

# **New Zealand Botanic Gardens Internship**



**By  
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Cover photo: *Fuchsia procumbens*

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## Introduction

The internship is based in New Zealand at two botanical gardens in Wellington City and lasts for two months, November and December, with one month spent at each garden. The two botanic gardens are Wellington Botanic Garden and Otari Wilton's Bush. My time at Wellington Botanic Garden is from the 4<sup>th</sup> of November to the 29<sup>th</sup> of November, followed by Otari Wilton's Bush which starts on the 2<sup>nd</sup> of December and ends on the 27<sup>th</sup> of December.

## Key Objectives

This internship has three main objectives:

1. Gaining practical horticultural experience – This is a very hands on objective, helping out the staff at both gardens with various tasks ranging from maintenance to regeneration. Also, in my horticultural career so far I never had the chance to work full-time in a gardening role, so this experience will be much more demanding for me and I will see what it is like to work as a full-time gardener.
2. Learning new skills – This is closely linked with the first objective; carrying out the garden tasks alongside experienced staff members allows me to learn new skills, for instance learning how to prune different shrub species and at what time of year.
3. Expand horticultural knowledge – Working in the gardens will allow me to learn the different plants and types of plants which grow in New Zealand; these plants include both natives and non-natives, used for either ornamental purposes within the gardens or plants which grow naturally in the New Zealand bush.

## New Zealand's Climate

As New Zealand is on the southern hemisphere it differs greatly from what I am used to in England; most notably the seasons are switched round, so on my arrival to the country on the 30<sup>th</sup> of October it was spring, rather than autumn. Another difference is the position of the sun; in England a south facing wall or slope would be the hottest, however in New Zealand it is the north facing walls and slopes which are the hottest. The country is also much warmer and frosts are rarer and lighter which allows frost tender plants to grow outside even during the winter months. Below is a photograph of a species of *Citrus*, located in the scented garden of Wellington Botanic Garden.





The positioning of the garden puts it in an area of fairly dramatic topography, giving the garden lots of different conditions for plants to grow in. A steep gully is home to a fern garden and some native plants, and some other lower areas contain streams or ponds, providing wet and sheltered areas for plants which prefer those conditions.

The succulent garden is located about half way up a north facing slope, providing the succulent plants with all day sun and heat which is ideal for them to grow their best, as they are mostly from countries with very warm climates. Also on this hill is the Australian garden, containing many more heat and draught tolerant plants, though these aren't of succulent nature but rather woody shrubs and trees.



*Aloe polyphylla*, a small succulent plant native to South Africa, from the family *Asparagaceae*.



*Banksia serrata*, a small tree native to Australia from the family *Proteaceae*.

## Plants

As the garden contains ornamental plants from all over the world there are many plants from genera I recognise, including *Aucuba*, *Helleborus*, *Quercus*, *Nicotiana*, *Parthenocissus* and *Liriodendron*, though there are many more exotic species at the gardens I recognise. Some notable genera which are new to me include *Phoenix*, *Metrosideros*, *Sophora*, *Nothofagus*, *Crassula* and *Woodwardia*; these genera are mostly different types of plants, ranging from large trees and palms to smaller succulents and ferns.

The garden contains such a range of plants belonging to many different families from different countries; too many to name in this report, but of these it is interesting to note that there are many New Zealand native plants that belong to same family as many non-native plants seen about the garden, some examples of which are given in the following text.

The succulent garden contains a lot of *Aloe* and *Agave* specimens, and while these are natives of South Africa and Australia the family they are in, *Asparagaceae*, also contains the New Zealand native *Cordyline australis* which grows in abundance.

*Phormium* is another common and well known native genus among the family *Xanthorrhoeaceae*, also included in this family are the genera *Kniphofia* from Africa and *Hemerocallis* which has a widespread origin in the middle east from Russia to India.

Other instances like this include *Phoenix canariensis* which is planted widely within the garden; it is a palm native to the Canary Islands and is among the palm family *Arecaceae*, along with New Zealand's only native palm, *Rhopalostylis sapida*.

*Fatsia japonica* is a popular ornamental within gardens; it is in the family *Araliaceae* and is native to East Asia, though in this family too is the genus *Pseudopanax* which contains some New Zealand native species.

*Banksia serrata* is a tree native to Australia and is within the family *Proteaceae*, and while this family does contain plants which are mostly non-native to New Zealand, it does contain one notable native species; *Knightia excelsa*.

To the right is a flower of *Knightia excelsa*. The trees tall fastigiate growing habit makes it easily recognisable from a distance, as it grows above the main canopy made by the shorter trees in regenerating woodland.



The family *Myrtaceae* is a large and widespread family in New Zealand, containing a lot of tree species, and Wellington Botanic Garden contains genera under this family which are native and non-native; native genera include *Kunzia* and *Metrosideros*, whereas non-native genera include *Backhousia* and *Eucalyptus*. The woodland areas contain a mix of species, including some from the family *Myrtaceae*, but also contains a lot of *Pinus radiata* from California which was brought over to New Zealand for use as a timber crop.

One of the more notable New Zealand natives in the garden is *Xeronema callistemon*, seen on the right; it is from it's own family *Xeronemataceae* and is a native plant which is classed as being threatened in the wild.



## **Garden Tasks**

For the duration of my time at Wellington Botanic Garden I have been assigned to the main garden team which oversees the area around the visitor centre and main entrance area, along with other planted areas such as the conifer banks, rock garden and herb garden.

As a volunteer I was kept with staff members when working out in the gardens; this provided me with the opportunity to ask questions as most of the staff were more experienced than myself.

## **Pruning**

Having left college I had felt that pruning was a weak point in my knowledge base; I had learned that pruning is generally carried out after flowering, and also got the chance to carry out a small amount of rose pruning at college. All shrubs are different though, and pruning techniques vary depending on the plant, along with the purpose of the pruning which could be improving the form, dead-heading or removing dead wood.

### ***Viburnum***

On the first week I was tasked one morning with pruning some medium sized *Viburnum*; these being the species *V. tinus* and *V. x rhytidophylloides*. The main garden area curator taught myself how to prune them, cutting the dead wood off and cutting living growth back to an axillary bud which would then grow in the direction which was desired; away from the path and to form a large rounded dome. We also tried to prune them in a way that leaves would cover the ends of the branches where they were cut.

### ***Camellia***

Wellington Botanic Garden has a large *Camellia* garden which consists predominantly of the species *C. japonica* with some *C. sasanqua* mixed in, though despite this most of the shrubs are cultivars and contain one of each, providing a bit of variety. Due to the high number of *Camellia*'s this garden is split into three sections which are pruned on a rotational basis, with one section being pruned once every 3 years. The aim of the pruning is to thin out the shrubs in an effort to try and create an open layered effect

On the day of pruning I had learned that the correct way to prune *Camellia* is to do it after flowering and before the new growth starts, but on this occasion most of them were still flowering but were also putting on a lot of new growth. The garden curator accompanying us assured us that pruning the shrubs now would not cause any significant damage however, as they are a tough shrub.

### ***Sarcococca***

This is a common plant within the main gardens, being present as both formal hedging and as more natural looking shrubs. The hedging species was *S. ruscifolia* and was trimmed with hand shears, cutting off the new growth to prevent it growing too large, though due to this plant's nature the hedge has quite a rough, natural look to it even after being trimmed.

The species *S. confusa* is also present within the garden and is left to grow more as a medium sized shrub. Its long spreading branches are undesired however so I was given the task of cutting them off; this takes away its natural form and keeps it looking like a more compact, rounded shrub.

### ***Rosa***

One late afternoon I helped the team at the Rose Garden finish their large deadheading task. While it was mostly done when I arrived, I did get the chance to prune a few beds full and learn how to do it. The dead heading is done by cutting back the spent or deteriorating flowers down to the first leaf with 5 lobes, as cutting back less often results in new growth which does not produce new flowers until the next year.

## Planting

During my time at Wellington Botanic Garden I had the opportunity to plant a range of different plants and plant types, including shrubs, perennials, annuals and ground covers.

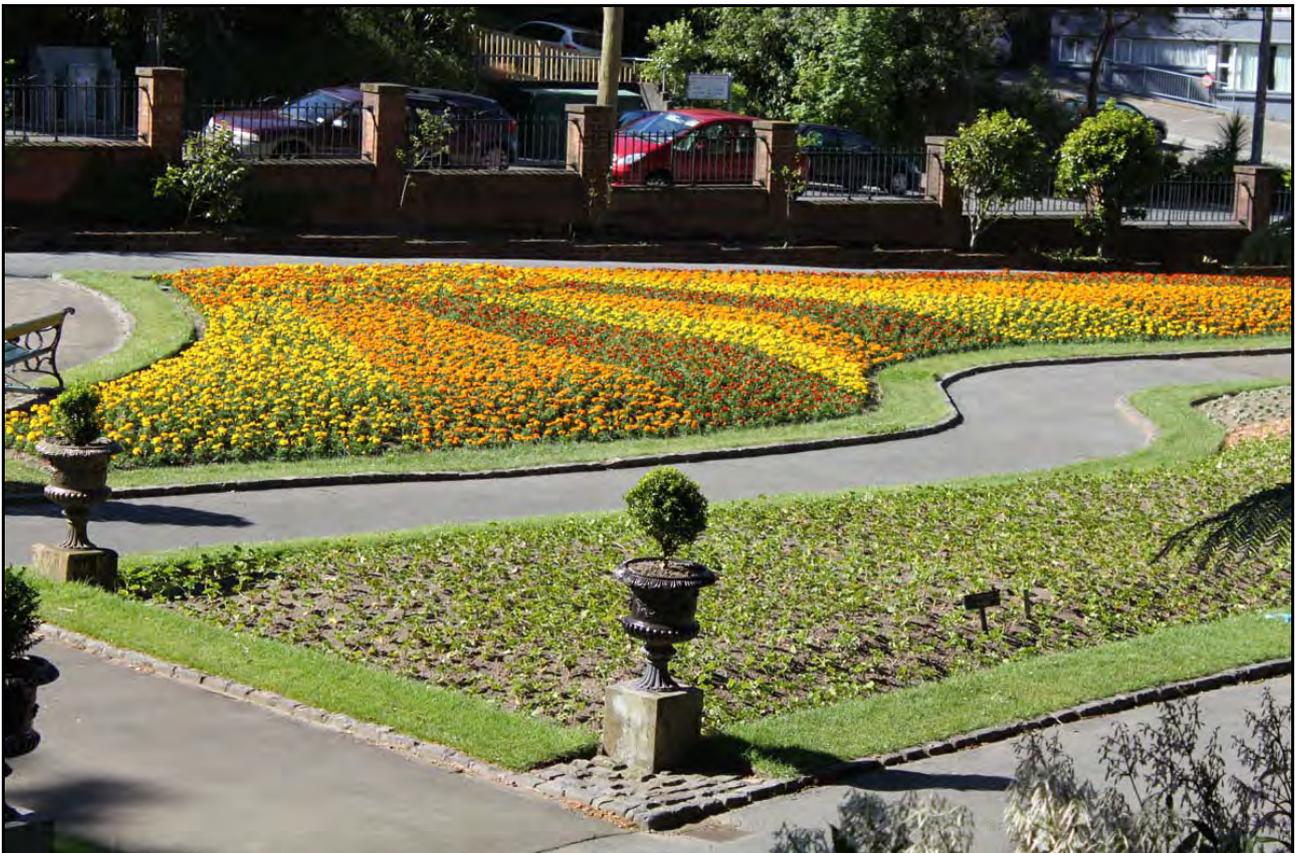
## Bedding

The most prominent feature of the main entrance are the large planting beds which are filled with tulip bulbs during winter and bedding schemes during summer. When I started work at the gardens these planting beds had been stripped of their many tulip bulbs and were now awaiting their bedding plants.

There were 12 beds to be planted up with bedding, ranging in size and planted with a wide variety of plants to give different colours. We used the following plants as bedding: *Alyssum* spp., *Begonia* spp., *Geranium* spp., *Impatiens* spp., *Iresine lindenii*, *Iresine herbstii*, *Salvia salsa*, *Tagetes patula* and *Zinnia* spp..

I had arrived just in time to help plant hundreds of plug sized plants, and as a first timer I listened to a quick explanation of how to do it along with the spacing before getting on with it myself; it was a relatively simple process of planting, being much like planting anything else except for the quantity of plants, though it took a bit of time to refine my technique and to be able to plant them by judging the distance by eye, rather than rough measurement with a trowel.

A week after planting the bedding many of the *Impatiens* were showing signs of transplant shock. This had happened because the plants hadn't been hardened off at the off-site nursery, showing the importance of hardening off young plants before suddenly exposing them fully to the outdoor weather. All this dieback meant that we had to move many of the plants around, spreading out the living ones and swapping them with dead ones since we had run out of stock to replace them with.



A section of the bedding looking at the *Tagetes* sun and *Geranium* spp. which will show a pattern of geometric shapes when they flower and grow.

## Container Plants

The other plants I planted were a mixture of native and non-native species and were all container grown stock, this meant that each plant was largely the same in terms of planting; digging a hole, pulling the plants out the container, loosening the roots then burying it in the ground. The plants I helped plant were:

***Fuchsia procumbens*** – I helped plant a lot of these in the Fuchsia bed, it is a native ground cover which can quickly grow to its full spread of 1.5m in about a year, and as we planted them about 30cm from each other they will soon grow into a thick layer covering all of the bare soil.

***Podocarpus totara*** – This is a native conifer which can grow up to 30m tall, though the 18 I helped plant were going to be kept as 3 short hedge rows, rather than being allowed to grow to their full height. The purpose of the planting was to turn one of the bedding plant beds in the main garden into a hedge row, which also meant that some grass sowing needed to be done around the hedging. *P. totara* is a slow growing plant, so it may take up to 20 years for them to bush out to create an ongoing hedge.

***Viburnum x rhytidophylloides*** – This is a shrub which can grow to around 3 metres tall and as much wide. One of the shrub beds near the duck pond contained some old *Viburnum x rhytidophylloides*, so we had a task of pulling them out and planting the bed with new plants of the same species. There were 6 to plant in total, all in close proximity to each other.



*Podocarpus totara* hedge with left-over *Alyssum* spp. planted at the base, and surrounded by newly planted grass. The small bit of ground cover net is covering grass which hasn't developed as fast as the rest of it.

## **Integrated Pest Management (IPM)**

IPM is a method of controlling pests which I had learned about in college but never got to see in practise, though now I have had the opportunity to carry it out myself. The session we had carrying out IPM was making use of nematodes which target the weevils that can be damaging towards ornamental plants, in particular plants from the families *Saxiphragaceae* and *Primulaceae* which are more susceptible to weevil damage.

The nematodes, *Heterorhabditis bacteriophora*, come in a tub of glucose powder which we mixed with water ready for spraying. Each small tub contains around 50 million nematode juveniles so the spray can be very dilute, allowing for large area coverage. The process of spreading them involved pouring the nematode infested water over the plants and soil, followed by spraying the plant with water to spread the nematodes around and into the soil where the weevils are present.

## **Weeding**

As all gardeners know, weeding is a big part of work during spring and summer. During the many hours I have spent weeding at Wellington Botanic garden I have come to realise that the weeds are not all that different from the ones I am used to seeing in England, including common species such as *Euphorbia helioscopia* and *Galium aparine*. *Convolvulus sepium* and *Oxalis* spp. are two of the more troublesome weeds, being present in almost every planting bed.

There is limited use of herbicides to kill off some of these weeds, and instead of using chemical mixtures a coconut oil based herbicide called Hitman is used; this is a contact herbicide which burns off the vegetation but leaves the roots intact.

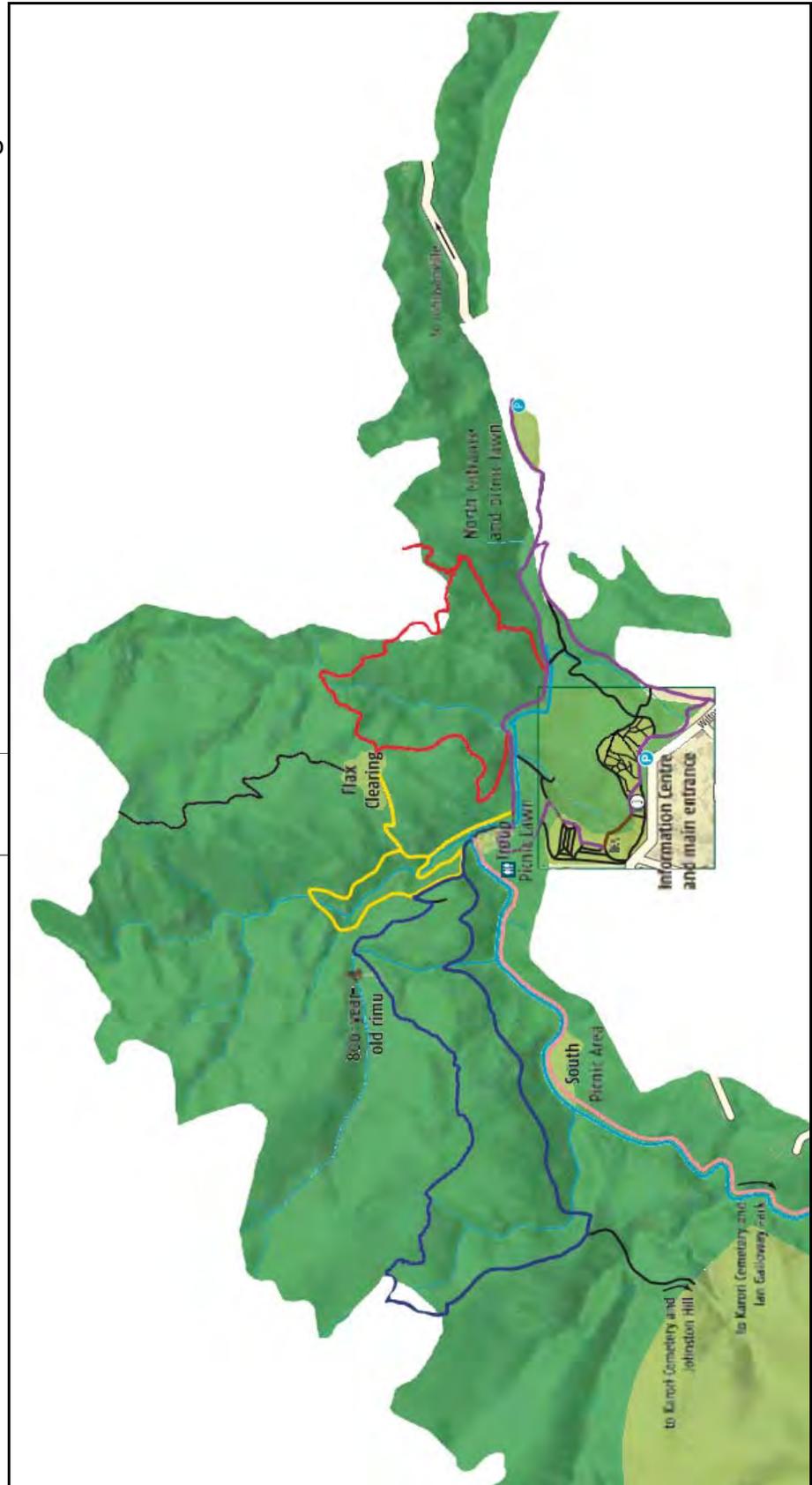
Besides the actual activity of pulling plants out of the ground, it is also a good way of learning the ornamental plants as one is constantly on the ground among the plants and their name labels.

Along with all the previously mentioned tasks there are also the general tidying up tasks like sweeping the paths to remove leaves or even out the gravel and bark chipping; while these aren't as plant based as other tasks they are still important to the overall appearance of the garden.

## Otari Wilton's Bush

Otari Wilton's Bush is a botanic garden located a short way out west from the city centre of Wellington. It is a native botanic garden so it only contains plants native to New Zealand, ornamental or otherwise. The garden takes up a total of 105 hectares, with 100 being allocated to native bush consisting of trees, tree ferns, understory shrubs and grasses. The remaining 5 hectares consists of the plant collections; containing areas such as the canopy walkway, coastal border, Kowhai collection, apline garden, rock garden and fernery, among other sections dedicated to specific genera or plant types.

Otari Wilton's Bush map  
(Wellington City Council, 2013)





Otari Wilton's Bush ornamental plant collections map (Wellington City Council, 2013)

## Plants

Otari Wilton's Bush can be divided into two main sections; the ornamental garden containing all sorts of ornamental plants from lots of different families, and the bush area which is more naturalised and managed to a far lesser extent, mimicing native undisturbed bush.

Working at a native botanic garden allows me to really concentrate on learning the native flora of New Zealand, and what makes it easier is that each time I learn a plant here I know it is native.

Along with new families and genera to learn there are two interesting characteristics about New Zealand's native flora. The first is that there are plants known as divaricate plants; these are plants which have a different juvenile form to it's mature form. One of the more extreme examples of this is *Pseudopanax ferox* and *Pseudopanax crassifolius* from the family *Araliaceae*, where the juvenile form looks much different to the adult form, although this characteristic is not limited to a few species of this genera, and also includes plants such as *Coprosma acerosa*, *Coprosma arborea*, *Myrsine divaricata* and *Sophora prostrata*. There are many theories on why these plants have evolved with these juvenile and adult forms, but some believe it is a defence against browsing from the now extinct Moa.

The second characteristic is that there is still a lot of natural hybridising happening between plants; the photograph below shows *Pseudopanax crassifolius* on the right and *Pseudopanax colensoi* on the left, with various un-named hybrids in between. *P. crassifolius* normally has a single long leaf, but the hybrids have a trifoliate leaf instead; a characteristic coming in from the palmate *P. colensoi*. Whereas the *P. colensoi* hybrids have a longer and more heavily serrated leaf edge then their original form.



native plants of New Zealand are spread across many families, with some of the main ones being *Myrtaceae*, *Podocarpaceae*, *Plantaginaceae* and *Asteraceae*. There are many more families than these however, some of which are *Elaeocarpaceae*, *Proteaceae*, *Sapindaceae*, *Lauraceae* and *Araliaceae*. Along with these families there are also some common genera from different families, such as *Sophora*, *Carmichaelia*, *Coprosma*, *Pittosporum* and *Macropiper*.

*Myrtaceae* is a large family of trees and shrubs including genera such as *Metrosideros*, *Kunzia* and *Lophomyrtus*. *Podocarpaceae* is New Zealand's main native conifer family, including prominent genera such as *Podocarpus*, *Dacrydium* and *Dacrycarpus*. *Dacrydium cupressinum* is a native

conifer and is capable of growing up to 50m tall; Otari in particular has an 800 year old *D. cupressinum*, along with some much smaller specimens. *Podocarpaceae* also includes New Zealand's tallest tree, *Dacrycarpus dacrydioides*, which is capable of growing up to 60m tall and favors damper lowland areas (Te Ara, 2013).

The photograph below shows a mature *Dacrydium cupressinum* with a *Metrosideros robusta* growing up it. *M. robusta* starts as an epiphyte like the *Collospermum hastatum* tufts also seen in the photograph, but unlike the *Collospermum* spp., the *M. robusta* sends roots down to the forest floor along with producing stems around the trunk of the host tree, eventually growing large enough to support itself for when the host tree dies. *M. robusta* is not parasitic and simply uses other trees for support, though it does eventually strangle the host tree.



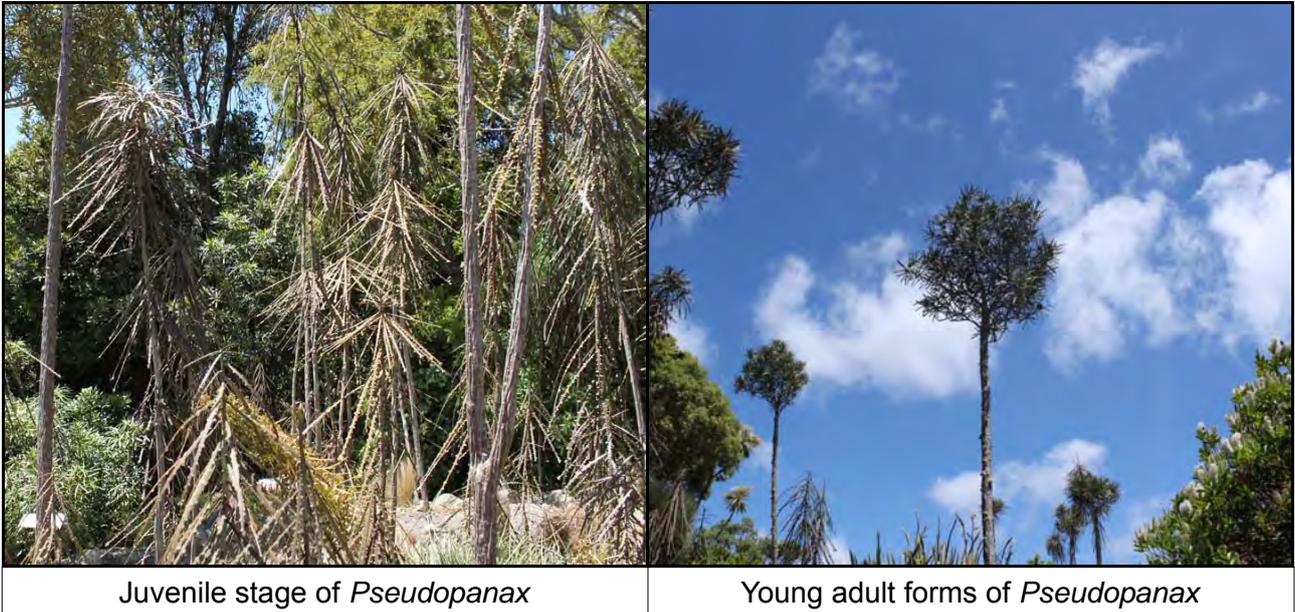
Native conifers aren't bound to *Podocarpaceae* however; the family *Cupressaceae* contains the genus *Libocedrus*, of which there are two native species, *L. bidwillii* and *L. Plumosa*. The third and final family of native conifers is *Araucariaceae* which contains just one native species – *Agathis australis*.

The family *Plantaginaceae* includes the *Hebe*'s which New Zealand is famous for, along with other genera such as *Veronica* and *Parahebe*. The family *Asteraceae* is one of the largest families of flowering plants and includes many native genera, though certain genera are much more common in New Zealand; these being *Brachyglottis*, *Leptinella*, *Olearia* and *Celmisia*.

New Zealand also has native plants within the family *Rosaceae*, including the genera *Rubus* and *Acaena*. *Acaena* is a common ground cover plant, and *Rubus* contains some popular ornamental plants such as *R. squarrosus* and *R. parvus*.

There are New Zealand's native Beech trees too; the genus *Nothofagus* within the family *Nothofagaceae*. Within this genus there are 4 species; *N. truncata*, *N. fusca*, *N. mnziesii* and *N. solandri*.

The Photographs below show the different forms of the previously mentioned divaricate plants from the genus *Pseudopanax*.



Juvenile stage of *Pseudopanax*

Young adult forms of *Pseudopanax*

Along with the dicotyledons there are also the monocotyledons which are a common plant within New Zealand. The monocotyledons are split into many different families, though the most common three are *Poaceae* which is the grass family, *Cyperaceae* which is the sedge family, and lastly *Juncaceae*, the rushes. Some genera among these families include *Chionocloa*, *Festucia* and *Spinifex* from *Poaceae*, *Carex* and *Gahnia* from *Cyperaceae* and *Luzula* from *Juncaceae*. There are many more families than these three though, some of which are *Asteliaceae* which includes the genus *Astelia* and *Xanthorrhoeaceae* which includes the well known genus *Phormium*. Below is a photograph of a *Phormium* species though the species is difficult to distinguish. The simplest way to identify them is by the seed pods; these are erect on *P. cookianum* and hang down on *P. tenax*.



New Zealand's flora also includes ferns; there are over 150 species of fern in New Zealand split into many genera, and range from ground ferns, tree ferns and climbing ferns. Otari Wilton's Bush has quite a large fern garden and within it there were some ground fern genera I recognised such as *Asplenium*, *Blechnum*, *Dryopteris* and *Polystichum*, though there are also many genera which are new to me, including *Marattia* from the family *Marattiaceae*, *Adiantum* from *Adiantaceae* and *Nephrolepis* from *Oleandraceae*.

Differing from the many ground fern species there are only 10 species of tree fern in New Zealand which are split into 2 genera; *Cyathea* and *Dicksonia*, both of which are in their own families *Cyatheaceae* and *Dicksoniaceae*. Some of the more common tree fern species include *Cyathea dealbata*, *C. medullaris* and *Dicksonia squarrosa*. *C. medullaris* is the tallest growing tree fern in New Zealand, being able to grow to around 20m tall, while *C. dealbata* is one of the most common species and has become the nation's symbol. (Te Ara, 2013)

The climbing ferns are spread across many different families, including the previously mentioned *Blechnaceae* which also includes a lot of ground fern genera. Other families of climbing fern which include native genera are *Davalliaceae*, *Polypodiaceae* and *Schizaeaceae*.

By learning lots of plant families I have come to realise that some familiar weed plants in England have more ornamental and less invasive relatives in New Zealand. Taking the family *Convolvulaceae* as an example; it contains *Convolvulus sepium*, a notorious weed, but also contains the New Zealand native *Calystegia soldanella*, shown in the photograph below, which is a native bindweed growing on coastal areas and is also planted occasionally for ornamental reasons as it is much less invasive.



A similar case of this can be seen with the family *Urticaceae*, the stinging nettle family. *Urtica dioica* is a well known plant of this family by being a common weed, but also in this family is the New Zealand native *Elatostema rugosum*, an ornamental plant which doesn't sting like some of its relatives. *E. rugosum* is the only species of this genus native to New Zealand however, with the majority of the genera being native to parts of Africa and Asia.

## Garden Tasks

My time at Otari consisted of working mostly in the small ornamental section, although there are tracks among the bush area which need maintenance, requiring one to walk the tracks with loppers and a saw to clear away any branches or fronds which may have fallen to cause an obstruction. The working situation at Otari also differed to that of Wellington Botanic Garden as I was often left on my own to get on with a task, or left to my own devices completely and allowed to find my own work to do for the day.

## Nusery work

One large job was to carry out a stock check of the plants in the nursery; this provided me with an excellent opportunity to learn plants and their names. Although on one day I had spent nearly 5 hours staring at plants and their names, there are so many that it became a challenge to remember all the plants and the entire name. Learning the genera alone however is easier by comparison and still very useful, as if a plants genus alone can be determined it is a fairly easy task to narrow it down to a species.

Stock taking is also a good way of learning how to identify some plant genera; all *Coprosma* for example have a small upward pointing stipule on each node and domatia on the leaves, though this can be difficult to see on the small leaved species. Having learned a rule like this however, I have also learned that not all genera are this easy to distinguish; *Pseudopanax* is a common genus of plant in New Zealand but the species within the genus vary greatly, from the divaricating *P. ferox* which for one has two different forms, but is also much different in appearance to *P. colensoi*.

I also had an introduction to taking cuttings which is something I had never done before.

*Coprosma acerosa* was the plant being propagated here and was done by taking side shoot cuttings; this is done by simply pulling off the shoot with its heel then cutting off the lower leaves and buds, before putting the shoots into water so they didn't dry out before going into a substrate of ground pumice. The humidity surrounding the plant while in the pumice is also a key factor in its survival; the cuttings don't have roots to absorb enough moisture so a mist system has been put in place to keep the cuttings damp, reducing water loss through the leaves.

Another day I had the task of potting up some *Uncinia uncinata* and *Carex* spp.; the way this was done was by taking a pinch of the substrate with some plants in, then putting it in a pot of compost. I had plenty of practise doing this technique by planting up 32 pots of each species.

## Pruning

### Dead heading

*Arthropodium* spp. is a common sight among gardens in New Zealand, providing myself and the staff with a large dead heading task when the flowers have been spent. The way the staff approach it is not spending days doing only dead heading, but rather doing a patch each day in between other duties. The way we did it was by cutting down the old flower stems as far down to the ground as possible.

### Dead Wooding/leafing

Each week the groups of *Myosotidium hortensii* need to be checked and have any dead or dying leaves removed if there are any. Dead heading would have been done too, but the seeds are being left to ripen so they can be collected and used in the near future for propagation.

Generally it is always good to have secateurs at hand, ready for a bit of casual pruning whilst carrying out other duties; *Hebe*'s in particular seem to have a lot of dead wood in them and require a lot of cutting back.

## Tree Ferns

Every now and then the tree-ferns need to be pruned as the fronds can become so large and heavy they hang down low over the path or simply die off as the plant ages. The pruning also changes the form, turning what at first is a large spreading shape into a more upright form. One morning consisted of me and another staff member going around pruning the many *Cyathea dealbata*'s, removing the dead, dieing or low hanging fronds with loppers or a long handled saw; this was a new and exciting task for me as tree ferns are not something I am used to working with. Despite drastically changing the look by pruning the lower fronds off it doesn't take long for the tree ferns to return to their original form; some of the ferns were back to their original form a couple of weeks later.

Another day when I was left to my own devices I had a go at pruning some of the *Cyathea medullaris* specimens, this was similar to when pruning the *C. dealbata*, with the only difference being the height of the plant; I had to attach an extra length of handle onto the end of the long handled saw in order to reach the fronds of the *C. medullaris* which were growing at a height of around 5 metres from the ground. Below are a couple of before and after shots of a *Cyathea dealbata* I had pruned.



## Planting

During my time at Otari I was able to plant plants of varying types such as perennials, trees, shrubs and ferns. Although a wide range of plants were planted, the technique of planting was generally the same for them, with consideration to the size a plant will grow and the spacing, along with the conditions of the soil and atmosphere.

The fern garden had been going through quite a change during my time here due to a storm not too long ago which destroyed a couple of mature trees, increasing the amount of sunlight and wind which the fern garden receives.

I planted one *Beilschmiedea tawa*; this was an important job as it will replace the Tawa which fell recently during the storm. At its mature size of 35 metres it will once again provide shade to the fern garden, though it will take around a century for it to reach its mature size. (New Zealand Plant Conservation Network, 2013)



The large mature sized stump from the fallen *Beilschmiedea tawa* with the much smaller one I planted to the left.

I planted one species of fern in the fern garden; this being *Doodia aspera* from the family *Blechnaceae*, it is a small fern and was planted to expand an already existing clump of it. I also got to help plant a small number of *Pittosporum cornifolium* from the family *Pittosporaceae*; this is a rare species of *Pittosporum* which is found in the wild as an epiphyte growing in common trees such as *Metrosideros robusta*, though it can tolerate growing on the ground where we planted it as the soil is well drained. (T.E.R.R.A.I.N, 2013)

Another plant I had planted was the popular *Arphrodium cirratum* from the family *Asparagaceae*.

I had planted a batch of 20 to create an informal looking border at the back of a planting bed, forming a fairly natural looking boundary between that and a more natural bush area.

Another day consisted of a large planting task, involving myself and a few staff members; the purpose of this planting was to fill out the space between existing plants until they spread out. We also planted some more ornamentals to add interest to the planting bed. *Carex* spp. and *Anemanthele lessoniana* were the main filling in plants, being planted in large quantities and were planted from containers. In this bed we also planted some *Muelenbeckia* spp. and *Atriplex hortensis* which acted more as specimen shrubs rather than temporary fill, these were also container grown stock.

The team at Otari Wilton's Bush also looks after the planting at Te Papa, the national museum of New Zealand which is used in Wellington, and is another area planted only with native species. The staff and I carried out some regular maintenance tasks such as pruning, weeding and mulching but also did some planting too.

One day at Te Papa consisted of a large planting task of about 30 plants to fill out an area where some large *Phormium*'s had recently been removed, along with filling out some other gaps in the shrub bed. The plants we planted here were a mix of *Aciphylla squarrosa*, *Coprosma acerosa*, *Hebe elliptica*, *Olearia solandri* and *Phormium cookianum*. The plants were small and planted quite thickly and close together to prevent people walking through it and also to minimize bare ground, so as the plants start to grow and spread out some thinning will have to be done.

I also had the opportunity to help plant up some sand dunes on the south coast not far from Wellington City, this was to help revegetate the area and hold the sand dunes together; the plant used for this was *Spinifex sericeus*.

Planting these was quite different to any other planting I had done due to the difficult conditions the plants grow in; the south coast has particularly high salty winds which the plants need to contend with, along with a sandy ground surface which is constantly shifting. In order to ensure the wind doesn't expose and dry out the roots, the *Spinifex* had to be planted much deeper than with any usual planting, with the top of the root ball submerged far below the sand's surface.

## Weeding

As with all gardening jobs there is the inevitable weeding task, and even at Otari Wilton's Bush there are many familiar weed species such as *Oxalis* spp. and *Euphorbia helioscopia*, though there are many seedlings of native plants too such as *Cordyline australis* which gave me something new to weed.

The weeding did again provide me with the same opportunity as Wellington Botanic Garden; observing plants and their labels, learning new plants while carrying out the task at hand. Otari provided me with more native plants though, rather than plants from all over the world. Weeding here also presented itself with new challenges, such as weeding through some of the *Aciphylla* spp. tufts, shown to the right, which are sharp and require a certain technique.



When it came to weeding through the coastal border the question "What is a weed?" came to mind; seedlings of *Sonchus Kirkii* were appearing all over the planting bed in a way which could be considered weedy, growing in the ground under other shrubs and generally being dotted around the garden. Despite all this seeding however, it was agreed upon amongst the staff to leave it as it is a coastal plant and is classified as being at risk in the wild, so it is left alone in the coastal border.

## Plant List

<p><b>Adiantaceae:</b> <i>Adiantum</i> spp.</p>	<p><b>Blechnaceae:</b> <i>Blechnum</i> spp. <i>Doodia aspera</i> – Prickly Rasp Fern <i>Woodwardia</i> spp.</p>
<p><b>Amaranthaceae:</b> <i>Atriplex hortensis</i> – Mountain Spinach <i>Iresine</i> spp.</p>	<p><b>Boraginaceae:</b> <i>Myosotidium hortensii</i> – Chatham Island Forget-me-not</p>
<p><b>Apiaceae:</b> <i>Aciphylla squarrosa</i> – Common Speargrass</p>	<p><b>Brassicaceae:</b> <i>Alyssum</i> spp.</p>
<p><b>Araliaceae:</b> <i>Fatsia japonica</i> – Japanese Aralia <i>Pseudopanax colensoi</i> – Mountain Five Finger <i>Pseudopanax crassifolius</i> – Lancewood <i>Pseudopanax ferox</i> – Fierce Lancewood</p>	<p><b>Buxaceae:</b> <i>Sarcococca confusa</i> – Christmas Box <i>Sarcococca ruscifolia</i> – Fragrant Sweetbox</p>
<p><b>Araucariaceae:</b> <i>Agathis australis</i> – Kauri</p>	<p><b>Caprifoliaceae:</b> <i>Viburnum rhytidophylloides</i> – Allegheny Viburnum <i>Viburnum tinus</i> – Laurustinus Viburnum</p>
<p><b>Arecaceae:</b> <i>Phoenix canariensis</i> – Canary Island Date Palm <i>Rhopalostylis sapida</i> – Nikau Palm</p>	<p><b>Convolvulaceae:</b> <i>Calystegia soldanella</i> – Coastal Bindweed <i>Convolvulus sepium</i> – Hedge Bindweed</p>
<p><b>Asparagaceae:</b> <i>Agave</i> spp. <i>Aloe</i> spp. <i>Arthropodium cirratum</i> – New Zealand Rock Lily <i>Cordyline australis</i> – Cabbage Tree</p>	<p><b>Crassulaceae:</b> <i>Crassula</i> spp.</p>
<p><b>Aspleniaceae:</b> <i>Asplenium</i> spp.</p>	<p><b>Cupressaceae:</b> <i>Libocedrus bidwillii</i> – Pahautea <i>Libocedrus plumosa</i> – Kaikawaka</p>
<p><b>Asteliaceae:</b> <i>Astelia</i> spp.</p>	<p><b>Cyatheaceae:</b> <i>Cyathea dealbata</i> – Silver Tree Fern <i>Cyathea medullaris</i> – Black Tree Fern</p>
<p><b>Asteraceae:</b> <i>Brachyglottis</i> spp. <i>Celmisia</i> spp. <i>Leptinella</i> spp. <i>Olearia solandri</i> – Coastal Shrub Daisy <i>Sonchus kirkii</i> – New Zealand Sow Thistle <i>Tagetes</i> spp. <i>Zinnia</i> spp.</p>	<p><b>Cyperaceae:</b> <i>Carex</i> spp. <i>Uncinia uncinata</i> – Hook Grass</p>
<p><b>Balsaminaceae:</b> <i>Impatiens</i> spp.</p>	<p><b>Dicksoniaceae:</b> <i>Dicksonia squarrosa</i> – Rough Tree Fern</p>
<p><b>Begoniaceae:</b> <i>Begonia</i> spp.</p>	<p><b>Dryopteridaceae:</b> <i>Dryopteris</i> spp. <i>Polystichum</i> spp.</p>

<b>Euphorbiaceae:</b> <i>Euphorbia helioscopia</i> – Sun Spurge	<b>Onagraceae:</b> <i>Fuchsia procumbens</i> – Creeping Fuchsia
<b>Fabaceae:</b> <i>Carmichealia</i> spp. <i>Sophora microphylla</i> – Kowhai <i>Sophora prostrata</i> – Dwarf kowhai	<b>Oxalidaceae:</b> <i>Oxalis</i> spp. – Woodsorrel
<b>Fagaceae:</b> <i>Quercus</i> – Oak	<b>Pineaceae:</b> <i>Pinus radiata</i> – Monterey Pine
<b>Garryaceae:</b> <i>Aucuba</i> spp.	<b>Piperaceae:</b> <i>Macropiper excelsum</i> – Kawa
<b>Geraniaceae:</b> <i>Geranium</i> spp.	<b>Pittosporaceae:</b> <i>Pittosporum cornifolium</i> – Perching Kohuhu
<b>Lamiaceae:</b> <i>Salvia</i> spp.	<b>Plantaginaceae:</b> <i>Hebe elliptica</i> – Shore Hebe <i>Parahebe</i> spp. <i>Veronica</i> spp.
<b>Lauraceae:</b> <i>Beilschmiedea tawa</i> – Tawa	<b>Poaceae:</b> <i>Anemanthele lessoniana</i> – Gossamer Grass <i>Chionocloa</i> spp. – Snow Grass <i>Festucia</i> spp. <i>Spinifex sericeus</i> – Coastal Spinifex
<b>Liliaceae:</b> <i>Collospermum hastatum</i>	<b>Podocarpaceae:</b> <i>Dacrycarpus dacrydiodes</i> – Kahikatea <i>Dacrydium cupressinum</i> – Rimu <i>Podocarpus Totara</i> – Totara
<b>Magnoliaceae:</b> <i>Liriodendron</i> spp. – Tulip Tree	<b>Polygonaceae:</b> <i>Muehlenbeckia astonii</i> – Shrubby Tororaro
<b>Marattiaceae:</b> <i>Marattia</i> spp.	<b>Proteaceae:</b> <i>Banksia serrata</i> – Saw Banksia <i>Knightia excelsa</i> – Rewarewa
<b>Myrsinaceae:</b> <i>Myrsine divaricata</i> – Weeping Matipo	<b>Ranunculaceae:</b> <i>Helleborus</i> spp. – Winter Rose
<b>Myrtaceae:</b> <i>Kunzia</i> spp. – Kanuka <i>Lophomyrtus</i> spp. <i>Metrosideros excelsa</i> – Pohutukawa <i>Metrosideros robusta</i> – Northern Rata	<b>Rosaceae:</b> <i>Acaena caesiiglauca</i> – Glaucous Bidbid <i>Rosa</i> spp. – Rose <i>Rubus fruticosus</i> – Brambles <i>Rubus parvus</i> – Creeping Lawyer <i>Rubus squarrosus</i> – Yellow Prickled Lawyer
<b>Nothofagaceae:</b> <i>Nothofagus fusca</i> – Red Beech <i>Nothofagus mnziesii</i> – Silver Beech <i>Nothofagus solandri</i> - <i>Nothofagus truncata</i> – Hard Beech	<b>Rubiaceae:</b> <i>Coprosma acerosa</i> – Sand Coprosma <i>Coprosma arborea</i> – Mamangi <i>Galium aparine</i> – Cleavers
<b>Oleandraceae:</b> <i>Nephrolepis</i> spp.	<b>Rutaceae:</b> <i>Citrus</i> spp.

<b>Solanaceae:</b> <i>Nicotiana</i> spp.	<b>Vitaceae:</b> <i>Parthenocissus</i> spp.
<b>Theaceae:</b> <i>Camellia japonica</i> – Japanese Camellia <i>Camellia sasanqua</i> – Christmas Camellia	<b>Xanthorrhoeaceae:</b> <i>Hemerocallis</i> spp. – Daylily <i>Kniphofia</i> spp. – Red Hot Poker <i>Phormium cookianum</i> – Mountain Flax
<b>Urticaceae:</b> <i>Urtica dioica</i> – Stinging Nettle <i>Elatostema rugosum</i> – Parataniwha	<b>Xeronemataceae:</b> <i>Xeronema callistemon</i> – Poor Knights Lily

## What I have Gained

### Learning new skills:

During my time in New Zealand so far there have been some garden tasks I had never carried out before or didn't know much about, including:

- Pruning certain shrubs - During this internship I have carried out all manner of pruning (Shaping, dead wooding and dead heading) and practised it on different shrub species.
- Learning about hardening off plants – This I learned soon after planting the *Impatiens* as bedding; from observation it is clear to me that it is an important part of growing plants in the nursery
- Integrated Pest Management – Ecology and the negative effects on it through chemical use is now widely accepted, and as such it is good to see new methods of dealing with pests and diseases. IPM is just one example of this and there are many different methods under this scheme to organically control pests; I am satisfied I have been able to carry out and learn about one method of this.

I have also had the opportunity to carry out some nursery work in the small on-site nursery at Otari Wilton's Bush, including the following tasks:

- Stock checking – I found this one of the best ways to learn plant names as well as seeing how it is done and what information is recorded.
- Taking cuttings – This was done with a New Zealand native species, and although there are different techniques of taking cuttings I am now familiar with taking heel cuttings, along with knowing what conditions provide best results such as having a misty atmosphere around the plants so they lose less water and keeping them out of direct sunlight.

### Expand horticultural knowledge:

Taxonomy has been a strong point for me as I enjoy learning new plants, though I had never really learned about families, instead focusing on genera and species; coming to New Zealand however I have focused equally on families as I have with genus and species and now feel like I understand them better. Although I have been learning families of new plants I have learned, I have also taken the time to learn what families the plants I already know belong to.

It is interesting to see how widespread plant families can be, and also the variation which can be seen in some families, an example being the family *Asparagaceae* which contains succulent *Aloe* spp. along with the perennial *Cordyline* spp. which both look very different to each other.

I have found that families can also be a good way of identifying plants too; narrowing down what an unknown plant could be if the family can be ascertained, though naturally this works better with a small family such as *Garryaceae* which contains 18 species within 2 genera, rather than with a large family such as *Asteraceae* which currently contains around 25,000 species split into over 1000 genera and 12 sub-families.

Working at both botanic gardens I have also been able to learn such a wide variety of plants, as well as learning about different characteristics New Zealand's flora has, namely the divaricate plants and the hybridising between different species.

Although at Otari Wilton's Bush I have learned a lot of New Zealand natives which would have trouble growing in England, I have an understanding of how different other countries flora can be, although there are some New Zealand natives which grow in other countries. Working at Wellington Botanic garden I have been able to learn plants which come from all over the world; ones which I will see and work with when I return to England, or perhaps even in other countries I may visit and work in.

## **Post Internship**

Although my internship at the botanic gardens in Wellington has concluded, I still have another 21 months on my working visa, allowing me to carry on working in New Zealand and gain more experience in horticultural roles and expanding my knowledge base.

Currently I am in Waipukurau, a small town further north than Wellington in Hawke's Bay, doing some gardening at a private property, but as botanic gardens are where I would like to work in the future I will continue to look for paid jobs in these gardens before my visa runs out.

The Department of Conservation also manages some sites within this region, allowing me to have the opportunity to join their volunteer parties at either Te Mata Park or Ahuriri Estuary which meet up once a month, helping out with tasks such as tree planting, weed control and general care of plants.

## References

All photos are property of the Author, Thomas Bayley

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Wellington City Council, 2013, Wellington.govt.nz/Recreation/Gardens/Otariwiltons-bush or Botanicgarden

## Account of Finances

Plane	£770.00
Travel Insurance	£400.00
Accommodation	£900.00
Food	£190.00