

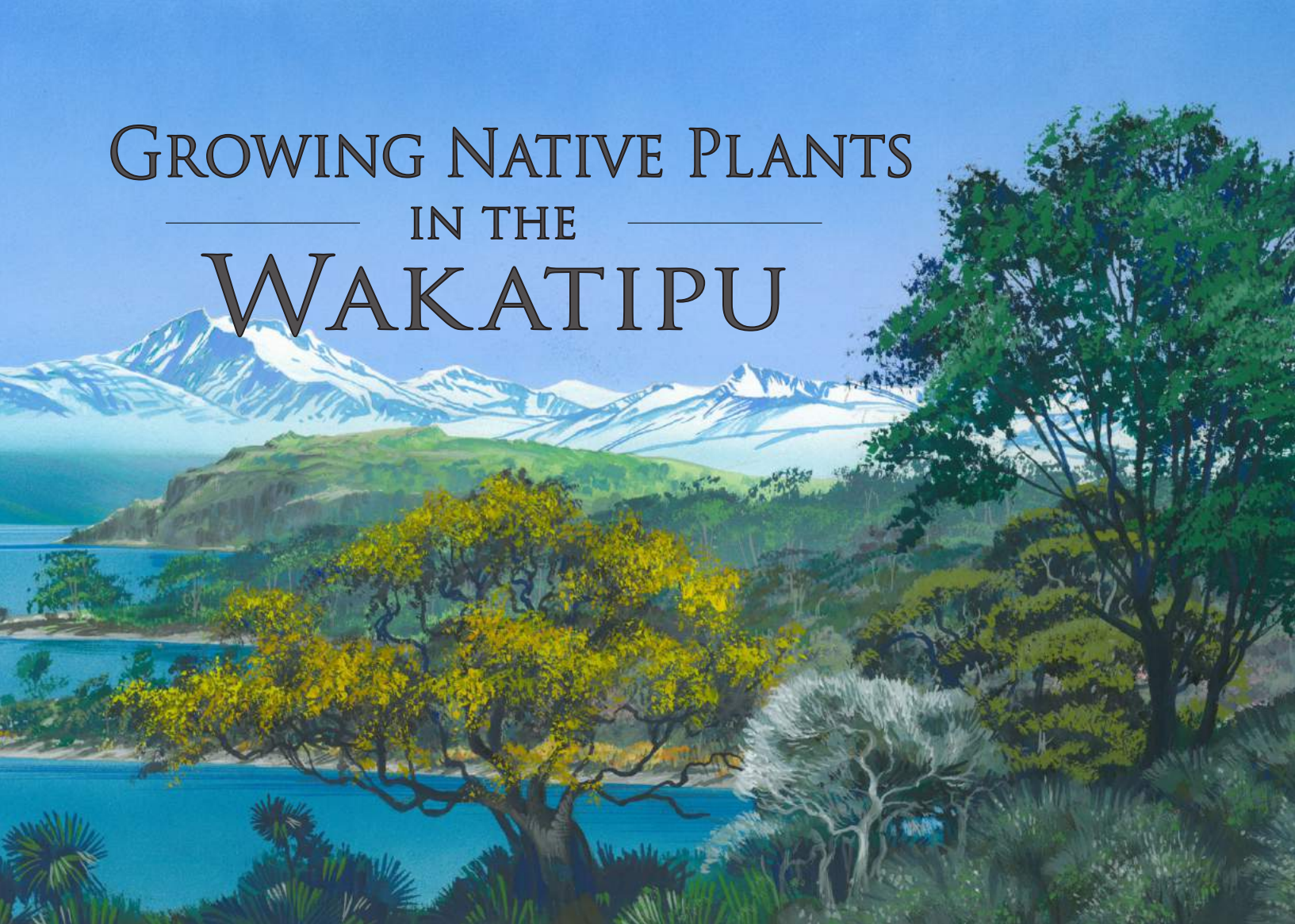
The Wakatipu Basin has some of the most unique and adaptive groups of plants found anywhere on the planet. Extensive modification of our landscape has seen these plants all but disappear from large parts of the basin. However, the importance of native species in New Zealand is being gradually recognised, and the importance of plants in the Wakatipu Basin is no exception. Many in the past have considered native plants slow growing and poorly adaptive, but the truth is the complete opposite. Native species found in the basin have had millions of years to adapt to its harsh, but beautiful terrain. It is important for anyone considering planting to determine what plants are right for this area so they can not only thrive, but help increase biodiversity values and bring back the native birds.

This practical guide has been written to help anyone who is interested in planting native species within the Wakatipu Basin. It tells the story of the region, and explains how to best enhance one's garden or patch of land. It includes helpful tips that will improve the success of any native plantings, particularly when considering sites encompassing the challenging micro-climates found throughout the district. It provides helpful advice to the first time gardener or the seasoned pro. It covers all aspects of planting, including maintenance advice and plant lists, so that even the most amateur gardener can soon have a thriving native patch filled with native bird song.

WAKATIPU
REFORESTATION TRUST



GROWING NATIVE PLANTS
— IN THE —
WAKATIPU



Growing Native Plants in the Wakatipu
Published by the Wakatipu Reforestation Trust (WRT)
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The WRT has many volunteering opportunities. See the website and Facebook page for more details.



CONTENTS

THE GUIDE.....	6
HISTORY.....	7
NATURAL CLIMATE.....	11
LANDFORMS.....	12
WHY PLANT NATIVES.....	13
THREATENED HABITATS.....	15
BIRDS.....	17
INVERTEBRATES.....	18
LIZARDS.....	19
WHEN TO PLANT.....	20
PREPARATION.....	21
PLANTING.....	22
WHERE TO PLANT.....	24
WHAT TO PLANT.....	25
FURTHER READING.....	41
ACKNOWLEDGEMENTS.....	42



WAKATIPU BASIN



INTRODUCTION

This booklet is designed to help people grow native plants in the Wakatipu. It has been put together by the Wakatipu Reforestation Trust (WRT) in response to the many queries about how and where to grow native plants in the Wakatipu. We often hear that “natives are too slow growing”, or “it’s too frosty and cold”. However, consider that the whole Wakatipu Basin (see map) was once covered by native vegetation, and parts of it could be again.

The WRT grew from the establishment of the Wakatipu Islands Reforestation Trust, a group that has been focused on revegetating the badly burnt parts of Pigeon Island (Wāwāhi Waka). This work has been undertaken over the last 20 years with assistance from the local community. Planting on the island is now complete and is flourishing. Those involved looked to other parts of the Wakatipu for further revegetation projects.

WHY WE PLANT

We believe that native plants are part of all New Zealanders’ natural and cultural heritage; but that heritage is under continued threat from the

gradual loss of native species. As Colin Meurk, a scientist with a deep knowledge of New Zealand flora, once said:

“Without endemic touchstones visible to the resident population on a daily basis, their appreciation of the history of their own land and identification with it will gradually atrophy. As northern temperate images fill people’s experience and imagination, these foreign elements become entrenched in tradition with an inevitable global loss of both biological and cultural diversity.”

Many of the native plants in New Zealand are unique; 82% are found nowhere else in the world. They form part of a wider ecological network that supports other unique species including native birds, bats, lizards, and insects. Native plants are hardy and have adapted to live and thrive in the local environment. Many are fast growing and uniquely adapted to our harsh climate. As more native species become established, the overall biodiversity of our area increases, providing additional support to our struggling native wildlife. As more areas are planted, viable populations of indigenous plants and wildlife can be sustained. Recent research has shown that native bird species are crucial in pollinating

and distributing native seeds. Not only is the planting of natives good for biodiversity, but once established in your garden they are easy care, hardy, cost effective, and, if you wish, they can be beautifully landscaped

The Wakatipu contains a number of plant species whose survival is considered to be threatened by various factors such as competition from weeds, loss of habitat, declining numbers and the vulnerability of small, scattered populations. Many of these are small and/or alpine plants, but several are small hardy trees and shrubs. Some have been listed in this guide. These include *Leonohebe cupressoides*, a plant that initially forms a bright green, round ball and is widely grown in gardens (its largest remaining population is found in the upper Shotover), *Olearia hectorii* (two old trees at the head of Lake Dispute), *Olearia lineata*, *Olearia fimbriata* (Hector mountains), *Olearia fragrantissima* (Kingston lakeshore), and *Coprosma virescens*. For those interested, other species are listed on the QLDC District Plan.





THE GUIDE

This guide has been written to help those who are interested in planting and establishing native gardens, be it in your back garden or in the wider community – a back gully, an untamed patch on the property, or to replace woody weeds on a hillside. We often hear from intrepid gardeners who have had no luck growing native plants. The reasons for failure, as any gardener knows, can be varied and frustrating. In some instances the wrong species were planted for the site. The wrong soil, or climate, or even where the plants are sourced from can all lead to poor results. Around the Wakatipu Basin there are numerous micro-climates, and these can help or hinder certain plant species. Some winters are more bitterly cold than others, and newly established plants can struggle in these conditions. Perhaps one of the most significant factors in the loss of native species is the lack of maintenance. Native plants are generally very low maintenance, but do need some care in the first few years of their life. This can be as simple as watering during drought and a little bit of weeding to reduce competition. Some species may be slow to start, but once established will grow surprisingly quickly. With a little help, including controlling pests, any patch of ground can become a thriving island of native biodiversity.

This guide has been set out in a format to help anyone who wishes to re-establish some of our native biodiversity in the Wakatipu Basin. The first section briefly covers the diverse and unique natural history of the area. The second section identifies in more detail why we plant native species. The third section deals with how and when to plant. The last section provides a list of plants sorted by size and type. Each species has information as to what conditions it is best suited. This last part of the guide will help you determine which species will do best where.

New Zealand has some of the most unique flora and fauna in the world, and the Wakatipu is no exception. Even for those who have spent their whole lives here, there still may be a few surprises around the corner.





HISTORY

The Wakatipu Basin is characterised by a diversity of landforms, from steep mountains to braided rivers. The basin is at the centre of a geological crossroad. Its western border is flanked by the Southern Alps, holding back vast amounts of rain. To the north and east it borders the semi-arid plains of Central Otago. The basin was formed from a series of glacial advances over the last two million years. These have carved deep valleys into the mountains, and as they retreated, left behind the lakes and rivers we have today. The last major glacial advance was 18,000 years ago, and reached as far as Kingston. The top of the glacier stretched about 100 metres above the current lake level.

As the glaciers retreated, plants began to re-establish. We can identify what the vegetation of the basin was likely to have been before humans arrived from different sources that include: vegetation remnants, pollen cores, preserved charcoal, interpreting past climate, types of soils, coprolites (fossilised droppings – particularly from moa), and moa gizzard contents.

The pre-human vegetation of the Wakatipu Basin would have been a mix of beech and broadleaf-podocarp forests. Beech began to dominate

most hill and mountain slopes up to about 1100m from the Southern Alps to the Remarkables, with scattered patches further east. Mountain beech would have been found on the drier slopes, with areas of red beech and occasional silver beech. Silver beech dominated the upper, wetter valleys. Good red beech forest mixed with mountain beech can be found at Bobs Cove, and tiny remnants of mountain beech can still be seen on the upper slopes of the Remarkables. Above the treeline snow tussock mixed with scattered shrubs dominated, rising to herbfields, cushion fields, rock, snow, and ice.

Lakeshore vegetation was influenced by the moderating effect of the water and, therefore, was more diverse. Here grew many broadleaved trees and podocarps, such as mountain totara, kahikatea, matai, and miro (all still found on Pigeon Island) along with numerous shrubs. Ground plants included various herbs, ferns, grasses, orchids, sedges, mosses, lichens and fungi. Bird life would have been prolific and noisy.

The Arrow Basin with its scarps, deep gullies, many wetlands, knolls, and frost hollows would have contained a mosaic of plant communities. These would have included: wetlands, pockets of broadleaf and beech

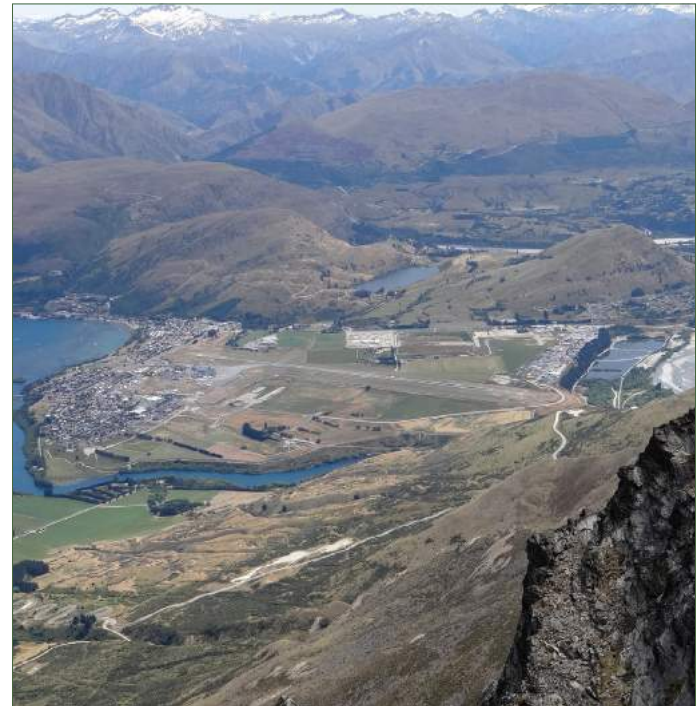
forest, diverse shrubland mixed with grassland, small shrubs, and herbs on shallow soils and open valley floors.

Kowhai would have been a prominent species across the Wakatipu Basin. Grey shrubland, composed of hardy dryland plants, was probably confined to valley floors and rockfields, and would have been less prominent than is found today. Throughout the basin this diverse array of plant species would have provided numerous sources of food and habitat for lizards, birds, bats, and vast numbers of insects.

Several thousand years ago, the inland basins of the South Island high country had more moderate climates that at present. They were probably less prone to summer drought with a correspondingly lower incidence of fire. Consequently the landscape was more wooded than at the time of human settlement, with beech and podocarp forest occupying extensive hillside tracts and scrubby woodlands on valley flats. Many totara logs have been found around the hills of inland Otago, dating back to about 800 years ago. Natural fires intensified with Polynesian settlement, and deforestation took place within decades after initial human arrival in the drier parts of New Zealand. Our native trees are inherently vulnerable to fires. Targeted, repeat-burning in highly flammable recovering vegetation was sufficient to create an alternate fire-prone stable state (consisting of scrub, fern and grassland).

Dense matagouri and associated shrubs, tussocklands, and speargrass were the dominant vegetation on the valley floor by the time European settlers arrived. They quickly put this to the torch (in often dramatic fashion) to improve access through the often impenetrable, thorny vegetation and dense stands of bracken fern, and provide pasture for sheep. When William Rees came over the ridge from the Cardrona Valley in 1859, looking for good sheep country, he is reported in the Otago Witness as saying, “no fires had cleared the country before us and

consequently our further progress was not only fatiguing but painful. Speargrass, often more than three feet high and masses of matagouri constantly impeded us, especially in gullies”. A few days later having progressed, again with difficulty, up the lake by homemade raft they started back “setting fire to the fern as they went and soon flames reached the top of the mountain...the fire was devouring everything behind them”.



PRE-HUMAN LANDSCAPE





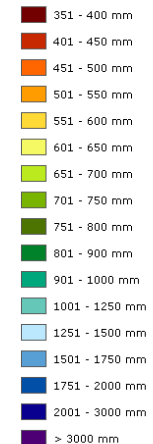
NATURAL CLIMATE

The climate of the Wakatipu Basin is characterised by hot arid summers and cold winters. But even over such a short distance, different microclimates can be found. Near lakes and in gorges, sheltered sites and milder conditions can allow more tender species to grow and thrive. Rainfall in Glenorchy is recorded at over 1.5 metres annually, while at Frankton it is half that, and around a third in Arrowtown.

Climatic conditions that can stress plants include heavy frosts, drying winds, and low rainfall. Frosts form where cold air settles in calm conditions. The bottom of slopes and in hollows are generally the severest places for frosts. They can also be found along the basin floor, and on the lower gentle hill slopes. Large bodies of water, such as Lake Wakatipu and Lake Hayes, provide a moderating effect near the shoreline. While frosts can still settle, especially on south facing slopes, the overall temperature will not be as cold as other parts of the basin. Windy sites, such as a gorge, will also help prevent frosts from settling. However, wind will more quickly dry out exposed soil. Small leaved plants survive both frost and desiccating winds best. Larger leaved plants will struggle to deal with the combination of moisture loss and freezing conditions.



Annual Rainfall - Median



LANDFORMS

Lake Wakatipu is surrounded by steep hill slopes dissected by deep streams and broad river valleys with areas of braided river bed. All of it has been shaped by glaciers. This glacial action is particularly evident in the Arrow Basin with its rounded hills and knobs, hollows containing wetlands, scarps, roche moutonnées (Ferry, Slope and Morven Hills) and lakes (Johnson, Hayes). Outwash plains underlie the airport, and deep layers of lake silt can be seen on SH6 opposite the Kelvin Peninsula turnoff.

Terrain is an important factor that affects plant growth. Higher levels of soil moisture, soil fertility, and frostiness occur in hollows and on gentle lower slopes. Greater moisture also occurs at higher altitudes that generally receive higher rainfall or cloudiness. Shady slopes (east and south facing) are cooler and usually damper than north and west faces that receive the full force of the sun and dry out much more quickly. Steep-sided gullies can provide shelter from weather extremes and enable plants to grow that may struggle to survive on open land nearby. Large water bodies influence local temperature, especially during the winter, and a number of less hardy plants such as mahoe, tarata, and wineberry are generally found close to the lake. Several plants require relatively open growing conditions. They grow naturally on rocky faces, scarps, and bluffs, or along lake or river edges. Kowhai is one such plant.





WHY PLANT NATIVES

The reintroduction of native plants in the Wakatipu Basin will help improve the overall biodiversity of the area. These plants are not only indigenous to New Zealand; in some instances they are found nowhere else in the world. In addition, these plants evolved with our natural fauna to provide habitat to a wide range of species, including birds, lizards, bats, and insects.

The current number and diversity of native species is only a tiny remnant of the original vegetation. Tucked in sheltered gullies high up mountain slopes we see the remnant of what was. As plants were removed through fire and farming, there was significant loss of habitat for all native species. Exotic pasture grasses and weed species such as wilding conifer have spread. These plants do not provide the habitat for native species to thrive. For anyone who has walked through a conifer forest, think of the stillness and lack of bird song. The current native

biodiversity of the basin is not sufficient to support populations of native wildlife. Continuing loss of habitat through clearance or replacement by exotic species further threatens species already significantly in decline.

*With the deer and the cat and the goat and the pig
They chewed up the land to make themselves big,
They all ran wild with the stoat and the rabbit
Whose numbers were growing too much of a habit.*

Elsie Locke

Native plants, on the other hand, provide rich sources of food for native animals and shelter from prey. One perfect example of this beneficial system can be seen on the porcupine scrub (*Melicytus alpinus*). An unassuming spiky shrub that is well adapted to growing on rocky knolls, it produces berries on the underneath of the plant. It has evolved for its seeds to be dispersed by lizards, and by providing fruit on the underside



of the plant, it not only offers a meal, but provides protection to the lizard from any roving birds. Other species have adapted to have their berries dispersed by birds, and thriving insect populations within native vegetation provide another source of food.

As biodiversity increases, environments can better withstand stressful events and have a better chance of adapting to environmental change. The more species present in a system, the more resilient and stable it will be. Plants can also help in other ways. Benefits can include erosion and flood control, moderation of climate, recycling of nutrients, control of pests, help with pollination, and, in some instances, the filtering of contaminants. Increased native biodiversity results in cleaner rivers and streams, helping out threatened native fish. It also has added advantages such as boosting tourism, where people from around the world travel to see a place unlike anywhere else. Many of our species are found only in this country. If these species are lost here, then they are lost to the world.



Falcon/kārearea

Barry Lawrence



Kowhai

John Barkla

THREATENED HABITATS

GREY SHRUBLANDS

Grey shrublands are beautiful for the silvery-grey hue the branches and small leaves create. These shrublands can range from open to closed habits comprising a mix of small leaved, often divaricating (densely interlaced stems) shrub species. The shrubland is like a mini-forest, short in stature but bursting with life, as fantails and tomtits flit through the shrubby masses, with geckos and skinks climbing throughout in search of invertebrates and berries. Before moa became extinct, they would have browsed on these shrubs, and in so doing created a mosaic patchwork of open tussock mixed with grey shrubland. They are also used as prime hunting grounds for the New Zealand eastern falcon (kārearea), a bird of prey that hunts smaller birds amongst the shrubs.

There are some key plant species within grey shrubland. The golden flowered kowhai provides a great source of spring food for nectar-loving birds. Coprosma shrubs, well adapted to the harsh seasons with their divaricating branches, have beautiful pale white and blue berries that provide skinks with food. A less well-known plant group includes the Olearia species, also known as tree daisies, vital for keeping alive

endemic invertebrate species within the basin, such as up to 27 species of moths. Matagouri is an early source of nectar for honeybees, has a land stabilising influence, fixes nitrogen, feeds the native parasitic fly that attacks grass grub, and contributes to the natural character of the landscape. There are a total of 93 woody and 62 herbaceous indigenous plants that are potentially suitable for revegetation in the Wakatipu Basin. When at carrying capacity, grey shrubland can support large numbers of native birds.



Tui in Kowhai

Barry Lawrence

WETLANDS

Wetlands are amongst the most threatened habitat type across the country. Only an estimated 10% of inland wetlands now remain. Many have been destroyed through a combination of drainage, deforestation, increased nutrients, and human-induced burning. Within the Wakatipu Basin, all wetlands are formed by freshwater that is at or near the surface, or where land is permanently covered in water. Wetlands can act like kidneys for the earth, cleaning the water that flows into them. They trap sediments and soils, filter out nutrients and remove contaminants, reduce flooding and help maintain water tables, and return nitrogen to the atmosphere.



As such, the few areas that remain have become increasingly important, particularly to wetland bird species such as scaup (papango), white-faced heron (matuku moana), and pied stilts (poaka). New Zealand has a surprisingly large number of native plants that grow and, in some cases, specialise in wetland environments. These can include trees and shrubs, sedges and rushes, grasses and forbs (herbaceous flowering plants with a grass-like morphology). Native sedges, flax, toi toi, and tussock can surround wetlands and ponds, and provide the perfect playground for pukeko and paradise ducks (pūtakitaki). Clusters of the water-loving *Carex* species can provide immense value to wildlife, and can be found growing along the southern edge of Lake Hayes.





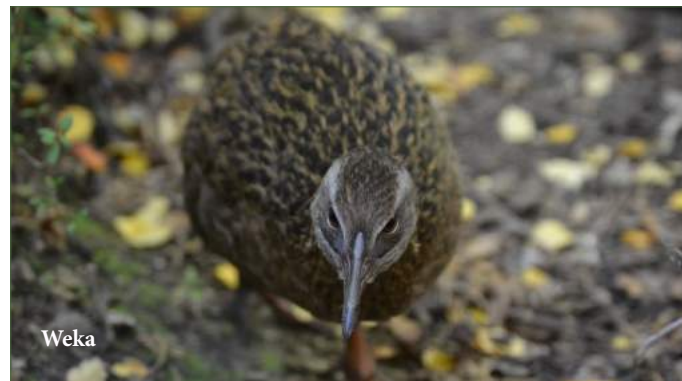
BIRDS

There are many native birds that would have once thrived in the basin. With more forest cover the morepork (ruru), a small owl, will flourish, hunting insects and smaller birds. Other forest bird species such as parakeets (kākāriki) and robins (toutouwai) could return. Parakeets are the chatterboxes of the forests, hanging out in groups and calling amongst themselves. The inquisitive robin, a mainstay in forests elsewhere in New Zealand, will quite happily follow you, investigating your footprints to find insects for lunch.

Where grey shrublands are re-established, other bird species will flourish. The nectar loving tui and bellbird (korimako) will happily dine from yellow kowhai flowers. Insectivorous fantails (piwakawaka) will find both shelter and food amongst the shrub, protected from predators. The native falcon (kārearea), a bird of prey, will find an increased food source in the smaller birds that frequent the shrubland and tops of the trees.

Where wetlands are restored, native ducks such as the scaup (pāpango) and the New Zealand shoveller (kuruwhengi) will find an ideal habitat. Native rushes and sedges provide shelter and food, as well as places to

rear young. Great crested grebes (pūteketeke) and kingfishers (kotare) will go hunting for fish and frogs. Many of the bird species that use wetlands for their habitat are threatened or endangered. One of the most secretive New Zealand birds, the marsh crake (koitareke), is only found in wetlands. The widespread loss of this habitat across the country has pushed many of these birds to the edge of extinction.



A large, dark spider with yellowish-brown legs is positioned on its intricate web. The background is a soft, out-of-focus green, suggesting a natural outdoor setting.

INVERTEBRATES

Our native plants also play host to a number of insects, many of which are endemic and uniquely adapted to New Zealand conditions. These invertebrate species have been identified as providing a major contribution to world biodiversity and are as important as the kiwi or tuatara. Native invertebrates are vital to the functioning of any ecosystem. New Zealand has one of the highest rates of unique invertebrate species in the world.

Their small size allows a large number to share a single habitat. Because most have quick life cycles and depend on suitable conditions to breed, they cannot easily overcome even short periods of adversity. Most also have very limited means to disperse, and therefore are slow to re-inhabit those areas they have been lost from. They do best in areas that contain a variety of habitats, which allow gradual transition to take place.

Invertebrates also help aerate the soil, decompose dead plant material which creates an organic layer that releases nutrients for living plants, and help with the formation of soil structure. Without certain species, the grasslands, shrublands, and forests would die within months, smothered by vegetation. Aquatic invertebrates provide a food source

for native fish and help keep the waterways clean. Flying insects provide a method of pollination, and often form symbiotic relationships with plants. Weta have adapted to the cold mountain temperatures by having 'antifreeze' in their blood.



Speargrass Weevil

Barry Lawrence

LIZARDS

The hot dry summers and cold winters of the Wakatipu Basin have led to several species of lizards making their home amongst the schist outcrops. Unfortunately, as with other New Zealand fauna, the loss of extensive amounts of habitat has led to many of the species throughout Otago being threatened, endangered, or in decline. Before humans arrived, lizards would have occupied every habitat from the shoreline to 2,000 metres above sea level, high in the mountain ranges. Lizards (ngārara, mokomoko) are an integral part of remaining ecosystems, consuming fruit and invertebrates, providing a source of food to native birds, and helping to distribute plant seeds. However, the introduction of a suite of pests, in particular cats, and the continued modification and loss of habitat have decimated lizard populations, driving some to extinction. By maintaining or enhancing the quality of lizard habitats through planting more native species, we can stop their decline. Within the basin there are three species of geckos; the Cromwell gecko (right) found around the Shotover and Kawarau Gorges, the Otago/Southland large gecko found around the basin, and the southern mini gecko which is restricted to the mountains south and east of Lake Wakatipu. Jewelled geckos have been reported in manuka shrubland near Queenstown. There are four species of skinks within the basin, with McCann's skinks and common skinks (above) being most widespread.



Kawarau Gecko

Sam Haultain



WHEN TO PLANT

When to plant depends on where you want to plant and the season. Milder winters mean that planting can be undertaken all year round in some situations. Long dry spells will affect planting times and can occur any time of the year, but are most critical during the hotter part of the year.

- Spring (late August, September/October, early November) has traditionally been the best time to plant. The ground is generally damp and warming, giving the plants a chance to start forming new roots before the ground dries out and the hotter days arrive.
- Summer (December, January, February, early March) is too hot and can be very dry in the later part. Planting is not recommended. If you have irrigation, it can be successful.
- Autumn (late March, April, May) can be a good time to plant as long as the ground is moist. Cooler days and nights, but still warm enough, allow the plants to put on some root growth ready for the spring.
- Winter (June, July, August) is not recommended on very cold sites or where heavy frosts are frequent. However, on warmer north and west facing slopes, on areas that dry out early in summer, and in sheltered gullies or places near a lake, planting can be undertaken.

Overall, plants do best when they get ample water and mild temperatures, particularly just after they have been planted. The removal of a plant from ideal nursery conditions to being stuck in the ground can put a lot of pressure on young and old plants. Where conditions are ideal, this shock is lessened, and gives the plant a better chance to grow.

Tip - Time of Day

Planting on cool, overcast days or showery days is better than on hot sunny days as roots can dry out very quickly once exposed, especially on small plants.

Tip - Child Labour

Get the kids involved. Planting is kid-friendly, provides a great opportunity to get outside and learn about the local environment, and they really get stuck in once they get going.



PREPARATION

The amount of preparation necessary will depend on the site and its existing vegetation. For small sites it is best to totally clear existing vegetation by cultivating or using a suitable herbicide. For larger sites there are several options such as mowing (mower, scrub bar, weed eater) or spot spraying each plant position with herbicide. For the more energetic, screening (removing the surface cover to expose the soil) or grubbing away the grass at each plant site is very effective. Spraying a large area with herbicide is only recommended if it is intended to mulch the whole area. Otherwise it is expensive and will allow a mass of weeds to appear, necessitating further spraying



Tip - Cover

Planting can be very successful when transplanting directly into bracken, broom, and gorse if they are not too tall and dense, or they can be removed with a scrub bar and re-used as mulch and animal protection around the plants after planting. If they are too dense, it is beneficial to open up planting areas first. Alternatively spray the bracken, broom or gorse but leave standing to provide shelter until the native plants are established.

Tip - Nursery effect

Bracken and manuka are early colonisers that provide a nursery effect for taller plants that eventually over-top and replace them.



PLANTING

Native plants do best when planted in close proximity. If planting a large site, it is better to plant in groups rather than try to cover a large area by spacing out the plants. Shrubs and small trees are best planted about 1 m apart, preferably not in straight lines. With larger trees, such as beech, 2 to 3 metres apart is recommended. Plants such as beech and manuka tend to dominate areas in their natural habitat and can be planted in groups. Most other species can be mixed or planted 2 or 3 together. For small plants, grasses, and ground-cover, 500 to 800mm is good spacing to provide quick cover and thus reduce maintenance.

STEPS

- Dig a hole. For soft ground use a spade or shovel. In hard or stony ground, a shovel or narrow spade is easier than a square spade. A pick can be useful to start the hole. The hole should be larger than the root ball of the plant and deep enough so that the top of the root ball is level with the soil surface, or slightly below so that moisture can collect around the plant. This is especially important on a hill slope where the water can collect rather than run off downhill.
- Loosen the soil in the bottom of the hole and flatten so that the root ball sits square. In hard digging sites, it is more important to dig a large hole to give the new roots an easier start. In soft soil this is not so important. Place the removed soil close to the hole ready to put back.
- Remove the plant from its bag or pot by tipping upside down and sliding off the bag. If root bound, cut the bag. To remove from a pot, turn upside down and tap the edge of the pot with the hand or something harder.
- A small scattering of general or slow release fertiliser, about a milk cap full, can be put in the hole. Make sure the roots do not touch the fertiliser directly.
- Place the plant in the centre of the hole and put the loose soil around the root ball, pressing down gently.
- Water thoroughly after planting. Creating a shallow ringed depression around the plant will allow water to reach the plant roots and not run off. On very steep slopes, dig into the slope then pull the soil down into the hole to form a platform to collect water.

MULCHING

Mulching is not essential but will help retain moisture around the plant, reduce the effect of frozen ground, and reduce competition from grasses and weeds, thus reducing maintenance. A wide range of materials can be used, such as the dead grass that may have been cut on the site, bark chips, stones, squares cut from old carpet, or you can buy plant mats from plant shops and nurseries. If using fresh bark chips or mulched material, you should add nitrogen to the soil otherwise the micro-organisms that break down the mulched material can tie up nitrogen that the plants need. Yellowing leaves are a symptom of this.

IRRIGATION

Irrigation if practical (depending on size of area and cost) will be a great help for survival and growth of new plants. An alternative is to water by hose or hand during very dry periods, or water any plants looking stressed.

CARE/MAINTENANCE

After the hard work of planting is done, native plants need a little care and attention. Some species are particularly sensitive to competition from weeds and grass. Weeds can be removed by hand, spot sprayed, or smothered in mulch. Long grass, if it is not directly competing with the plant, can provide some shelter from wind and protection from rabbits. As the plants increase in size, maintenance decreases because

Tip - Water

Water appears to be the critical factor for plant growth in the Wakatipu climate. Give plants a long thorough water after planting

Tip - Source Local

Due to the significant loss of native habitat since the arrival of humans, genetic diversity of native species has also declined. Comparable to the issues with native birds, a large number of genetically similar or identical plants can lead to problems of disease, loss of genetics, and poor adaptability. Where possible, buy plants where they are locally sourced (i.e. eco-sourced). Ask the nursery where they acquired the seed.

grass and weeds become shaded. Maintenance will usually be required for between three to five years.

Variability in plants and site mean that not all survive, and generally plant mortality rates of up to 10% can be expected in most places. In sites where conditions are more severe, mortality can reach up to 25%. If the plants were close planted (1 m apart), then it may not be necessary to replant, as existing plants will fill the gap in time. As plants become established, they will create a nursery effect for any smaller seedlings, allowing more tender species to be planted.











WHERE TO PLANT












Because the basin has such varied climates and terrain, some plants will do better than others in different areas. There are many different native plants that have been found growing in the Wakatipu Basin (more than 700 species). For practicality, only those that are most suitable and easily available have been listed in the table below. In addition, site specifics important to consider are:

- Hillsides - Plant into shallow gullies and hollows first; these generally receive more water. Plant ridges with hardy plants. Mountain beech will often grow well on most hill slopes, especially if not too dry.
- North and west faces - Tend to be hot and dry in summer, receiving the full force of the sun. Unless watering or partial shade is available, generally it is best to plant hardy dryland species, at least until some shelter is present, or plant in late winter.
- South and east faces - Receive the sun at a lower angle and are therefore not so hot or dry. A wider variety of plants can be grown on these faces.
- Outcrops/bluffs - Rock outcrops can provide sheltered gullies or crevices in which hardy plants can be planted. Plants for these sites include grasses such as blue tussock, hebes such as *Leonohebe*











- cupressoides, *Hebe pimeleoides* var. *faucicola*, native broom, kowhai, porcupine shrub, and many of the plants on the hardy list.
- Hilltop - Many of the hilltops and knobs in the Wakatipu Basin have thin soils over rock that dry out very early. Grasses (tussocks) will often survive as will some of the hardy plants, particularly if they can get roots down into crevices in the underlying rock.
























SUITABLE CONDITIONS KEY			
	Full Sun		Attractive to Birds
	Sun or Light Shade		Prefers Wetland
	Shade		Hardy
	Grey Shrubland		Threatened
























WHAT TO PLANT









Botanical Name	Common & Māori Names	5 year height *	Suitable Conditions	Notes
TALL TREES 15M TO 25M				
<i>Dacrycarpus dactyloides</i>	kahikatea, white pine	1.5/2m	  	Slow growing, prefers damp, sheltered sites and wetlands. Our tallest tree when mature.
<i>Elaeocarpus hookerianus</i>	pōkākā	1m	 	Slow growing forest tree with distinct juvenile leaves. Only plant under cover of taller plants.
<i>Fuscospora cliffortioides</i>	tawhai rauriki mountain beech	3-5m	 	Fast growing. The hardiest of the beeches and will grow in most areas, but not in frost hollows. Can grow 1m per year.
<i>Fuscospora fusca</i>	tawhai raunui, red beech	3-5m	 	Fast growing. Prefers warmer sites. Will also grow 1 m per year once established. Very slow if under heavy shade.
<i>Lophozonia menziesii</i>	tawhai, silver beech	1-1.5m	 	Slow growing but generally hardy. Most beeches prefer some shelter or light shade when first planted. Becomes spindly if too shady.































* approximate height of plant after 5 years in average growing conditions. Smaller on hard or dry sites, taller when in well-watered, warm sites.











Botanical Name	Common & Māori Names	5 year height *	Suitable Conditions	Notes
<i>Plagianthus regius</i>	manatu lowland ribbonwood	4-5m		Fast growing, deciduous tree that eventually forms a round-headed tree. Very hardy but slow if too dry.
<i>Prumnopitys taxifolia</i>	matai, black pine	1/1.5m		A slow growing, long lived podocarp. Hardy but prefers to grow under the shelter of other plants. Juvenile foliage wiry.
MEDIUM SIZE TREES 8M TO 10M				
<i>Aristotelia serrata</i>	makomako, wineberry	3/4m		Fast growing small tree but does not like hard frosts. Good in sheltered gullies, hill slopes or near lakes.
<i>Carpodetus serratus</i>	putaputaweta, marble leaf	3m		Very pretty small tree with marbled leaves and small white flowers. Prefers shelter.
<i>Coprosma linariifolia</i>	mikimiki yellow wood	2m		The tallest coprosma with narrow, brownish leaves. Prefers shelter and is happy growing under other trees.
<i>Cordyline australis</i>	tī kōuka, cabbage tree	2m		Hardy. Plant around wetlands, on hill slopes, or lakeside.
<i>Fuchsia excorticata</i>	kōtukutuku, konini, tree fuchsia	1.5m		Deciduous so cold hardy, but needs shelter while young. Plant in sheltered gullies.
<i>Griselinia littoralis</i>	kapuka, broadleaf	1/2m		Can be planted in most situations, but not where heavy frosts are likely unless under the cover of other plants.
<i>Hoheria sexstylosa</i>	houhere, lacebark, ribbonwood	4m		Hardy and fast growing with lovely white flowers autumn.
<i>Melicytus ramiflorus</i>	māhoe, whitey wood	1.5/2m		Frost tender but OK near the lake. Usually several branches grow from the base. Flowers produced on the branches.
































Botanical Name	Common & Māori Names	5 year height *	Suitable Conditions	Notes
Metrosideros umbellata	southern rātā	1m	 	Prefers rocky sites especially near water. Will grow elsewhere, as long as not too dry.
Pennantia corymbosa	kaikomako	1m	 	An understory forest tree. The juvenile is twiggy with small semi-lobed leaves that are larger when an adult.
Pittosporum eugenioides	tarata, lemonwood	2/3m	 	Reasonably fast growing and bushy with lemon scented leaves and yellow flowers. Is frost tender.
Pittosporum tenuifolium	kōhūhū	2/3m	 	One of the most common small trees throughout the district forming a many-stemmed bright green tree. Can be used for hedges as bushy and readily trimmed. Seed spread by birds.
Podocarpus laetus	mountain tōtara, hall's tōtara	1m	 	Slow growing, hardy, but prefers some shelter when young.
Sophora microphylla	South Island kōwhai	2/3m	 	Once wide spread on our surrounding hills. Slow to start but hardy. Good on rocky sites and hill slopes or lake edge.
SMALL TREES TO LARGE SHRUBS 4M TO 6M				
Aristotelia fruticosa	mountain wineberry	1.8m	  	Usually found in sheltered gullies with other shrubs, sometimes in grey shrubland. Generally quite hardy but mixed results locally. Has small pink/red flowers.
Coprosma crassifolius		1.8m	   	Hardy, bushy shrub especially on rocky soils. The underside of its rounded leaves is whitish-green.
Coprosma intertexta		1.8m	   	Hardy, twiggy shrub that suckers. Has tiny, narrow leaves that give the plant an orange-brownish look.























Botanical Name	Common & Māori Names	5 year height *	Suitable Conditions	Notes
<i>Coprosma lucida</i>	karamū	2/3m	 	A taller coprosma with bright green, shiny leaves, often confused with broadleaf, but the leaves are opposite on the stem as with all coprosmas. Only female plants bear large bunches of bright orange fruit. Very showy.
<i>Coprosma propinqua</i>	mingimingi, mikimiki	1.5m	   	Small dark green, glossy leaves usually with pointed tip but quite variable. Blue fruit. Looks almost black from a distance. Major component of grey shrubland. Hardy, will grow in wet or dry, sun or shade.
<i>Coprosma rugosa</i>		1.5/2m	  	This brownish or olive-green coprosma has small, narrow leaves. It spreads by suckers and prefers damper sites, but is quite hardy. Its foliage forms a nice contrast amongst greener, broader leaf shrubs.
<i>Coprosma virescens</i>		2/3m	   	Another hardy coprosma with an interesting form that is tall and narrow (columnar). It has interlacing branches with tiny trowel-shaped leaves. Can be partly deciduous in winter.
<i>Corokia cotoneaster</i>	korokia	1/1.5m	   	Common around the lake, forming tight bushes with small yellow flowers in spring followed by orange to red fruit. Slow growing but very hardy. Good low hedge plant and needs little trimming.
<i>Discaria toumatou</i>	matagouri	1.5m	   	Slow growing, hardy, likes stony soils. Prickly, but eventually forms an attractive round-headed small tree. The gnarled, rough-barked trunk on older plants is quite attractive.
<i>Dracophyllum longifolium</i>	inaka, grass tree	0.8m	 	A very slow growing sub-alpine shrub. Has attractive, grass-like leaves. Not readily available from plant nurseries.











Botanical Name	Common & Māori Names	5 year height *	Suitable Conditions	Notes
<i>Halocarpus bidwillii</i>	bog pine	0.5/1m		Another slow growing shrub to small tree that forms a bush as wide as tall. Often seen growing in bogs and likes peaty soil. Hardy.
<i>Hebe salicifolia</i>	koromiko	2m		Common hebe with long white flower heads (racemes) and willow-like leaves. Likes growing on banks and along stream edges. The leaf buds have medicinal value and were/are used by Maori for various cures.
<i>Hoheria glabrata</i>	mountain ribbonwood	1.5/2m		A deciduous mountain tree with wonderful bunches of cherry-like white flowers in December; flowers later in the mountains. Relatively hardy but tends to be short lived, 30 - 40 years.
<i>Leptospermum scoparium</i>	mānuka	1.5/2m		Hardy but seems to have variable results when planted out from nursery stock. Found naturally throughout the district and is hardy, but some have died even after looking healthy for several years.
<i>Lophomyrtus obcordata</i>	rahotu	2m		A small upright tree with attractive mottled leaves when young. Generally found along lake shores and on forest edges. Belongs to the Myrtle family (with rātā, mānuka, pōhutukawa) and has small, white flowers and carmine fruit.
<i>Melicope simplex</i>	poataniwha, wharangi	2m		Shrub of open forest or forest edges. Relatively hardy and bushier if in the open. Has interesting flattened leaf stems (petioles).
<i>Myrsine australis</i>	mapou, red matipo	1.5m		Can be mistaken for kōhūhū but has yellow-green wavy-edged leaves and red stems. Slower growing than kōhūhū but hardy.
<i>Myrsine divaricata</i>	weeping mapou	1.m		An upright, twiggy shrub with turned down branches that give a stiff, weeping look. Leaves are small and generally heart-shaped.

Botanical Name	Common & Māori Names	5 year height *	Suitable Conditions	Notes
<i>Olearia aviceniifolia</i>		2/2.5m	 	A large-leaved olearia with grey-green leaves that is happy on banks and rocky sites in full sun.
<i>Olearia arborescens</i>	heketara	1.5/2m	 	This small tree is frost tender but has lovely bunches of daisy flowers. Best with some shelter.
<i>Olearia bullata</i>	swamp tree daisy	2m	   	The rest of the olearias in this list are all small-leaved tree daisies, all hardy and host many insects therefore great for small birds. This species prefers wetlands such as bogs but will grow on much drier sites also. Has tiny, bubbled leaves.
<i>Olearia fimbriata</i>	robust tree daisy	3/4m	    	Grows vigorously as a bushy, many-branched tall shrub and seems to thrive on most sites around the district. Found locally in grey shrubland.
<i>Olearia fragrantissima</i>	fragrant tree daisy	2.5m	   	Another threatened tree daisy only found naturally along the lake shore near Kingston in this district. It is deciduous, hardy and likes rocky sites. Its zigzag branches bear small, scented yellow flowers in spring.
<i>Olearia lineata</i>	narrow-leaved tree daisy	3/4m	    	Similar growth form to <i>O. fimbriata</i> but with narrow leaves. Hardy, fast growing, wet or dry, full sun but light shade OK.
<i>Olearia hectorii</i>	Hector's tree daisy	3m	   	Another threatened tree daisy only found naturally at the head of Lake Dispute and in McKinlays Creek. Hardy but grows best on damper sites. Deciduous and easily confused with <i>O. fragrantissima</i> , but has its leaves opposite on the branch, not alternate.
<i>Olearia odorata</i>	scented tree daisy	2/3m	   	A dryland plant often part of grey shrubland. Deciduous unless in shelter. Hardy in most situations.

Botanical Name	Common & Māori Names	5 year height *	Suitable Conditions	Notes
Phyllocladus alpinus	mountain toatoa	0.8m		A small slow-growing tree mainly of wet montane to sub-alpine regions. Thought to have been widespread through Central Otago on frost flats with bog pine. The 'leaves' are flattened stems.
Pseudopanax colensoi var. ternatus	orihou, three finger	1m		A bright green round-headed small tree with leaves formed of three toothed leaflets. Attractive tree.
Pseudopanax crassifolius	horoeka, lancewood	1m		Prefers some shelter in its early life but generally hardy. May be frost tender on some sites.
Pseudopanax ferox	fierce lancewood,	1.5m		Is hardy and happy on rocky sites. May also be somewhat frost tender. Noted for the knobbly toothed leaves when young. Eventually a small, round-headed tree with shorter leaves.
SMALL SHRUBS				
Carmichaelia petriei	native broom	1.5m		Has slender, upright, spiny-like stems/branches that are leafless, yellow-green or brown-green, with tiny mauve flowers.
Coprosma acerosa & brunnea	dwarf coprosmas	0.5m		These low, sprawling coprosmas vary in colour and form but are great ground cover. C. brunnea has blue fruit.
Hebe biggarii		0.3m		Low growing hebe found on rocks or rocky ground.
Hebe buchananii		0.3m		Small, bushy hebe with tiny, close-set leaves.
Hebe hectori	whipchord hebe	0.5m		Leaves are pressed tightly to the stem on whipcord hebes. This has upright branching and is yellow-green in colour.
Hebe odora		1m		Forms a round, bright green ball. A plant of tussock grasslands and damper sites, but hardy.

Botanical Name	Common & Māori Names	5 year height *	Suitable Conditions	Notes
<i>Hebe pimeleoides</i> var. <i>faucicola</i>		0.3m	 	An open branched hebe with blue-green leaves and mauve flowers found on cliffs and stony ridge tops in Kawarau Gorge.
<i>Hebe pimeleoides</i> var. <i>pimeleoides</i>		0.2m	 	A very low growing hebe of dry ridges and riverbeds with pretty mauve flowers.
<i>Heliohebe cupressoides</i>		1/1.3m	   	Hardy shrub that initially forms a bright green ball as wide as high. A threatened plant with the largest population found in the Shotover River Gorge.
<i>Melicytus alpinus</i>	porcupine shrub	0.3m	   	A hardy, low growing, stiff-branched shrub that provides food and shelter for lizards.
<i>Muehlenbeckia complexa</i>	scrambling creeper	0.5/1m	   	A hardy creeper that can be shrub-like in the open, or a climber amongst other shrubs.
<i>Ozothamnus leptophyllus</i> var. <i>vauvilliersii</i>		1m	   	Hardy shrub with small yellow-green leaves. Grows in the tussocklands.
<i>Podocarpus nivalis</i>	snow tōtara	0.8m	  	Hardy, a sprawling, slow growing shrub that can cover a metre or two in time.
FLAXES, FERNS, GRASSES, SEDGES AND OTHER PLANTS				
<i>Phormium cookianum</i>	wharariki, mountain flax	1/1.5m	  	Hardy. Will grow on most sites except frost hollows. Smaller than <i>P. tenax</i> .
<i>Phormium tenax</i>	harakiki swamp flax	2m	   	Hardy. Will grow on most sites but particularly around water. Tolerates drier sites.
<i>Astelia fragrans</i>	bush lily	1m		A large flax-like plant with drooping leaves. Prefers some shade.

Botanical Name	Common & Māori Names	5 year height *	Suitable Conditions	Notes
<i>Astelia nervosa</i>	mountain lily	0.5m		A much smaller plant with greyish leaves. Prefers damper conditions, but not wetland.
<i>Austroderia richardii</i>	toi toi	2m	  	Hardy and will grow on drier sites. Usually associated with damp to wet sites.
<i>Chionochloa rigida</i>	narrow-leaved snow tussock	1 m		A robust tussock, good for drier sites.
<i>Chionochloa rubra</i>	red tussock	1m	 	A robust tussock, good for wetter sites, but also copes with drier sites.
<i>Elymus solandri</i>	wheat grass	0.3m	 	A grass, forming small tufts with drooping flower heads that are attractive. Not generally found in plant shops.
<i>Festuca novae-zelandiae</i>	hard tussock	0.5m	 	Hard tussock is a smaller version of silver tussock with usually stiffer form. Very hardy.
<i>Microlaena avenacea</i>	bush rice grass	0.5m		A tufted bluish grass found in the forest. Not generally available from nurseries.
<i>Poa colensoi</i>	blue tussock	0.4m	 	Our smallest tussock with stiff to lax, often bluish leaves. Is very hardy – grows on rocks, stony ground, as well as most other places.
<i>Poa cita</i>	silver tussock	0.5m	 	Commonly seen in mass plantings. A good ground cover but in good soils gets very untidy/messy. Seen at its best on harder sites.
<i>Carex buchananii</i>		0.5m	 	A small, stiff, upright sedge, generally found along the lake edge.
<i>Carex flagellifera</i>		0.5m	 	A reddish, drooping sedge with seeds on elongating stems. Can look untidy.
<i>Carex secta</i>	makura, oio	1m	 	A large tussock-forming sedge generally seen in swamps, along stream edges and in damp gullies. Grows on drier land.

Botanical Name	Common & Māori Names	5 year height *	Suitable Conditions	Notes
<i>Carex testacea</i>		0.5m		Similar to <i>C. flagellifera</i> , but tends to be greenish.
<i>Asplenium gracillimum</i>				Hen and chicken fern without the chickens.
<i>Blechnum penna-marina</i>				A small, creeping fern that is good ground cover where not too dry.
<i>Polystichum vestitum</i>	prickly shield fern			A robust fern forming large clumps up to 1m tall, but generally smaller.
GROUND COVER PLANTS				
<i>Acaena anseriniifolia</i>	bidibidi			A green ground cover. A purple form of <i>acaena</i> that is often seen in plant shops.
<i>Acaena buchananii</i>				This forms a very flat, pale green ground cover and was at one time on the threatened plant list. Will grow on dry ground.
<i>Anaphalioides bellidioides</i>	everlasting daisy			An attractive spreading plant with white daisy flowers on stalks.
<i>Leptinella serrulata</i>				Another ground hugger with tight, silky grey leaves.
<i>Parahebe lyallii</i>				Forms low bushes less than 30 cm tall with attractive mauve flowers.
<i>Raoulia</i> species				Several mat-forming species are available, both green and grey-leaved.





FUSCOSPORA SP.

COPROSMA SP.

OLEARIA SP.

TUSSOCK SP.

VALLEY FLOOR



SOPHORA SP.

HEBE SP.

OLEARIA SP.

COPROSMA SP.

HEBE SP.

A vibrant, prehistoric landscape featuring a variety of plants and flying creatures. In the foreground, there are tall, golden-yellow grasses and a large, gnarled tree with thick, dark bark. To the left, a bush with bright yellow flowers is visible. In the middle ground, there are several trees, including a prominent one with a grey, textured trunk and a smaller one with yellow leaves. The background shows a misty, blue mountain range under a clear sky. Several birds are flying in the air, including a large eagle-like bird in the upper right and a smaller blue bird in the lower center. The overall scene is bright and detailed, with a focus on natural elements.

FUSCOSPORA SP.

PODOCARPUS SP.

COPROSMA SP.

SOPHORA SP.

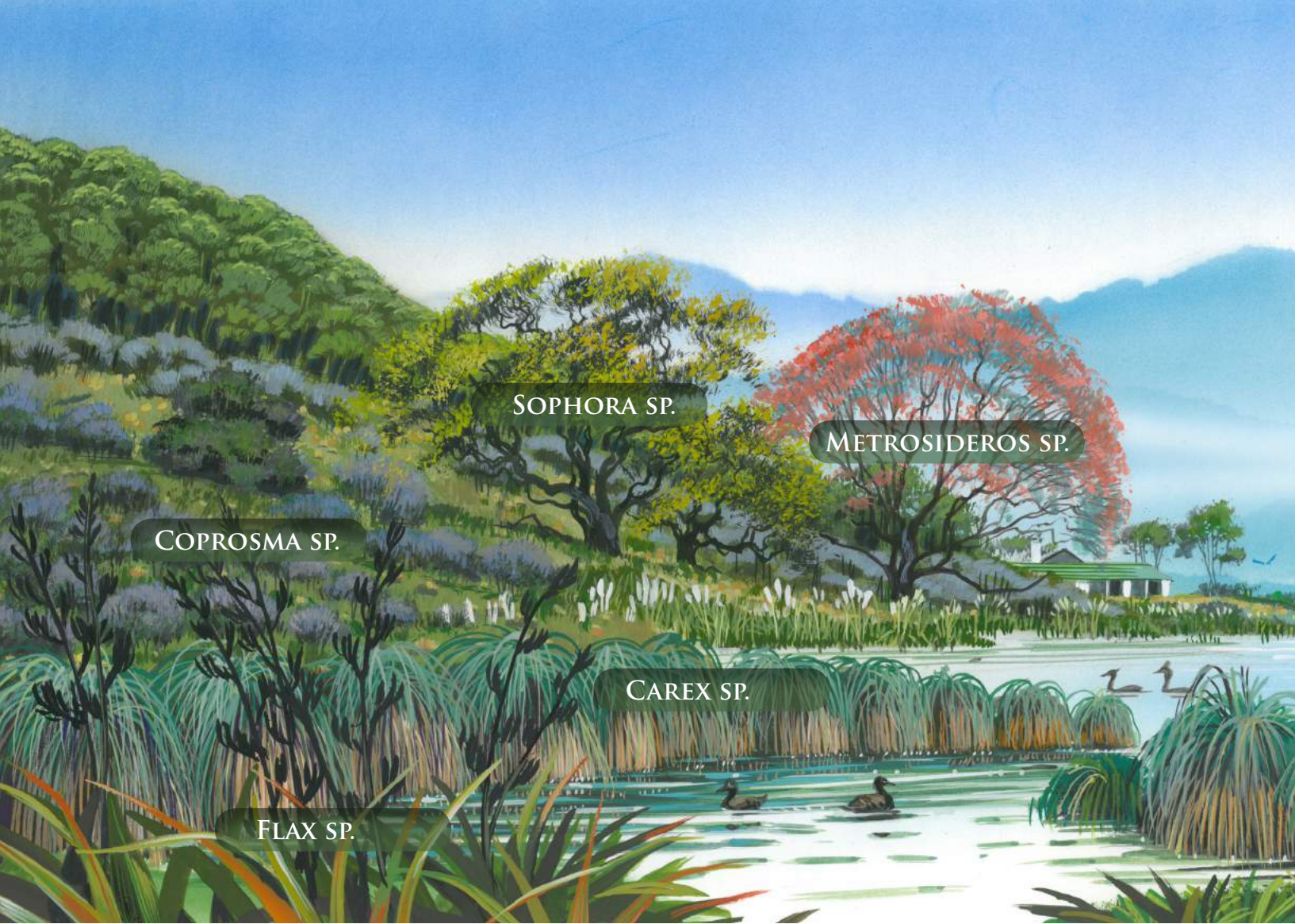


HILLSIDE

DISCARIA SP.

COPROSMA SP.

TUSSOCK SP.



SOPHORA SP.

METROSIDEROS SP.

COPROSMA SP.

CAREX SP.

FLAX SP.

LAKESHORE

A scenic landscape illustration. In the foreground, several tall, slender grasses with feathery, light-colored seed heads stand prominently. The middle ground shows a calm lake reflecting the sky, with a small house and trees on the right bank. The background consists of layered, hazy mountains under a clear blue sky. The overall style is soft and painterly.

AUSTRODERIA SP.

FURTHER READING

- Duncan, Alfred H. 1964: The Wakatipians. Reprint by Lake County Centennial Museum, Arrowtown.
- Lucas, D., Head, J., Lynn, I., Simpson, N., Patrick, B., Loh, G., O'Donnell, Lucas, C. 1995: Indigenous Ecosystems: An Ecological Plan Structure for the Lakes District. Lucas Associates, Christchurch.
- Meurk, Colin D. 1997: Rediscovering & Restoring Natural Heritage in the Wakatipu Basin. Landcare Research Contract Report: LC9697/081. Prepared for the Wakatipu Environmental Society, Queenstown.
- McWethy, D. B., Whitlock, C., Wilmherst, J. M., McGlone, M. S., Li, X. 2009: Rapid deforestation of South Island, New Zealand, by early Polynesian fires. *Holocene* 19 (6): 883-897.
- Going Native - Making use of New Zealand plants. Edited by Ian Spellerberg and David Given.
- Trees and Shrubs of New Zealand. Poole and Adams.
- Wetland Plants of New Zealand. Johnson and Brooke.
- Small-leaved Shrubs of New Zealand. Hugh Wilson.
- New Zealand's Native Trees. John Dawson and Rob Lucas.
- Cultivation of New Zealand Plants. Lawrie Metcalf.
- Other books by Lawrie Metcalf.



Glade Copper Butterfly

Brian Patrick

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Tip - Websites

Further information about native plants can be found at:

www.nzpcn.org.nz

www.landcareresearch.co.nz/resources/identification/plants

www.doc.govt.nz/nature/native-plants

[www.orc.govt.nz> Guide to managing waterways/wetlands pdf](http://www.orc.govt.nz/Guide%20to%20managing%20waterways/wetlands.pdf)



Barry Lawrence