

# Nikau within Wellington City

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New Zealanders have enthusiastically adopted the nikau palm (*Rhopalostylis sapida*) and given it iconic status. It appears in our paintings, on our pottery and clothes, in the names of our businesses and even as part of our architecture, as seen in the metal nikau that surround Wellington's public library (Fig. 1).

Strangely, the palm is not seen where we would expect to see it—in the forests in and around the urban parts of the City. Yet nikau is an indigenous tree of the Wellington Peninsula (which roughly corresponds to the local government area of Wellington City). This may come as a surprise if, like me, you associate nikau with other places in the region, such as, the eastern side of the harbour (Butterfly Creek), the Porirua area (Porirua Reserve) and the Kapiti coast (Nikau Reserve).

Where are Wellington's nikau and why are they little known?

## LAND, CLIMATE AND FORESTS

The Wellington Peninsula lies within the Cook Strait and Wellington Ecological Districts. It is characterised by relatively fertile soils derived from loess and weathered greywacke crushed by active faulting (Gabites 1993). The forest types have been described as coastal and semi-coastal forest, and inland, podocarp / broadleaved forest (Gabites 1993). A notable feature is the absence of beech (*Nothofagus*) species, the nearest being found on the opposite side of Wellington Harbour and on the hills of the eastern Hutt Valley.



Figure 1. Steel nikau outside the Wellington Central Library. Photo: Neil Price, Wellington City Council.

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1. 3 Quetta Street, Ngāio, Wellington

The land is subject to frequent winds off Cook Strait from the north-west and south-east. During severe storms, salt-spray is carried far inland. Windiness, combined with moderately high sunshine hours, gives Wellington quite a high evaporation rate compared with the rest of the North Island (Gabites 1993).

The topography of Wellington Peninsula is rugged, with hills climbing to over 400 metres and sizable cliffs along much of the coastline. The diversity of landforms, combined with variations of climate and soil, provides a diversity of plant habitats.

### WELLINGTON'S NIKAU

The best known and most visited areas of native forest around the urban parts of Wellington City are the Botanic Gardens, Karori Sanctuary, Wright Hill, Johnston Hill, Otari-Wilton's Bush, Trelissick Park, Huntleigh Park, Khandallah Park and Redwood Bush. I will call these the 'City Forests' (Fig. 2).

Except for planted specimens (Botanic Gardens and Otari-Wilton's Bush) there are no mature nikau in our City Forests.

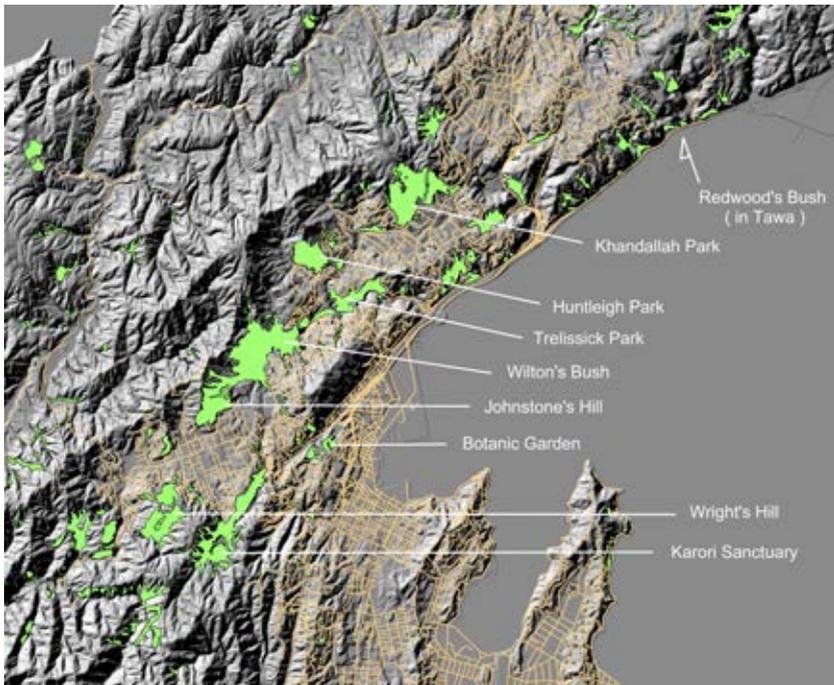


Figure 2. Wellington 'City Forests' (green) based on Geoff Park's sites (Park 1999). Sourced from the Wellington City Council GIS system.

## SURVIVING NIKAU

We are fortunate to have a comprehensive survey of almost all<sup>2</sup> significant indigenous forest in Wellington City. *An Inventory of the Surviving Traces of the Primary Forest of Wellington City* was produced for Wellington City Council by Geoff Park (Park 1999). He described and mapped 433 surviving primary forest remnants and areas of advanced secondary regeneration within the boundaries of the City.

Park used a rapid survey method to examine the canopy of a patch of bush from outside the stand. Selected 'marker species'—for example, kohekohe (*Dysoxylum spectabile*), northern rata (*Metrosideros robusta*), and tawa (*Beilschmiedia tawa*)—were used to decide whether a site contained 'primary forest elements'. Nikau was not one of the marker species but it was recorded at the sites where it was visible in the canopy.

Nikau were recorded at 53 of the sites. I have subsequently found nikau near one more site (in Khandallah) and eliminated it from another. Table 1 summarises the records and Fig. 3 shows their location.

## LOCATION AND SIZE OF REMNANTS

The sites with nikau are mostly located in a ring beyond the better known, and most visited, City Forests (Fig. 3). They are generally small and tend to be gully sites that are described as secondary regeneration or are surrounded by secondary regeneration. The number of 'marker species' of primary forest (Park 1999) are mostly low compared to the larger City Forests.

Of the 53 sites with nikau, most are small. 53% are less than 1 hectare in area and 87% are less than 5 hectares. The largest, an area of secondary regeneration in the Silver Stream Catchment (to the south of Karori Sanctuary), is 14.1 hectares.

I have measured the trunk height of nikau at four sites. A lone palm in a gully near Makara Peak measures 5.2 metres (Fig. 4). Another lone nikau in a forest at Crofton Downs is 5.3 metres. A group of four mature palms in a garden in Khandallah range from 3 to 4.5 metres. The group is between two small remnants mapped by Park (1999), and appears to be part of the original vegetation of these remnants. The nikau on the hillside beside Waihinahina Park (the old Newlands landfill) emerge above a matrix of low regenerating forest and appear to be relatively young with trunks between 2.3 and 3.8 metres (Fig. 7, p. 61).

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2. A small number of landowners refused access to their property. In some instances sites could be observed from adjoining land.

Table 1. The number of forest sites within Wellington City boundaries with nikau in the canopy (Park 1999).

Area of the City	Number of remnants with nikau	Size of remnants with nikau (ha = hectare) <sup>3</sup>	Comments
Crofton Downs, Khandallah	2	< 1ha : 1 1 - 5ha : 1	Off Silverstream Road, Torwood Avenue
Ngauranga Gorge, Newlands	6	< 1ha : 2 1 - 5ha : 4	Includes Waihinahina Park
Korokoro Catchment	11	< 1ha : 4 1 - 5ha : 6 > 5ha : 1	
Takapu Valley	4	< 1ha : 3 1 - 5ha : 1	
Ohariu Valley	3	< 1ha : 3	Northern and western slopes of Mt Kaukau
Makara Valley, western side of South Makara Valley	12	< 1ha : 5 1 - 5ha : 4 > 5ha : 3	
Oteranga Stream, Shepherds Gully	3	< 1ha : 3	
South Makara Road, eastern side and Makara Peak	5	< 1ha : 2 1 - 5ha : 2 > 5ha : 1	
Silver Stream Catchment	5	< 1ha : 3 > 5ha : 2	
Owhiro landfill	1	< 1ha : 1	
Karaka Bay	1	< 1ha : 1	
<b>Totals</b>	<b>53</b>	<b>&lt; 1ha = 28</b> <b>1 - 5ha = 18</b> <b>&gt; 5ha = 7</b>	

3. The part of the forest with the nikau, measured in hectares. Where a single figure is given for the areas of 'primary' and 'secondary' vegetation, that figure is used.

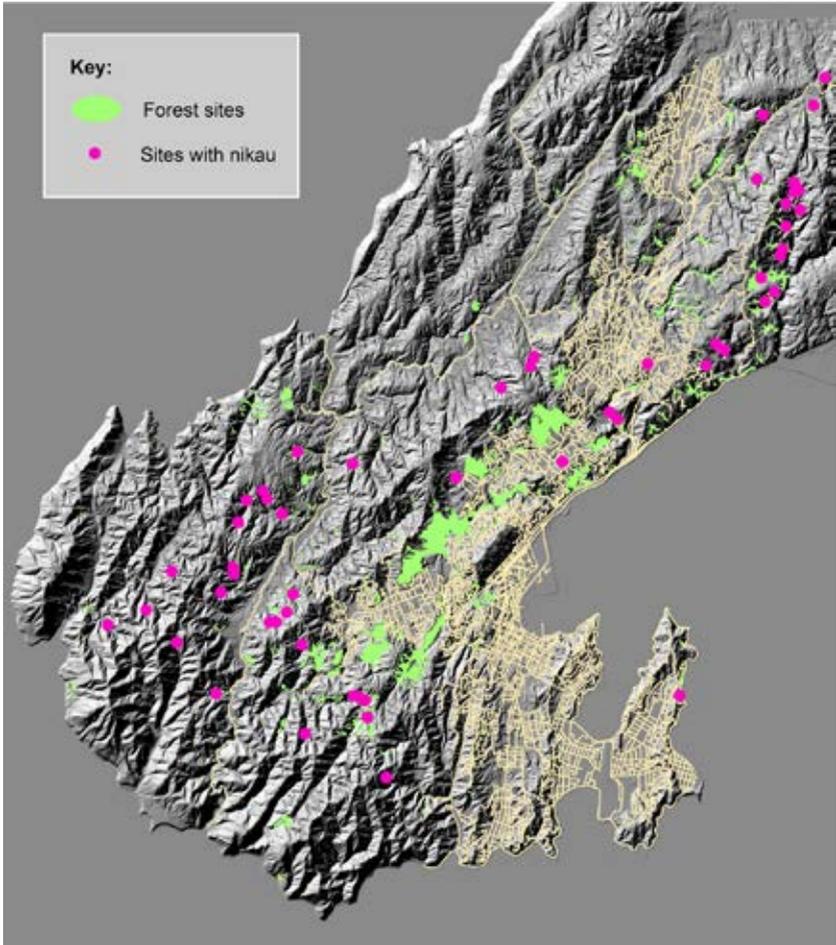


Figure 3. Forest sites (Park 1999) within Wellington City boundaries and sites with adult nikau.

### **PORIRUA RESERVE NIKAU**

A place to see taller and older nikau is just a little to the north of the Wellington City boundary. It is in a deep, steep sided gully at the southern end of the Porirua Scenic Reserve. The palms are easy to visit because the Colonial Knob Track passes through the gully (a few minutes from the Raiha Street car park).

There are palms of all sizes. The tallest are spectacular, with trunks in excess of 10 metres. They are the sort of nikau I would expect to see but are missing from our City Forests.



Figure 4. A lone nikau at Makara Peak.

## SEEDLINGS IN CITY FORESTS

There are no naturally occurring mature nikau in our City Forests. By 'mature' I mean palms that have not only a trunk but are old enough to produce flowers and fruit.

Our best known and most visited forests, particularly the lower altitude and less inland ones, seem to be suited to nikau. Planted nikau grow well at the Botanic Gardens and at Otari-Wilton's Bush. At the Botanic Gardens seedlings have established in the vicinity of the parent palms, where the conditions are suitable and the seedlings have been left to grow. The process has been going on for many years and there is a population of individuals of different sizes. They are mostly found at the Duck Pond end of the Lower Gardens and in the bush in Stable Gully.

Young nikau are establishing in several other City Forests. I am familiar with two naturally established seedlings in Trelissick Park (as well as a number of planted nikau). Seedlings have been recorded from Redwood Bush (Wellington Botanical Society 2003).

The most exciting place for me is Khandallah Park. Literally hundreds of seedlings (I have counted them) have established themselves in a few locations in the lower parts of the forest (Fig. 5). As with the Botanic Gardens the parents are planted palms, in this case four individuals in private gardens outside the forest. The seedlings are concentrated in areas within a relatively limited distance of one or other of the parent palms, with few seedlings more than 100–150 metres from an adult.

## POSSIBLE EXPLANATIONS

Why are there seedlings but no mature nikau in our City Forests? There are two possibilities:

- mature nikau were present in the forests at the time of European settlement in 1840, but they have since disappeared.
- mature nikau were not part of the forests in 1840. Conditions are now favourable for seedlings to establish and grow.

To explore these ideas further I will look into two areas, the ecology of the species and historical records of nikau in Wellington.

## NIKAU ECOLOGY

Ecologically, nikau appears to behave like other species that are found in the understorey and in canopy gaps, and on the edges of old forest. They are often components of secondary regeneration. By far the most abundant of these species on the Wellington Peninsula is the ubiquitous mahoe (*Meliclytus ramiflorus*). Other species are mamaku (*Cyathea medullaris*) and pigeonwood (*Hedycarya arborea*).

Nikau seedlings establish in significant numbers where there are suitable conditions of soil, moisture, shade and shelter. The literature, both botanical and horticultural, advises that nikau grow best in a rich, moist, deep soil (Metcalf 2000). Young plants need shade and protection from direct sun for the first five to six years (Jones 1995). Nikau grow best with shelter from wind (Mathews 1986). The species will only tolerate light frosts of -2 to -3°C and they have been killed by frosts of -5°C on the French Riviera (Boyer 1992).

My observations are that seedlings can be found on sites that vary from moderate shade (in gardens, under shelterbelts) to heavily shaded (under a dense kohekohe canopy). There is usually plenty of humus and forest litter. Seedlings are particularly numerous in gullies along streams and on gentle slopes and terraces, which are moist and even poorly drained (Khandallah Park; Nikau Reserve, Paraparaumu). Seedlings can be numerous in an area of forest floor and then vanish completely over a few metres, presumably due to some change in soil, moisture or competing groundcover.

The species is generally considered to be slow growing. Research on a population of nikau in Auckland's Waitakere Ranges estimated that it takes an average of 52 years to develop a trunk and 90 years to reach a height of at least 2.2 metres, when the palm flowers for the first time (Enright & Watson 1992). They can grow faster in cultivation. Jones (1995) writes of nikau forming a trunk at fifteen years old and flowering at about 30 years old. These shorter times may be possible for wild nikau growing in optimum conditions. I have not been able to find any references to the growth rate of wild nikau in parts of the country other than Auckland. Research has shown the number of leaf scars on the trunk is a poor indicator of age (Esler 1969; Enright & Watson 1992).

Enright & Watson (1992) consider nikau to be long lived, living in excess of 200 years. The only cause of death of mature palms observed in their study was one palm that was strangled by supplejack (*Ripogonum scandens*), which inhibited leaf fall, and three tall palms that were crushed by a single fallen tree. The species itself is not susceptible to windthrow. Thompson (1936) recorded considerable damage to forests in the Tararua Ranges, from a gale of that year. He wrote:

*Nikau palms and mamakus (Cyathea medullaris) stood up well and over large areas form the only vegetation erect.*

Nikau generally fruit annually. Flowers and fruit are produced on a much branched inflorescence, or flower head, at the top of the trunk (Fig. 6). There is generally an inflorescence at the base of each leaf, which expands quickly when the leaf falls away. Esler (1969) studied a population of nikau in pasture near Palmerston North. He found 65% of falling leaves exposed an inflorescence and two-thirds of those went on to produce ripe fruit (Esler



Figure 5. Seedlings in Khandallah Park forest.

1969). There may be two, three or more inflorescences on a palm at one time, the lowest and oldest, bearing fruit. Sometimes the lowest stalk is a dried relic with a handful of grey fruit left from an earlier season.

The flowers are unisexual with one female flower sited between two males. The species is protandrous. The anthers of the male flowers shed their pollen, and most fall from the flower stalk, before the stigma of the female flowers are receptive (Esler 1969). However, Esler provides some evidence to suggest there are varying degrees of protandry.



Figure 6. Inflorescences with female flowers and green fruit, Waihinahina Park, 6 March 2011.

Each inflorescence can potentially produce 4000-5000 fruit (Esler 1969). The fruit of nikau is brick-red when ripe. Flesh surrounds a single hard seed, which is dispersed by birds. In Wellington blackbirds (*Turdus merula*) and kereru (*Hemiphaga novaeseelandiae*) are the main contenders (Clout & Hay 1989). Surprisingly, I have not been able to find any conclusive reference to tui (*Prosthemadera novaeseelandiae*) eating nikau fruit. For example, it is not recorded in the comprehensive Clout & Hay paper on birds as browsers, pollinators and seed dispersers in New Zealand forests. Possibly the fruit is too large for tui to swallow.

## HISTORICAL RECORDS—EARLY WELLINGTON

At the time of European settlement much of the Wellington Peninsula was covered in dense forest (Boffa Miskell 1998). Today's areas of Thorndon, the Central Business District, Mt. Victoria, Kilbirnie and Miramar had already been modified by Maori fires. The vegetation in these areas was mostly swamp, fern and shrub-land (Boffa Miskell 1998).

References and depictions of nikau on the Wellington Peninsula are rare. Only one artwork, Samuel Charles Brees' *The Hutt Road taken at the gorge looking toward Wellington* of 1847, shows nikau (Boffa Miskell 1998), although the plants could be poorly drawn mamaku. Another artist, George Angus, walked in the Porirua Valley (the Tawa area) a little before this date. He wrote enthusiastically of:

*... the lofty forest – filled with noble trees of gigantic growth... there is an undergrowth in these damp and windless twilight solitudes, composed of the nikau palm and the beautiful treefern ...* (Gabites 1993).

The absence of nikau from other early writings, paintings and photographs is surprising. The palm is distinctive and it was readily identified. Tree ferns, cabbage trees and epiphytic asteliads (*Astelia* and *Collospermum* species) are also distinctive and they were commonly mentioned or depicted.

The botanist John Buchanan has left us two comprehensive plant lists for Wellington: the Miramar Peninsula in 1872 (Boffa Miskell 1998) and the present day Botanic Gardens in 1875 (Shepherd & Cook 1988). It is noteworthy that nikau is absent from both his lists.

The two references we have for the City are from the northern parts of the Wellington Peninsula, near the Ngauranga Gorge (or possibly the Kaiwharawhara Gorge) and in the lower Tawa Valley. The absence of other historic sources suggests that nikau may have been uncommon or absent on most of the Peninsula, particularly the parts close to the Wellington settlement.

## USES OF NIKAU

An intriguing statement is found in the Otari-Wilton's Bush Management Plan (Wellington City Council 1996, 2007). It may be of major significance.

*... it was the custom of Maori to remove timber from forests to sell to settlers and nikau was particularly popular in this respect.*

Unfortunately, the source is not cited and it is not clear whether the part about nikau applied to Wellington. Despite some searching, I have only been able to find one other reference in books or articles on nikau as firewood. The writer observes the trunk is useless for timber or firewood (Richards 1956).

A separate source tells us that in 1850 the Maori of the Kaiwhara and Ngauranga settlements cut firewood to sell to Wellington settlers (Ward 1928). If nikau was particularly popular, as suggested in the management plan, it would have been targeted. It is possible that any adult palms in the vicinity of Wellington were cut in the first few years of the settlement, by either Maori or Europeans.

Other uses of nikau are well documented. The terminal bud and young developing leaves could be eaten, which invariably led to the death of the palm (Richards 1956; Moore & Irwin 1978). The large leaves were used to build whare and huts, and a perfectly watertight roof and walls could be constructed (Laing & Blackwell 1940). The leaves were popular for many decades in some areas of the country as decoration for social events, such as dances (Crookes 1926).

## MAKING FARMS

Clearing of the bush for farming would have had a huge impact on nikau. It destroyed the forest, which is the habitat of the species. The standard practice for clearing land was to clear the climbers and understorey, fell the larger trees and leave the wood and remaining vegetation to dry out before setting fire to the whole (Te Ara 2005). Seedlings and young nikau would have been killed by the heat and burning but adult nikau would sometimes survive (Laing & Blackwell 1940). Being a palm, nikau has vascular bundles scattered throughout its trunk, and it is not necessarily killed by heat and charring.

Another large impact of farm development was browsing animals. Seedlings and young nikau are eaten and trampled by sheep, goats and cattle (Walls 2000; Kessels & Associates 2008). Nikau can also be destroyed by pigs, which uproot the palms or eat the bases of the leaves (Brockie 1992). They also eat and destroy fallen seed (Walls 2000). Pigs have been numerous in forests of the Wellington district since the early 1840s (Brockie 1992). Despite these impacts, in the Orongorongo forest in 1992, nikau was one of the species withstanding animal browsers, particularly possums, deer and goats (Brockie 1992).

It was the standard practice for settlers creating farms to run cattle, including milking cows, in the bush before any land was cleared for pasture (Best n.d.). The animals had no problem surviving by browsing palatable trees, shrubs and ferns (cattle was essentially a forest species before domestication).

## RATS AND POSSUMS

The Polynesian rat or kiore (*Rattus exulans*) was present in the forests for several centuries before 1840. It was subsequently replaced by other rat species. It remains a predator of nikau fruit on off-shore islands in northern New Zealand (Campbell & Atkinson 1999). It also eats the leaves of first year seedlings and digs them up to eat the bulbous root base. Experiments with enclosures demonstrated that kiore strongly depress seedling survival. Even so, nikau do establish on islands with kiore (Campbell & Atkinson 1999).

After 1840 Norway rat (*Rattus norvegicus*) would have been common in the vicinity of Wellington township. It probably ate the fallen seeds. The species, however, is a poor climber. The smooth shiny trunks of nikau would have frustrated its efforts to reach the fruit, unless lianas such as thread fern (*Blechnum filiforme*) and hounds tongue (*Microsorium pustulatum* subsp. *pustulatum*) provided a pathway to the fruit. Kiore being a better climber probably had a greater effect on fruit on the palm and on dispersal by birds to other areas of forest. The two species may have coexisted for a period before the establishment of a third rat species (Atkinson 1973).

Ship rat (*Rattus rattus*), despite its name, did not colonise until the common use of steam ships (Atkinson 1973). The first ship rat identified in the Wellington district was trapped in Tinakori Road in 1871 (Brockie 1992). The ship rat is a strong climber and it is able to reach buds, flowers and green fruit (Brockie 1992).

Possum (*Trichosurus vulpecula*) was another later introduction to the forests, with the first possums being introduced to the Wellington district in the 1890's (Brockie 1992). Today the possum is a significant predator of nikau buds, flowers and fruit. Ripe fruit was very rarely seen in the Orongorongo Valley in recent decades (Brockie 1992).

## DISCUSSION—MATURE NIKAU

Today there are no mature nikau in our City Forests, the better known and most visited areas of bush. This is despite these forests being the largest remnants on the Wellington Peninsula with the highest numbers of canopy tree species indicative of primary forest (Park 1999). I would have expected to find at least a few tall nikau similar to the ones in the Porirua Reserve in the less inland forests of the Botanic Gardens, Trelissick Park and Redwood Bush.

The mature nikau we do have grow in isolated scraps of bush, further from the urban areas. The main concentrations are up side gullies of the Makara and Silver Stream valleys, and the Korokoro Gorge. The relatively small size of most of these sites, the proportion described as purely secondary forest and the tree species that the nikau are associated with (Park 1999) suggest that these nikau are a component of regeneration, rather than a component of surviving primary forest (although some other tree species may be descended from primary forest on the site) (Park 1999). The relatively low height of the palms I have measured suggests that nikau have not been on the sites since 1840.

It is unlikely that nikau has regenerated from a seed bank. Experiments show that all viable seed germinates in the first season after it matures (Esler 1969; Burrows 1995). The only mechanism to retard germination seems

to be a requirement for relatively high temperatures. Near the species' southern limit on Banks Peninsula, seed collected in late January did not begin to germinate until early December of the following year (Burrows 1995). Therefore the most likely explanation for the mature nikau on the Wellington sites is long distance dispersal by birds, probably kereru, from larger forest remnants such as Porirua Reserve.

Some of the sites are at relatively high altitudes and exposed to regular wind. Waihinahina Park in Newlands is a good example (Fig. 7). Nikau near the edge of the mown area grow at 200m above sea level. They are exposed to cold south-westerlies directly off the harbour. A solitary nikau growing in a gully above the Owhiro Landfill is at 270m above sea level.

Wind and cold air drainage may give protection from heavy frosts, allowing the establishment and growth of young plants. It is possible nikau did not grow in these places in 1840 when continuous and taller forest, with emergent podocarps, provided greater shelter from the influence of Cook Strait (Gabites & Lucas 1998). The possible recent colonisation by nikau may parallel the observed shift in dominance of kohekohe over tawa on higher slopes and ridges. It was first proposed by Stan Reid in 1934 and supported by later research in 1982 and 1992 (Wellington City Council 1996, 2007). Kohekohe is better adapted to salt-laden winds than tawa, which becomes the canopy dominant on more sheltered and colder sites (Gabites 1993). It is interesting that both kohekohe and nikau are generally thought of as coastal species in the lower North Island.



Figure 7. Nikau in secondary regeneration at Waihinahina Park at 200m above sea level.

## **DISCUSSION—SEEDLINGS**

With our City Forests, the inland ones such as Wright Hill, Karori Sanctuary, Johnston Hill and Wilton's Bush may have winter frosts and cold that prevent the establishment of seedlings. If this is the case today it would have been the same in 1840. The recent establishment of seedlings in the Botanic Gardens, Trelissick Park, the lower parts of Khandallah Park and Redwood Bush at least suggests that nikau was part of these forests at the time of European settlement. This is supported by seedlings on other sites I have observed in suburban areas; e.g., Thorndon, Wadestown, Ngaio, Khandallah and Hataitai. There are no doubt others.

The areas with seedlings are localised but the limiting factor is the location of fruiting nikau in gardens. Occasionally a seedling, which is clearly not planted, is found a long way from any mature palm. I think this is due to long distance dispersal by kereru. My impression is that nikau is now on the way to becoming a 'natural component' of our lower altitude City Forests, as well as areas of secondary vegetation (of indigenous species, and mixtures of indigenous, non-indigenous native and exotic species).

## **DISCUSSION—LOSS THROUGH LAND USE**

Was nikau lost from our City Forests in the period following European settlement in 1840? Except for the Tawa Valley we do not have any reliable written or visual evidence from the colonial period that nikau existed in today's urban areas.

Paul Blaschke (pers. comm.) considers nikau did occur naturally within the mature forests of the City (today's urban area). He thinks nikau was only rarely a forest canopy dominant but was probably quite common, and locally dominant in the understorey in many types of sheltered forests. He observes the species preference is for sheltered temperate valley and lower hillside positions. Paul thinks there were few of these habitats in Wellington at the time of European settlement. For example, the Miramar Peninsula was no longer forested. He thinks the early clearance of other sheltered habitats (e.g., the Pipitea and Kaiwharawhara catchments) explains why there are no surviving mature nikau.

His view is consistent with the way farms were developed from the forest. A combination of felling and burning could have removed the few sites where nikau grew in numbers. If nikau was popular as firewood, as suggested by the unattributed statement (Wellington City Council 1996 & 2007), palms that survived initial clearing would have been cut for wood. Scattered nikau on less favourable sites at greater distances from the town would have been sought out, cut and sold. Seedlings and immature palms would have been killed by fires or by the grazing of largely uncontrolled

animals. This may explain why nikau was absent from the Botanic Garden when Buchanan undertook his comprehensive survey in 1872: Buchanan was very familiar with the land and produced the first map of the Gardens. While the land was owned by the Crown and set aside for reserve it had suffered three decades of clearing, firewood cutting and grazing (Shepherd & Cook 1988). The sheltered gullies of the Botanic Gardens are certainly one of those favourable sites where I would have expected nikau to originally grow. It does seem incredible that not a single young palm survived until Buchanan's time.

Nikau's protandrous breeding system may also have contributed to the species disappearance. Individual palms, which survived the initial period of bush clearing, may have been too distant from other palms to set fruit. Disruptions to the agents of pollination and seed dispersal may have also played a role. For example, kereru were hunted by settlers for food and sport (Feldman 2001) and they may have become rare in the vicinity of the town within a relatively short period.

## **DISCUSSION—CLIMATE CHANGE**

Climate change may be a factor in the present establishment of nikau seedlings. It is possible that today's conditions are more favourable than those of 1840. Wellington's average annual temperature has increased 0.86 degrees Celsius between 1909 and 2009 (NIWA 2010) and presumably more since 1840. The change may have increased the areas that are not subject to heavy frost and are mild enough to allow nikau to establish and grow.

It does not exclude the possibility that nikau previously grew in our City Forests or other parts of urban Wellington but it might have an influence on the local success of the species. The climate may have been more marginal for nikau in 1840, restricting it as a common species to a few favourable sites, with a wider spread of scattered individuals. In the climate of the future, nikau could become a common component of some forests, particularly our City Forests at lower altitudes.

## **CONCLUSIONS**

I have examined the ecological and historical evidence relating to the distribution of nikau, and discussed some possibilities based on this evidence. I have attempted to provide plausible reasons for why we have the current pattern of presences and absences of mature nikau and another pattern of seedlings.

I have no historic evidence that in 1840 nikau grew in our City Forests, the term I have used for our better known and larger forests in and around the urban areas of the city. The firewood reference is intriguing but for the

moment unsubstantiated. The ecological evidence suggests nikau could well have been a component of our City Forests, at least those at lower altitudes and not too far from the coast. The species was probably restricted to a few favourable sites, within our City Forests and in other places that are not forest today.

I can definitely say that mature nikau palms do grow at a reasonable number of sites on the wider Wellington Peninsula. Most of these sites are well removed from the urban parts of the City. They are mostly small with characteristics that suggest that they are secondary forests. The mature wild nikau I have observed or measured are relatively short. There is no evidence to indicate that nikau were on these sites in 1840. I have suggested that the sites are now suitable for the species because of changes to the wider landscape of the Wellington Peninsula. The sites are windier and therefore more likely to not suffer heavy frosts. These nikau are probably the result of long distance dispersal by birds.

I must confess that I have only visited or viewed 10 of the 53 sites, and the others may not all be as I have described. Some tall and ancient nikau may be hiding away in a few of them.

The clusters of seedlings inside and outside our City Forests are another piece of evidence. The locations are largely determined by the existence of mature palms. All the mature palms I have found so far around the City Forests are planted in gardens, with the possible exception of the site in Torwood Avenue, Khandallah. The fact that seedlings are thriving today suggests they may have grown in the same locations in 1840. However, an increase of a degree or more in the average annual temperature may have increased the range of the species.

The evidence I have collected has allowed me to put forward ideas. Much of it is circumstantial, however, and they are tentative explanations. I do not at this time have sufficient evidence to say with confidence what has happened. More research is required.

## **SUMMARY**

Nikau grows well in some of our City Forests today. The relative lack of early references to nikau in Wellington is therefore puzzling. Nikau may have been uncommon or rare in the forests of the Wellington Peninsula in 1840. The species may have been a victim of felling and burning, grazing and firewood consumption by Wellington's settlers. We may be looking at a case of both a local extinction, from the more immediate area of urban Wellington, and a colonisation by nikau of other parts of the Wellington Peninsula, as a result of changes to the wider landscape.

With many questions and few answers, one thing is clear: the present distribution of seedlings and young palms in forest areas close to the City is determined by the location of planted mature palms. To me the establishment of 'wild' nikau in the City is an exciting phenomenon. While the parents are of doubtful origins we can be encouraged by their success. We need to supplement these new seedlings with plants grown from seed collected from genuinely indigenous palms in the immediate Wellington area. This is necessary to conserve the form and other adaptive characteristics of the local race, and to ensure its genes are at least mixed with those of the established seedlings.

Nikau is establishing in, or possibly returning to, our City Forests: those we know and visit most often. Because it is a palm, nikau adds a tropical feel to our urban forests and it brings an additional lushness and diversity to the vegetation. With the spread and maturing of the species, Wellington will become a city of living nikau worthy of its celebration in our cultural images and icons.

## REFERENCES

- Atkinson, I.A.E. 1973: Spread of the Ship Rat (*Rattus r. rattus* L.) in New Zealand. *Journal of the Royal Society of New Zealand* 3: 457-472.
- Best, E. No date: *The Bush Settlers of Wellington District*: unpublished manuscript, Alexander Turnbull Library, Wellington.
- Boffa Miskell. 1998: Wellington's Native Vegetation: A Brief Survey of Early Historical Records. Prepared by Boffa Miskell Limited for Policy Unit-Commissioning, Wellington City Council. Unpublished report.
- Boyer, K. 1992: Palms and Cycads Beyond the Tropics. The Publication Fund, Palm and Cycad Societies of Australia. Milton, Queensland, Australia.
- Brockie, R. 1992: A Living New Zealand Forest: A community of plants and animals. David Bateman, Auckland, New Zealand.
- Burrows, C. J. 1995: Germination behaviour of the seeds of six New Zealand woody plant species. *New Zealand Journal of Botany* 33: 365-377.
- Campbell, D.J.; Atkinson, I.A.E. 1999: Effects of kiore (*Rattus exulans* Peale) on recruitment of indigenous coastal trees on northern offshore islands of New Zealand. *Journal of the Royal Society of New Zealand* 29: 265-290.
- Clout, M.N.; Hay J.R. 1989: The importance of birds as browsers, pollinators and seed dispersers in New Zealand forests. *New Zealand Journal of Ecology* 12 (Supplement): 27-56.
- Crookes, M.W. 1926: Plant life in Maori-land, a botanist's note book. Whitcombe and Tombs, New Zealand.
- Enright, N.J.; Watson, A.D. 1992: Population dynamics of the nikau palm, *Rhopalostylis sapida* (Wendl. et Drude), in a temperate forest remnant near Auckland, New Zealand. *New Zealand Journal of Botany* 30: 29-43.
- Esler, A.E. 1969: Leaf fall and flowering of nikau. *Bulletin of the Wellington Botanical Society* 36: 18-23.

- Feldman, J.W. 2001: Treaty Rights and Pigeon Poaching. Alienation of Maori Access to Kereru, 1864–1960. Waitangi Tribunal.
- Gabites, I. 1993: Wellington's Living Cloak: A Guide to the Natural Plant Communities. Wellington Botanical Society, Victoria University Press, Wellington, New Zealand.
- Gabites, I.; Lucas, R. 1998: The Native Garden: Design themes from wild New Zealand. Random House, Auckland, New Zealand.
- Jones, D.L. 1995: Palms throughout the World. Smithsonian Institution Press. Washington D.C., U.S.A.
- Kessels & Associates. 2008: Contact Wind Ltd, Hauaura ma raki – Waikato Wind Farm, Assessment of Ecological Effects, June 2008; [www.contactenergy.co.nz/web/pdf/our\\_projects/waikatowindfarm/june2008/T03\\_HMR\\_Assessment\\_of\\_Ecological\\_Effects.pdf](http://www.contactenergy.co.nz/web/pdf/our_projects/waikatowindfarm/june2008/T03_HMR_Assessment_of_Ecological_Effects.pdf)
- Laing, R.M.; Blackwell E.W. 1940: Plants of New Zealand, Fourth (Centennial) Edition, Revised and Enlarged. Whitcombe and Tombs, New Zealand.
- Mathews, J. 1986: The New Zealand Garden Book. Endeavour Press, Auckland, New Zealand.
- Metcalf, L.E. 2000: New Zealand Trees and Shrubs: a Comprehensive Guide to Cultivation and Identification. Reed, Auckland, New Zealand.
- Moore, L.B.; Irwin J.B. 1978: The Oxford Book of New Zealand Plants. Oxford University Press, Wellington, New Zealand.
- NIWA. 2010: Creating a Composite Temperature Series for Wellington. Taihoro Nukurangi, National Institute of Water and Atmospheric Research; [www.niwa.co.nz/\\_data/assets/pdf\\_file/0007/108889/Wellington\\_CompositeTemperatureSeries\\_13Dec2010\\_FINAL.pdf](http://www.niwa.co.nz/_data/assets/pdf_file/0007/108889/Wellington_CompositeTemperatureSeries_13Dec2010_FINAL.pdf)
- Park, G. 1999: An Inventory of the Surviving Traces of the Primary Forest of Wellington City: Compiled for Wellington City Council by Geoff Park Landscape Architecture & History. Unpublished report.
- Richards, E.C. 1956: Our New Zealand Trees and Flowers. Simpson and Williams, Christchurch, New Zealand.
- Shepherd, W.; Cook, W. 1988: The Botanic Garden, Wellington, A New Zealand History 1840 – 1987. Millwood Press, Wellington, New Zealand.
- Te Ara. 2005: North Island Farms Bush and Fern. The Encyclopaedia of New Zealand [online]; [www.teara.govt.nz/en/fire-and-agriculture/3](http://www.teara.govt.nz/en/fire-and-agriculture/3)
- Thomson, A.P. 1936: The recovery of an indigenous forest after wind-throw. *Te Kara Ngahere* 9: 32-33.
- Walls, G. 2000: Love them or lose them ... Palm forests of Pitt Island and their wildlife: An ecological assessment of management needs, with comment from Pitt Islanders. Department of Conservation, Wellington.
- Ward, L.E. 1928: Early Wellington. Whitcombe and Tombs Limited, Auckland, New Zealand; [www.nzetc.org/tm/scholarly/tei-WarEarl-t1-body-d13-d17.html](http://www.nzetc.org/tm/scholarly/tei-WarEarl-t1-body-d13-d17.html)
- Wellington Botanical Society. 2003: Trip Report: Wilf Mexted Scenic Reserve. *Wellington Botanical Society Newsletter October 2003*; [wellingtonbotsoc.wellington.net.nz/tripreports/2003/wilfmexted.html](http://wellingtonbotsoc.wellington.net.nz/tripreports/2003/wilfmexted.html)
- Wellington City Council. 1996: Otari Botanic Native Garden Management Plan 1996.
- Wellington City Council. 2007: Otari Native Garden and Wilton's Bush Reserve Management Plan – August 2007; [www.wellington.govt.nz/plans/policies/otari/index.html](http://www.wellington.govt.nz/plans/policies/otari/index.html)