtained for a reasonable cost.

Landowners, community groups and councils around the region have already started protecting waterways, enhancing existing areas and replanting what has been lost. Even by fencing a waterway and excluding livestock, you can make an important contribution to improving the stream habitat and water quality.

This pamphlet provides some simple steps for planting and maintaining a riparian buffer. For more detailed information, Auckland Council has produced some riparian management guidelines ('Riparian Zone Management: Strategy, Guideline and Planting Guide' (TP148)) and holds regular workshops.

For more information on the guidelines and workshops, contact the Auckland Council biodiversity team on **09 301 0101** or visit **aucklandcouncil.govt.nz**

Kererū, native pigeon – Rob Suisted



Hochstetters frog – Rob Suisted



5 key steps to planting and maintaining a riparian area

1. Get to know your stream

- Observe your stream throughout the year and think about how you might improve it. Look at the varying water levels and make notes of the seasonal changes.
- Consider what you want to achieve and identify risks and benefits.
- Do you own the land? If not, contact the landowner to discuss your ideas and seek permission.
- Are any stream-works required? Contact Auckland Council to check if a Resource Consent is required.
- Select your planting site and decide how wide to make the riparian buffer (10 metres either side of the stream is the recommended minimum width).
- Who else is involved? Is there an opportunity for neighbours or the community to work together?
- Identify the different 'planting units or zones' [stream edge, flood area, back wetland or spring, slope – see below]. To identify these areas consider slope, distance from stream, how damp the area is and how your stream flows throughout the year.
- The stream edge planting unit is on the edges of stream channels. This planting unit is in a zone of high erosive potential and it is essential that this is recognised in planning which species to plant and when to plant them. Much of the original mature vegetation of the stream edge planting unit never becomes particularly tall. Many species remain less than a metre in height and are able to lie flat when flood waters rush over them. Grass-like sedges are common on stream edges.
- The flood area planting unit is very similar to the stream edge planting unit. It is the flat area that becomes wet and boggy over winter. Plants in this zone need to be able to cope with the extreme conditions of higher moisture levels over winter and dry soils in summer. You also need to plant species that do not restrict flood waters and bend with the flow of water (e.g. Carex species)

- Back wetland or spring is the area where stream banks have accreted or streams have changed course, or where springs emerge. The plants within these areas need to be able to tolerate permanently wet conditions.
- Slopes of varying steepness, including cliffs, may be present in clay, volcanic, alluvial or sandy soils. The conditions will be drier than on the stream flats, with moisture levels decreasing towards the top of the slope.

2. Prepare a planting plan

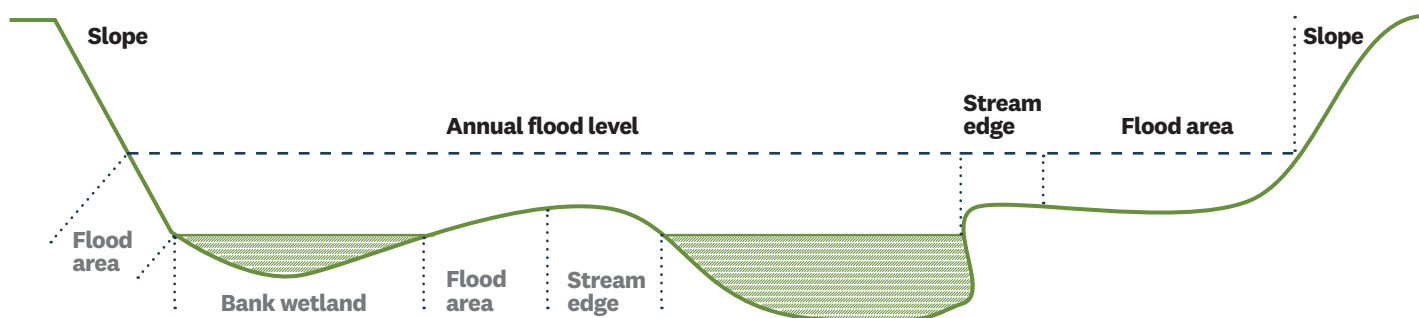
To find out how many plants you will require and of which species, you need to know the size of the planting area and compile a list of appropriate plants for each zone along the streambank.

Space the plants according to the zone they belong in and how big they grow. You will need approximately one plant per square metre (1 metre apart). Ferns, rushes and small sedges need to be planted up to three per square metre (about 50cm apart). Larger tree species (e.g. kahikatea, pūriri) need more room – plant them 5m apart in amongst smaller species.

The species list in this factsheet provides a basic list of some typical Auckland riparian plants and their general tolerance limits. To obtain further plant lists specific to certain soil types (e.g. volcanic, alluvial, clay and sand) and other detailed information, refer to the **Riparian Management Guidelines (TP148)** or contact the Auckland Council. The list focuses on freshwater species – for salt water tolerant species, refer to the **Auckland Council coastal planting guide No. 5 – Coastal wetlands, Saltmarshes & estuaries.**

Initial plantings (Stage 1 planting) may be needed to establish suitable **coloniser** (or nurse) vegetation. Coloniser species are those able to grow first at a site. They are able to cope with the drier, hotter conditions in open areas. These species should make up the bulk of a planting in an open area. These plants will provide shelter for other species that will establish naturally or that are planted later to encourage forest diversity. The species list in this factsheet also includes some forest enrichment species.

Stream cross section division



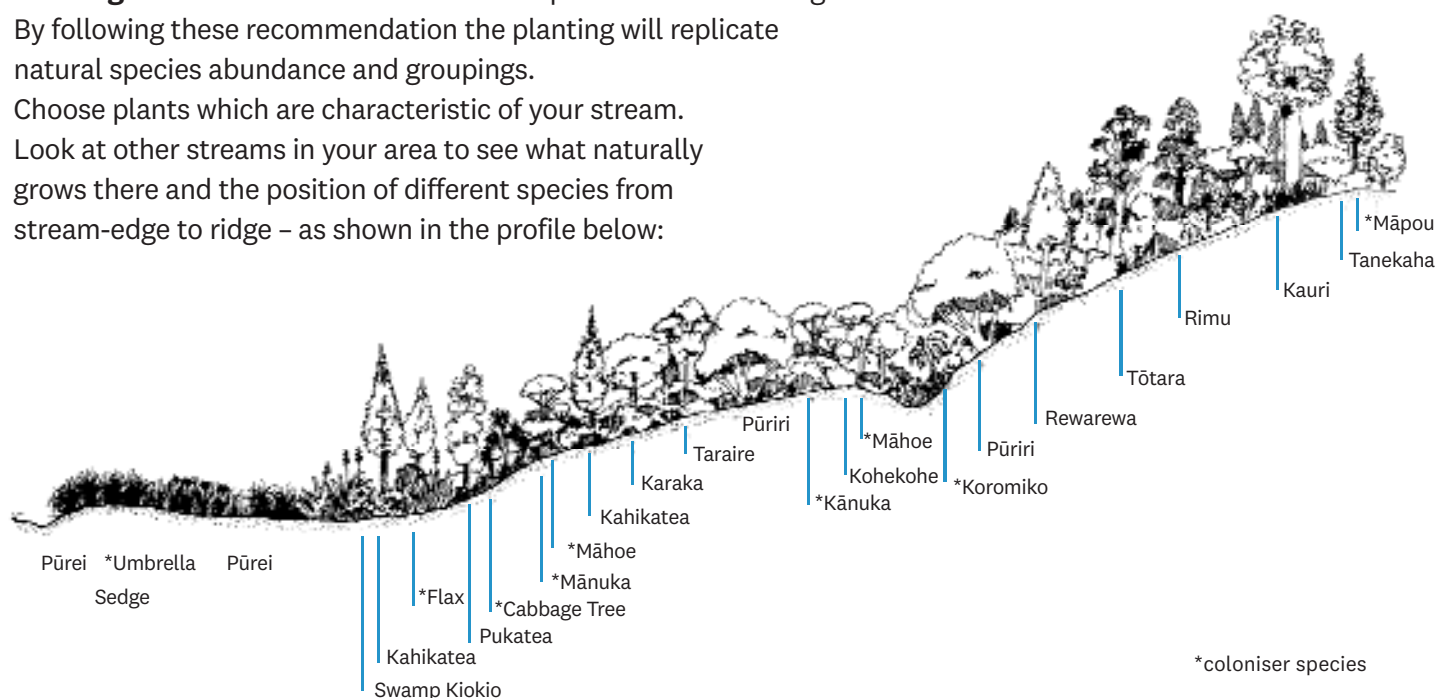
Enrichment species (Stage 2 planting) can be ‘interplanted’ between the original plants once shade and shelter has been established.

Planting abundance is indicated for each species in the following table.

By following these recommendation the planting will replicate natural species abundance and groupings.

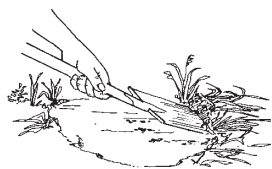
Choose plants which are characteristic of your stream.

Look at other streams in your area to see what naturally grows there and the position of different species from stream-edge to ridge – as shown in the profile below:



Planting guide

Decide on the plant's location

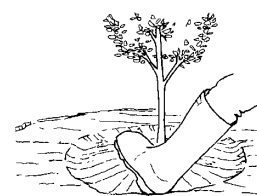
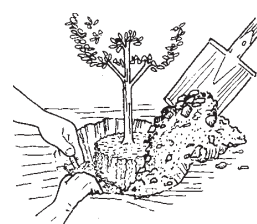
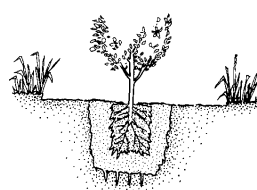
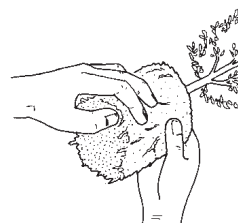


Skim any grass or weeds off the top of the planting site using a spade or grubber. If left they will compete with and could rapidly smother the plant. (You may need to spray if kikuyu is present. Do this several months in advance)

Prepare the planting hole

The hole should be larger than the plant container or root ball. Once the hole is large enough, loosen the soil on the sides and in the bottom of the hole, to allow the plant's roots to penetrate the soil more easily. The hole should be deep enough so the collar (base of the stem where the roots start) is slightly below (1cm) ground level on most sites, and slightly above (1-2cm) on wet or saturated sites.

Remove the plant from its pot, plastic bag or root trainer carefully retaining as much soil around the roots as possible. If the roots are tighty bound, gently tease them



apart. Root bound plants are slower growing and take longer to become well established.

Place the plant in the hole so the stem is the correct depth in relation to the adjacent soil surface. Before placing the plant in the hole, apply fertiliser if there is some available, to give the plant an extra growing boost. Mix the fertiliser with the loose soil in the bottom of the hole. Don't spread the fertiliser on the surface as this will just promote more weed growth.

Gradually add soil into the hole around the roots, firming each layer with your hands.

Firm the soil well after the hole is filled with the heel of your boot, leaving a slight depression to catch any rain or water run-off.

3. Prepare the site

Successful plantings require good site preparation. Native plants grow best with low disturbance from pests and stock. Stock needs to be excluded from the planting site and waterways, with alternative water sources being provided. Pests, such as rabbits, goats and possums need to be removed or controlled.

Clear grass and weeds around each planting site to ensure the new plants get enough light and nutrients. This initial weed control will prevent the young native plants from being immediately outcompeted by weeds.

Important weeds to watch for and remove include willows, tree privet, *Tradescantia*, ginger, woolly nightshade, kikuyu grass, moth plant and blue morning glory.

For further advice on weed and pest animal control, contact the Auckland Council or visit aucklandcouncil.govt.nz

4. Planting

Using your planting plan, source your plants and prepare to dig!

Depending on soil moisture, in riparian areas in Auckland, you can plant throughout autumn, winter and spring. The best planting season is from April to August, which allows plants to establish before the heat and dry of summer. If your site is susceptible to frosts, plant frost sensitive species in early spring.

Handy hints:

- Purchase native plants from nurseries that source plants from your area (“ecosourced”), to ensure they are suited to your area’s climate and soils.
- Grow some of your own plants from seeds.
- Stage your planting and don’t try to do too much at once! Remember that each planting area will require some ongoing maintenance, especially weed control.
- Stake plants when planting to make them easier to locate later.

To stop the spread of invasive pests please check all mulch, plants, their soil and containers (before you move them to your planting site) for contaminants, eggs and live animals i.e. Rainbow skinks and Argentine ants. Please avoid using contaminated mulch, soil and plant material in your restoration planting.

Kauri dieback disease

There is a high risk of spreading kauri dieback (the deadly kauri disease caused by *Phytophthora taxon Agathis*) around the Auckland region in contaminated soil and plant material. The Auckland Council recommends extreme caution when using kauri in restoration plantings.

Kauri seedlings should be sourced from healthy disease free adult plants. Check that your nursery sources their plants and seeds from areas free of kauri dieback. Don’t remove soil or plants from areas known to be infected with kauri dieback. Kauri seed can be tested for kauri dieback disease, free of charge, please contact the Auckland Council biosecurity team 09 301 0101. For more information visit kauridieback.co.nz

5. Ongoing maintenance

- Regularly check on the plants’ health for several years after planting.
- Weeding around plants may be necessary to avoid competition and stress. This should be carried out as required.
- Monitor the growth of your planting – enjoy watching it grow, attract wildlife and become self-sustaining. Take photographs each year to follow the changes!
- Further planting can be carried out when the coloniser cover of the site has established successfully. This is called ‘forest diversity planting’.
- Refer to the planting list for suggested species. These enrichment species or later successional species need the shelter of the coloniser species to establish and are less likely to survive in the open.



Giant Kokopū



Flax flowers

Planting guide

Maori name/ common name	Species	Planting unit					Life form	Height	Moisture Req	Salt-wind tolerance	Abundance		Comments
		Stream edge	Flood area	Back wetland	Slope						(+++ use plentifully, ++ use commonly, + use sparingly)		
											Initial planting Stage 1*	Enrichment planting Stage 2^	
Clump Formers													
Small swamp sedge	<i>Carex virgata</i>						Sedge	80cm	Wet or dry		+++		Plant densely.
Pūrei	<i>Carex secta</i>	•	•	•			Sedge	1m	Wet		+++		Establishes particularly well on Auckland stream banks, even though it was not a particularly common species naturally. Can form short trunks. Plant densely. Best in standing water.
Rautahi	<i>Carex geminata</i>						Sedge	1m	Wet		+++		Good for bank stability. Plant densely.
Toetoe	<i>Austroderia fulvida</i>						Grass	1.5m	Wet or dry	✓	+++		Smallest of the toetoes. Can be distinguished from invasive pampas by its drooping flowering spike. Able to grow on dry, disturbed, compacted sites. Plant densely.
Flat Leaved Sedge	<i>Carex dissita</i>	•	•				Sedge	50cm	Wet		++		Can spread seeds under forest canopy when ground cover weeds have been controlled. Plant densely.
Flax, Harakeke	<i>Phormium tenax</i>			•	•		Monocot clump former	2m	Wet or dry	✓	++		Very hardy with wide environmental tolerances. Unless the alluvial flats are wide, this species should be planted above frequent flood levels as it resists flood waters and can be torn out of the bank.
Ferns - Note: Ferns will often establish naturally and may not need to be planted.													
Kiokio	<i>Blechnum novae-zelandiae</i>	•	•	•			Fern	60cm	Wet or dry		+		Is a hardy plant that is widespread throughout the region. Particularly important on sandy substrates.
Gully Fern	<i>Pneumatopteris pennigera</i>			•			Fern	1m	Wet			+	Can form short trunks. Requires damp, shaded position.
Shrubs and small trees													
karamū	<i>Coprosma robusta</i>				•		Broadleaf shrub	2-4m	Wet or dry		+++		Fast growing, hardy species with wide tolerances from shade to full sun. Bird distributed, with abundant autumn berries for birds.
mānuka	<i>Leptospermum scoparium</i>			•	•		Broadleaf tree	4m	Wet or dry		+++		Grows vigorously and has a wide ecological tolerance, including the ability to colonise inhospitable, low fertility sites and the lower slopes along brackish streams. Needs to be planted in autumn and must not have roots disturbed during planting.
koromiko	<i>Hebe stricta/ Hebe macrocarpa</i>				•		Shrub	2m	Dry		++		Very hardy, fast growing native shrub species.
kawakawa	<i>Macropiper excelsum</i>				•		Broadleaf shrub	4m	Wet or dry		+	++	Bird distributed. Prefers shade.
hangehange	<i>Geniostoma ligustrifolium var. ligustrifolium</i>				•		Broadleaf shrub	4m	Mid			++	Fast growing shade tolerant species that grows well beneath a canopy or gorse.

Planting guide

Maori name/ common name	Species	Planting unit					Life form	Height	Moisture Req	Salt-wind tolerance	Abundance		Comments
		Stream edge	Flood area	Back wetland	Slope						(+++ use plentifully, ++ use commonly, + use sparingly)		
											Initial planting Stage 1*	Enrichment planting Stage 2^	
seven finger, pate	<i>Schefflera digitata</i>			•		Broadleaf tree	5m	Moist, wet				+	Grows rapidly in damp sites, particularly if there is some shade. Small fruits in autumn attract birds.
marble leaf, putaputawētā	<i>Carpodetus serratus</i>	•	•		•	Broadleaf tree	6m	Moist, wet				+	Bird-distributed. Tolerant of cool, wet sites. Host to pūriri moth.
Trees													
māhoe	<i>Melicytus ramiflorus</i>		•		•	Broadleaf tree	10m	Wet or dry			+++		Best planted in autumn. Establishes more slowly than other bank stabilising species, but is a very common species in young riparian vegetation throughout the region. Shade tolerant. Abundant purple fruits in late summer attract birds.
kānuka	<i>Kunzea ericoides</i>				•	Broadleaf tree	12m	Dry			+++		Important coloniser species. Needs to be planted in autumn and must not have roots disturbed during planting.
māpou	<i>Myrsine australis</i>				•	Broadleaf tree	6m	Dry			++		Bird distributed.
cabbage tree, tī kōuka	<i>Cordyline australis</i>	•	•	•	•	Monocot tree	8m	Wet or dry	✓		++		Bird-distributed. Can grow on lower slopes on brackish streams.
whauwhaupaku, fivefinger	<i>Pseudopanax arboreus</i>				•	Broadleaf tree	8m	Moist or dry			+		Very hardy species. Has bunches of succulent purple fruits.
wineberry, makomako	<i>Aristotelia serrata</i>				•	Broadleaf tree	8m	Moist			+		Fruit a favourite of tūi and silveryeye. Fast growing. Provides shade for other species.
kōwhai	<i>Sophora microphylla/</i>		•		•	Broadleaf tree	10m	Dry	✓		+	+	Preferred species of kowhai for inland sites and sites on lava topography. Fast growing, semi-deciduous. Useful for erosion control. Yellow flowers in spring attract tūi.
kōwhai	<i>Sophora chathamica</i>		•		•	Broadleaf tree	20m	Dry	✓		+	+	Use this species in coastal riparian plantings only. Yellow flowers in spring attract tūi.
lacebark, houhere	<i>Hoheria populnea</i>			•		Broadleaf tree	12m	Dry			+		Leaves are a winter food for kererū. Some native birds use bark for nest material.
swamp maire, maire tawake	<i>Syzygium maire</i>			•		Broadleaf tree	7m	Wet				+	Needs moisture. Bird- distributed. Develops breathing roots in waterlogged soils.
titoki	<i>Alectryon excelsus</i>				•	Broadleaf tree	8m	Mid				+	Prefers fertile sites. Bird-distributed.
karaka	<i>Corynocarpus laevigatus</i>		•		•	Broadleaf tree	12m	Moist	✓			+	Large orange fruits in summer attract kererū.
pigeonwood	<i>Hedycarya arborea</i>				•	Broadleaf tree	12m	Dry				+	Fruits popular with kererū. Requires some shelter from winds and protection from frost while young.
kohekohe	<i>Dysoxylum spectabile</i>				•	Broadleaf tree	15m	Mid				+	Bird-distributed seed. Highly palatable to possums.

Planting guide

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		Stream edge	Flood area	Back wetland	Slope					(+++ use plentifully, ++ use commonly, + use sparingly)		
										Initial planting Stage 1*	Enrichment planting Stage 2^	
pūriri	<i>Vitex lucens</i>					• Broadleaf tree	20m	Wet or dry			+	Prefers fertile sites. Year round flowers and fruit provide food for bellbirds, tūi and kererū. Frost tender when small.
taraire	<i>Beilschmiedia tarairi</i>					• Broadleaf tree	20m	Mid	✓		+	Frost tender. Large rounded glossy leaves. Big purple fruit eaten by kererū, in autumn-early winter.
pukatea	<i>Laurelia novae-zelandiae</i>					• Broadleaf tree	25m	Moist, wet			+	Slow growing, but characteristic of wet sites
kauri	<i>Agathis australis</i>					• Conifer tree	25m	Dry			+	Survives in infertile soil. See Kauri Dieback note.
NZ honeysuckle, rewarewa	<i>Knightia excelsa</i>					• Broadleaf tree	25m	Dry	✓		+	Slender, tapering tree with long, narrow serrated leaves. Rich nectar in summer attracts bellbirds and tūi.
white pine, kahikatea	<i>Dacrycarpus dacrydioides</i>	•	•	•	•	Conifer tree	30m	Moist, wet			+	Succulent fruits eaten by birds which distribute seeds.
rimu	<i>Dacrydium cupressinum</i>					• Conifer tree	30m	Mid			+	Bird-distributed. Mid slope species.
tōtara	<i>Podocarpus totara</i>					• Conifer tree	30m	Moist or dry			+	Survives well on dry and exposed sites. Orange-red fruits eaten by many native birds.

* Initial plantings – planted first, establishes quickly and shelters other plants in planting.

^ Enrichment plantings – planted when coloniser and early species have established, added beneath the existing shelter.

For further information

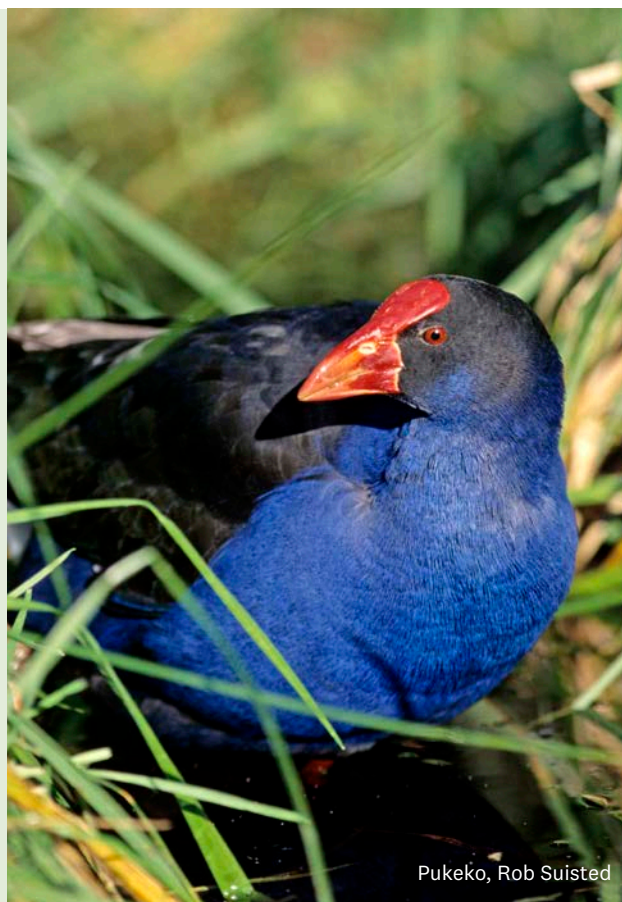
The Auckland Council's biodiversity team can provide further information on ecological restoration contact us on **09 301 0101** or visit our website **aucklandcouncil.govt.nz**

Other useful references available from Auckland Council:

- Riparian zone management guidelines (TP148)
- Wonderful wetlands factsheets 1 & 2
- Wildlife and your backyard
- Coastal planting guide series 1 – 6
- Fish passage guidelines for the auckland region (TP131)
- Water facts – What's all this about dams?
- Good start planting guide.
- Caring for forest fragments
- Native forest restoration

References

ARC Riparian Zone Management Guidelines TP 148.



Pukeko, Rob Suisted