another and much more extensive article. In the near future it is envisaged that a beachcare group will be established in Clarks Beach and Waiau Pa Wharf to help with the urgently needed ecological restoration.

Addendum 11/11/1999: Three plants of the less abundant *Tetragonia tetragonioides* have since been located on the north-facing beach at Clarks Beach. To my knowledge these are the only three plants in this area of Clarks Beach and Waiau Pa. One fruiting plant, 35 cm in diameter, with its characteristic angled, horned fruit was found on the coastal sands, washed at high tide and adjacent to the Wiksons Walkway. The two smaller plants were approximately 80 m away. The more abundant *Tetragonia trigyna* differs from *Tetragonia tetragonioides* in having succulent, globose fruits with no horns. This area has recently undergone disturbance caused by the construction of a sea defence wall. Could the seed have been lying dormant from a previous population and brought to the surface by this construction work, or is it a garden escape?

Indigenous Vascular Plant List of Clarks Beach and Waiau Pa.

Adiantum cunninghamii
Apium prostratum
Apodasmia similis
Asplenium flaccidum
Asplenium oblongifolium
Asplenium polyodon
Astelia banksii
Avicennia marina
Baumea articulata
Carex testacea
Coprosma repens
Coprosma robusta
Cordyline australis
Corynocarpus laevigatus
Cotula coronopifolia
Cyathea dealbata
Cyathea medullaris
Cyperus ustulatus
Dianella nigra
Dichondra repens
Dicksonia squarrosa
Doodia media
Gahnia ?setifolia
Geniostoma ligustrifolium
Griselinia lucida
Haloragis erecta
Hebe stricta
Isolepis cernua
Juncus maritimus var. *australiensis*
Leptospermum scoparium
Leucopogon fasciculatus
Lepidosperma laterale
Lobelia anceps
Macropiper excelsum
Melicytus ramiflorus
Metrosideros excelsa
Microsorum pustulatum
Muehlenbeckia complexa
Myrsine australis
Olearia furfuracea
Oplismenus imbecillis
Phormium tenax
Pittosporum crassifolium
Plagianthus divaricatus
Pteridium esculentum
Pyrrosia eleagnifolia
Samolus repens
Sarcocornia quinqueflora
Selliera radicans
Stipa stipoides
Suaeda novae-zelandiae
Tetragonia trigyna
Triglochin striatum
Typha orientalis
Vitex lucens

Queensland kauri (*Agathis robusta*) in Auckland

E.K. Cameron

Introduction

Australian native members of the primitive conifer family, Araucariaceae, are in three genera: *Agathis* spp. (*A. atropurpurea, A. microstachya, A. robusta*), two *Araucaria* spp. (*A. bidwillii, A. cunninghamii*) and *Wollemia nobilis*. New Zealand's only member (excluding the fossil record) is kauri (*Agathis australis*). Queensland kauri (*Agathis robusta*) is confined to two separate areas of Queensland rainforest: Cook and Kennedy districts of northern Queensland, and at Wide Bay, south-eastern Queensland (Hill 1998). All the older specimens cultivated in New Zealand come from the more southern population and can be recognised by their smaller catkins; and trees by Auckland's southern motorway and the one at View Road have longer catkins and are probably from northern Queensland (G.C. Platt pers. comm., and from his talk to Auckland Bot. Soc. in May 1999). [From Platt: fresh catkins <5 cm long are from south Queensland, 8-9 cm are from northern Queensland.] With their smooth grey trunks, towering heights, Queensland kauri are among the most magnificent trees in Auckland. They are especially prominent in Epsom and in the Auckland Domain.

Tree at Diocesan School threatened with removal

Auckland City Council received an application for a resource consent under the Resource Management Act from Diocesan School for Girls to remove a scheduled 41 m tall Queensland kauri from their grounds in Epsom. The school wants the tree removed because it over-hangs a school path and some branches have fallen in the past. In August 1999 the Auckland Bot. Soc. was invited to make a submission (along with others interested parties), which we have done, opposing the proposal. At the time of writing the hearing has yet to be scheduled. To gauge the importance of this tree I checked out and measured the circumference and estimated the height of all the other old Queensland kauri around Auckland. A total of 16 trees (see Appendix 1).

Some points from our submission

- It is the second largest, single-trunked specimen of this species in Auckland, and one of the largest in New Zealand. The largest Auckland tree is only 4 cm more in diameter. Burstall & Sale (1984: 44) felt that the Diocesan tree was one of the best Queensland kauri specimens in New Zealand: "One in the grounds of Dilworth School has been chosen as the best tree [Queensland kauri]. There is another rivalling it at the nearby Auckland Diocesan School but it is hemmed in by buildings which do not allow its form to show to the same extent." They listed the Queensland kauri at Dilworth School as tree no. 14 in their `The 100 Great Trees' list for the whole of New Zealand, which includes native species.

- It is currently protected because it is listed in the "Schedule of Notable Trees", appendix 2 of the Proposed District Plan and is identified for its "visual amenity value". It also has historical value as it is understood to have been planted "in the 1880s by James Dilworth who farmed this area" (Perwick 1999). Not to mention the scientific value as one of the finest specimens of this species growing in New Zealand.

- All reports mention that it is a healthy tree. The canopy is thick and green. This species should be vigorous and healthy for at least 300 years in the Auckland area, although its life expectancy would be much longer than this. Members of the kauri family (Araucariaceae) are some of the most hurricane resistant trees in the world. All of the 16 old (see Appendix 1) Auckland Queensland kauri are healthy and very few showed any sign of broken limbs. Some were in much more exposed sites than the Diocesan tree, two are by apartment blocks (Owens Rd, Gillies Ave) and one is in a very high use public area (Domain duck pond).

- The tree does have numerous big branches, and because some have fallen off in the past, we can understand the anxiety felt about the possible danger to people should this happen again. But we feel the danger has been over-stated. The likelihood of a branch falling unexpectedly is very low because it is unusual for this species to loose branches in the first place and secondly the most likely time for a branch to snap off is during a storm when no one is likely to be around. Rather than cut down the tree, other options are available to lesson the risk. [In Queensland, because they are so hurricane-proof, Queensland kauri is one of the main trees planted in school grounds (G. C. Platt pers. comm.).]

Queensland kauri in Auckland

Judging from the healthy Queensland kauri around, this species is obviously well suited to Auckland and others areas of the North Island. They grow much faster than their close New Zealand relative, the kauri.

The examples listed in Appendix 1 were almost certainly all planted in the 19th century, except for the one in Fraser Park, Parnell. Burstall and Sale (1984: 45) point out after these early plantings, the tree had little favour in the 20 th century, except for a recent row planted along Auckland's southern motorway. These were probably planted in the 1970s. Today eleven trees remain in two groups on the western side of the motorway. Two trees are c. 2 km south of the East Tamaki Road bridge at Papatoetoe, and nine trees are just south of this bridge. From north to south, the nine trees have the following DBHs (diameter at breast height): 97.9 cm, 65.5, 69.4, 59.5, 59.9 (+ small side branch at 2 m), 56.6, 85.3 (3 trunks: split at 0.95 m (cut off this year) and at 2.3 m), 73.8, tree recently removed (this year), 50.4 cm (all measured 5 Nov. 1999). The tree was possibly removed because it leant too close to the motorway which was widened in about 1995. The trees varied from c. 10-16 m tall, the most southern tree had a rather sparse canopy, all others were very healthy. Many had branches almost to the ground, some have had the side branches pruned off. The row was over 100 m long and had several gaps as if some trees had been removed in previous years. Of the group of two trees to the south, one has recently been hit by a vehicle and lost a large amount of bark; this will probably kill the tree. Both trees are a similar size (not measured) to the row further north.

The best Queensland kauri probably planted this century that I have seen is in the grounds of the Salvation Army Resthaven Eventide Home, 28 View Road, Mt Eden. It has a clean trunk for over 6 m, 98.9 cm DBH, and is c. 25 m tall (Nov. 1999). Unfortunately it is only 2 m away from a unit on the east side, but otherwise a lawn sets it off. Why do people build so close to such large trees?

There are other recent plantings around Auckland including two at the Auckland Botanical Gardens at Manurewa: planted 1985 at 25 cm tall, now 7 m; another planted 1996 at 2 m, now 4 m (S. P. Benham pers. comm., October 1999).

Large Queensland kauri in other parts of New Zealand

Burstall and Sale (1984: 101) record the largest and tallest Queensland kauri in New Zealand at Yatton Park, Tauranga, with a diameter of 141 cm and 32.6 m tall. On 28 August 1999 I re-measured this tree: 182.3 cm DBH and approximately 28 m tall (height probably under-estimated). Therefore it is still the largest but possibly not the tallest (cf. my estimated heights for Dilworth and Diocesan trees in Appendix 1). The tree divided into two trunks 8 m above the ground and it was rather crowded by a large camphor tree (*Cinnamomum camphora*) only 1 m away. Presumably this is why Burstall and Sale chose the smaller, but better formed, Dilworth tree for the best one in New Zealand.

Burstall and Sale (1984: 261) also record another large Queensland kauri at Wanganui, Riverbank Road, planted c. 1870, diameter 136 cm, height 31.4 m. It now (Nov. 1999) measures 167.3 cm DBH, c. 30 m tall and is a healthy, single-trunked tree, reputed to be the most southern for this species in New Zealand (C. C. and R. Ogle pers. comm., Nov. 1999).

There are two old Queensland kauri at the Haycock property, Arundel Lodge, Karren Road, west of Warkworth; one is much larger than the other (G.C. Platt pers. comm.). Also present here are seven fine Norfolk Island pines (*Araucaria heterophylla*) and two bunya bunya (*A. bidwillii*).

Acknowledgements

I thank Graeme Platt for many comments incorporated in this article; Mike Wilcox and Carol McSweeney for assisting with the Bot. Soc. submission on the Diocesan tree; John Adam, Mike Ayrton, Steve Benham, Colin and Robyn Ogle for some specific information; and private land owners for allowing access to measure and admire their trees.

References

Burstall, S.W. & Sale, E.V.1984: Great Trees of New Zealand. A.H. & A.W. Reed, Wellington.
Hill, K.D. 1998: Araucariaceae. *Flora of Australia 48*: 563-569.
Perwick, M. 1999: Resource consent application. Letter from Becca Carter Hollings & Ferner Ltd to Auckland City (dated 17 June 1999).

Appendix 1. Sizes of the older Queensland kauri (*Agathis robusta*) in Auckland City*

Diameter (DBH) (cm)	Height approx.(m)+	Planting date	Locality
157.6; 130.0**	32	1880s	Dilworth School, Epsom, by chapel
153.5; 138.0**	30	1880s	Diocesan School, Epsom
141.6	24	1867-1868*+	Auckland Domain, near Domain nursery
131.2	20	19th C	Pah Farm, Hillsborough, near Callitris
128.3	22	c.1880	Cornwall Park
125.7	26	1880-1883**	276 Remuera Rd, Remuera
119.1	20	19th C	Pah Farm, Hillsborough, near Chilean wine palm
118.3	22	1863-1868*+	Auckland Domain, by duck pond
117.6	20	19th C	34 Owens Road, Epsom
107.2	18	19th C	125 Gillies Ave, Epsom
105.3	17	1901**	Fraser Park, lower Parnell
95.5	20	1873-1879*+	Western Park, Ponsonby
56.6	18	1873-1879*+	Western Park (suppressed by adjacent trees)
187.7 (2 trunks at 4m)	30	1870s	Government House grounds, Epsom++
146.1 (2 trunks at 3m)	27	19th C	The Pines, 75 Owens Rd, Epsom (by apartments)
106.1 (2 trunks at 2m)+*	28	19th C	The Pines, 75 Owens Rd, Epsom (road level)

* unless otherwise stated all measurements were made August 1999
** from Burstall & Sale (1984)
+ these heights are probably under-estimated (cf. other recorded heights for these trees)
++ Burstall and Sale (1984) wrongly recorded this tree as *Agathis microstachya*
*+ from J. Adam (pers. comm., September 1999)
+* diameter measured at 1.95m up to avoid the swollen base