

# Pelican Point Revegetation, Atherton Tableland:

An example of a community Participatory Project –  
Establishment and Measuring Post – development Success



1993

2002



TREES FOR THE EVELYN AND ATHERTON TABLELAND Inc

# Pelican Point Revegetation, Atherton Tableland:

An example of a community Participatory Project –  
Establishment and Measuring Post – development Success

by

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## **ACKNOWLEDGEMENTS**

Financial and material support, co-operation and collaboration of the organizations and individuals listed below are gratefully acknowledged.

The One Billion Trees Programme, a Federal Government initiative administered by the Australian Nature Conservation Agency through the National Landcare Program.

Queensland Department of Parks and Wildlife Service.

Queensland Department of Natural Resources and Mines.

Queensland Department of Primary Industries.

Wet Tropics Tree Planting Scheme.

Atherton Shire Council.

Alan Bragg: — Initial Planning.

Alan Gillanders: — Initial planning.

Anthony Mair: — Photography.

Astrid Takken: — Supervision of the “Adopt-a-Plot” Scheme.

Barbara and Colin Walsh: — Organization of trapping for the small mammal surveys.

Brett Peroz: — Initial planning.

Chris Adriaansen: — Initial planning.

Chris Clague, Zoologist: — Bat survey.

Daryl Killen: — Initial planning.

Elinor Scambler, Ornithologist: — Supervision and coordination of the bird surveys.

Howard Bloomfield: — Initial planning.

Ian Last: — Initial planning

Joan Wright, Botanist: — Planning; tree phenology survey; botanical monitoring.

John Hall: — Planning, management, administration and organization.

Kay Dorricott, Zoologist: — Mammal survey

Les Moore, Zoologist: — Mammal survey.

Mark Heaton: — Species selection; planting and maintenance.

Nigel Tucker, Rainforest Ecologist: — Species selection; raising seedlings; planning; planting and maintenance of plots.

Olivia Whybird, Zoologist: — Bat survey

Peter Lazarini: — Initial Planning.

Tania Simmons, Rainforest Ecologist: — Tree phenology survey; botanical monitoring.

Tony Irvine, Rainforest Ecologist: — Species selection; tree phenology survey; botanical monitoring.

Simon Burchill: — Botanical monitoring, and preparation of Figure 2.

Werner Grimm, Eagle Eye Photographics, Malanda: — Aerial photography.

Members of TREAT: — For their volunteer labour in raising seedlings, tree planting, and weeding, and assistance with the bird and small mammal surveys.

Members of Birds Australia, NQ Naturalists, Birds Observers Club of Australia, School for Field Studies, Rainforest Co-operative Research Centre, and QPWS: — For assistance with the bird surveys.

Members of the general public: — For their commitment to the maintenance of the tree plots through the “Friends of Pelican Point” and “Adopt-a-Plot” schemes.

**Pelican Point today is a monument to the work of these organizations and the community of volunteers who planned, implemented, and completed the project.**

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## ABBREVIATIONS USED IN THE TEXT

Al	Aluminium
°C	Degrees centigrade
Ca	Calcium
CEC	Cation Exchange Capacity
cm	centimetres
CSIRO	Commonwealth Scientific and Industrial Research Organization
Cu	Copper
DPISC	Department of Primary Industry — Soil Conservation
EC	Electrical conductivity
ECEC	Effective Cation Exchange Capacity
Fe	Iron
g	grams
H	Hydrogen
hr	hour
ha	hectare
K	Potassium
kg	kilograms (1,000 grams)
km	kilometres (1,000 metres)
Mg	Magnesium
mg	milligrams
mm	millimetre
Mn	Manganese
N	Nitrogen
Na	Sodium
NHT	Natural Heritage Trust
Org. C	Organic carbon
%	percentage
P	Phosphorus
QDNRM	Queensland Department of Natural Resources and Mines
QDPI	Queensland Department of Primary Industries
QPWS	Queensland Parks and Wildlife Service
QWRC	Queensland Water Resources Commission
RAOU	Royal Australasian Ornithologists Union
S	Sulfur
TREAT	Trees for the Evelyn and Atherton Tablelands Inc.
WTTPS	Wet Tropics Tree Planting Scheme
Zn	Zinc

# **PELICAN POINT REVEGETATION, ATHERTON TABLELAND: An Example of a Community Participatory Project Establishment and Measuring Post-development Success**

## **SUMMARY**

The Pelican Point Revegetation Project is a successful example of a community participatory project involving co-operation between a number of Local, State and Federal Government Agencies and TREAT, a community-based volunteer group dedicated to planting native trees on the Evelyn and Atherton Tablelands in North Queensland.

The aim of the project was to establish different types of tree communities on about two-thirds of a 20.23 hectare piece of low lying land on the western edge of Lake Tinaroo in order to demonstrate the multiple benefits in revegetating sensitive areas for nature conservation, nature based community recreation, and environmental education.

Pelican Point is a narrow peninsular of land jutting into Lake Tinaroo. In the early 1900's, the original vine forest was cleared for agricultural use. When the Tinaroo Falls Dam was constructed in 1958, forming Lake Tinaroo, the area was declared a Flood Margin Reserve under the control of the QWRC. The revegetation programme was initiated by QWRC in 1990, and 2,500 native trees were planted by TREAT volunteers in 1991 along the lake shore fringe. In 1992, consultants were employed by QDNRM Forestry Service to prepare plans for a further revegetation phase to plant selected areas, developing a theme of forests, woodland and grassland. TREAT was invited to manage the project in 1993.

To establish and maintain diversity, an additional 13,000 native trees were planted from 1994 to 1996 to establish four types of forest:

- 1) Rainforest, the main species being Queensland Maple, Spermwood, Floppy-leafed Ash, Northern Tamarind, Flame Tree and Northern Laurel, was planted at between 1,850 and 2,600 trees/ha to produce a closed canopy.
- 2) Tall Wet Sclerophyll Forest, the main species being Rose Gum, Red Mahogany, Mountain Stringybark, Cadagi, Hoop Pine, and River Sheoak, was planted at densities between 425 and 650 trees/ha, except for one site planted at 2,350 trees/ha.
- 3) Open Woodland, the main species being Red Mahogany, Mountain Stringybark, Black Ironbox, Northern Black Wattle, Broad Leaf Salwood and Red Wattle, was planted at 700 trees/ha.
- 4) Swamp Forests comprising mainly Large White Paperbark, Black Paperbark, River Sheoak, Kanuka Box and bottlebrushes, was planted at densities of 1,100 and 1,500 trees/ha.

Further diversity was obtained by leaving about 10 hectares as grassland dominated by the introduced pasture grass *Brachiara decumbens*, and one area of native Blady Grass. The shoreline that recedes and advances was left natural and consists mainly of grasses, sedges, perennial herbs and forbs. The immediate water area is dominated by White Fringe Lilly on the western side.

Pelican Point now attracts many different species of birds, mammals and other fauna. During the revegetation phase, TREAT volunteers and members of other organizations recorded numbers and changes in bird species and small mammals, and monitored changes in vegetation and phenology of the trees [flowering and fruiting] to see if such changes correlate with faunal changes.

The revegetation of Pelican Point was completed with the last planting in 1996. The revegetation of Pelican Point was managed by TREAT and supported by funds from the One Billion Trees Programme. Further financial, in-kind, and technical support was provided by NHT, QPWS, QDNRM, WTTSPS, CSIRO and the Atherton Shire Council. Management of the area was taken over by the QDNRM in July 1997.

To build on the success of the revegetation program, TREAT obtained funds from NHT for a 4-year [1998 to 2001] project to measure the success of revegetation, and to examine how the different planting methods affected the establishment and growth of the various tree species. During this phase, the bird and small mammal surveys were continued to monitor how the changing phenology of the different tree species affected the use of the site by birds, mammals and other fauna. TREAT members through the 'Friends of Pelican Point' and the 'Adopt-a-Plot' schemes continued to provide some voluntary maintenance.

Members of the public are encouraged to use Pelican Point, to walk the 4 kilometres of trails, observe and record the wildlife, and enjoy the mix of trees and the views across the lake. Camping and fires are not permitted; nor is vehicular traffic encouraged.

## **BACKGROUND**

This is the story of the revegetation of a low lying peninsular of land that projects from the west bank into Lake Tinaroo. The revegetation is an example of successful co-operation between TREAT, a community-based organization of volunteers who are interested in planting native trees, and a number of Local, State and Federal Government Agencies. The outcome of this co-operation is a public area managed for nature conservation and environmental education.

### ***Location***

Pelican Point is located at 17 10, S 145 35' E on the western shore of Lake Tinaroo on the Atherton Tableland, approximately 50 kilometres south-west of Cairns, North Queensland [Figure 1]. It is a narrow, low lying peninsular of land projecting north into Lake Tinaroo [Figure 1; Plate 1; Plate 2] that can be reached from the Kairi—Tinaroo Road by travelling down Malcolm Road and Foster Road.

### ***History***

On maps of the Yungaburra district, Pelican Point is listed as a name of a point of land near Tinaburra. However, following the completion of Tinaroo Falls Dam in 1958, 'Pelican Point' became the local name for a point of land known previously as 'Foster's Farm' after the family who lived in the house on the southeast boundary of what is now called Pelican Point, and held the informal grazing lease on the area. 'Foster's Farm' was well known in bird watching circles through early baseline references to birds of the Atherton Tableland by Bravery (1964, 1970), the area being referenced as 'Fosters'. However, in an undated note, thought to date after 1975, Bravery refers to 'Fosters' as Pelican Point [Elinor Scambler; personal communication].

The origin of the name 'Pelican Point' refers to the pelicans that were one of the first birds to colonise the new Lake Tinaroo — the earliest noted record is 1962 (Bravery 1964). Because pelicans were commonly seen around the area, members of the local sailing club adopted the name Pelican Point for the landmark known locally as 'Foster's Farm'.

When Tinaroo Falls Dam was constructed in 1958, the 20.23 hectare site became a peninsula projecting north into Lake Tinaroo from the western shore as part of the flood margin reserve. It is presently described as Lot 11 on plan SP 105227 under the administration of Sunwater.

In March 1990, the QWRC was concerned about the condition of the lake shore and considered revegetation of parts of the shore above the upper water level to counter erosion of the shoreline and to produce a demonstration area. The local QWRC officer, Howard Bloomfield, called a meeting of State and Federal agencies, and community-based volunteer groups interested in revegetation of the area. This group, later called the Lake Tinaroo Flood Margin Revegetation Project Committee, comprised Howard Bloomfield, Chris Adriaansen, Joan Wright, Peter Lazarini, and Nigel Tucker. Mark Heaton assisted with advice.

Detailed plans were made to plant a wind-break of trees native to the area along the eastern shore of Pelican Point with the aid of a grant from Greening Australia. The estimated cost of this initial plan was \$8,740.00. A grant of \$3,010.00 was obtained, the balance being provided in volunteer work and the loan of equipment by Local and State Government agencies and individuals.

The land had been the subject of an informal lease between the neighbouring land-holder and the QWRC, and this was terminated. A new boundary fence was constructed with grant money on a surveyed line.

In 1992, QWRC asked TREAT for suggestions on the future use of Pelican Point. A submission was made outlining a plan to plant more trees to create a nature-based recreation reserve. The trees would be planted in large groups, such as rainforest, wet sclerophyll forest, open eucalypt woodland, and swamp forest. About 10 hectares of grassland would be left unplanted for habitat for Sarus Cranes, wallabies and other mammals and birds preferring open ground. Tracks would be maintained round Pelican Point to allow public access, but there would be no picnic areas or buildings. A bird-hide was suggested.

The QWRC approved the suggestion and subsequently TREAT developed the concept with the QDNRM District Forester, Ian Last. The outcome was the Pelican Point Revegetation Project, a comprehensive 3-year plan to develop Pelican Point as a nature-based recreational reserve for eventual management by QDNRM Forest Services in conjunction with other recreational areas nearby. The plan was compatible with local soil and water conservation policies, and was designed to create diverse, self-sustainable native vegetation, and to demonstrate the concept of integrated nature conservation.

Development costs were estimated at \$36,650. By communal voluntary work, TREAT proposed to provide \$11,700, State and Local Government agencies agreed to contribute \$11,400, and the remaining \$15,350 was sought from the National Landcare Program.

A subsequent 4-year program commenced in 1998 to measure the post-development success of revegetation in terms of inter-related longer term ecological changes in the biodiversity of the site. This project was costed at \$38,150, of which \$14,950 was provided by NHT, the remaining \$23,200 being the value of in-kind input by TREAT volunteers who collected and collated the field data.

### **Climate**

Table 1 shows the long term [1913 to 2000] climate averages from the Bureau of Meteorology for the nearby QDPI Kairi Research Station [Bureau of Meteorology Station Number 031034; Latitude: 17 22' 5; Longitude: 145 57' E; Elevation: 714.5 m].

Pelican Point enjoys a dry to moist, mild, tropical climate. Mean daily maximum temperatures at Kairi Research Station are above 21.0 °C in every month, the hottest months being November, December and January when the mean monthly maximum temperatures are between 28.2 °C and 28.8 °C. The coldest months are from May to August inclusive when the mean daily maximum temperatures are between 21.0 °C and 22.9 °C. The highest daily maximum temperature is never above 40 °C, the highest recorded temperatures being 38.8 °C, 38.7 °C and 38.9 °C in November, December and January respectively. However, maximum temperatures above 30 °C are common in the summer months. On an annual basis, about 34 days can be expected to have maximum temperatures above 30 °C, the mean number being 3.1 in October; 7.6 in November; 9.9 in December; 7.2 in January; 3.8 in February; and 1.5 in March.

Mean daily minimum temperatures are always above 10 °C, ranging from a low of 11.3 °C in July to a high of 19.5 °C in February. June, July and August are the coldest months when the mean daily minimum temperatures are between 11.3 °C and 11.9 °C; these months also

recorded the lowest minimum temperatures of  $-0.5^{\circ}\text{C}$ . As would be expected, the highest mean daily minimum temperatures are recorded from November to March inclusive when the recordings range between  $18.4^{\circ}\text{C}$  and  $19.5^{\circ}\text{C}$ .

Mean daily air temperatures at 9.00 AM, mean daily wet-bulb temperatures at 9.00 AM, and mean dew point temperatures at 9.00 AM follow similar trends to the maximum and minimum temperatures, being highest during the summer months of October to March and lowest during the winter months of May to August.

The mean daily Relative Humidity at 9.00 AM ranges from 80% to 86% from January to August, being highest from May to July. The lowest mean daily Relative Humidity of 68% is recorded in October and November.

This area is generally quite windy; mean wind speeds at 9.00 AM are generally between 10 km/hr and 14 km/hr throughout the year. The windy nature of Pelican Point was a matter of major concern in planning the revegetation of the site.

The mean annual total rainfall at Kairi Research Station from 1913 to 2000 is 1278.3 mm. The wettest months are December, January, February, March, and April when the mean monthly rainfalls are 135.0 mm, 248.2 mm, 264.0 mm, 256.2 mm, and 102.2 mm respectively. Hence, there is a marked summer incidence to the rainfall pattern with about 79% falling during the December to April period. The driest month is September with a mean rainfall of only 19.2 mm, although less than 30 mm can be expected to fall in each month from June to October.

A feature of the rainfall patterns of this area is its great variability. For example, it can experience very heavy rainfall during cyclonic conditions. Thus, 1246.6 mm have been recorded during January, 850.6 mm during February, and 1049.8 mm during March, while the highest recorded daily rainfall for January is 268.4 mm, for February is 309.6 mm, and for March is 447.8 mm. By contrast, very low monthly rainfalls have been recorded. Thus, in some years, no rain has fallen for the months from May through to November, while the lowest mean monthly rainfall recorded for the months from December through to March are 12.1 mm, 30.0 mm, 19.2 mm, 18.9 mm, and 3.0 mm respectively.

The number of cloudy days can be estimated from the number of raindays; on average about 145 days of each year have recorded rainfall. As would be expected, the number of raindays are higher from December to May when from 12 to 18 raindays occur each month. As a result, the mean number of hours of sunshine are less than 7 hours per day from December through to July, even though the hours of daylight are above 10 hours per day for this period. The greatest number of hours of sunshine occur during September, October and November, averaging between 8.1 and 8.8 hours per day. The combination of temperature, raindays, cloudy days, and hours of sunshine result in the lowest evaporation occurring during the winter months of May to July, and the highest evaporation taking place from September to March.

### **Soils**

The soils of Pelican Point have been classified as belonging to the Tolga Series by Laffan (1988). They are derived from very strongly weathered basaltic lavas. The profile is characterised by well drained, dusky red light clay to clay barns overlying dusky red medium to heavy clay sub-soils. Selected properties of a typical Tolga series soils are given in Table 2.

The soils are slightly acidic in the surface [6.2 at 0-10 cm] becoming more acidic with depth [5.7 at 210-240 cm]. Electrical conductivities are low throughout the soil profile, being 0.035 mS/cm at 0-10 cm declining to 0.011 mS/cm at 210-240 cm. Organic C is high in the surface soil [4.9%] and declines with depth [1.18% at 60-90 cm].

Some elements decline in amounts with depth while others remain relatively constant throughout the profile. Thus, decreases with depth occur with total P [from 2,000 mg/kg at 0-10 cm to 1,100 at 210-240 cm], total S [from 550 mg/kg to 50 mg/kg], and total Mn [from 6,050 mg/kg to 3,880 mg/kg]. By contrast, relatively constant concentrations throughout the profile occur with total K [from 0.25% at 0-10 cm to 0.23% at 210-240 cm], total Fe [from 12.7 % to 13.6%], total Cu [from 57 mg/kg to 66 mg/kg], and total Zn [from 146 mg/kg to 161 mg/kg].

Exchangeable cations [ $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{K}^+$ , and  $\text{Na}^+$ , and exchangeable acidity, ( $\text{H}^+$  and  $\text{Al}^{3+}$ )] all decrease with increasing depth down the profile:  $\text{Ca}^{2+}$  decreases from 10.50 to 1.91 cmol (+)/100 g soil;  $\text{Mg}^{2+}$  from 3.55 to 1.46 cmol (+)/100 g soil;  $\text{Na}^+$  from 0.09 to 0.04 cmol (+)/100 g soil;  $\text{K}^+$  from 0.97 to 0.19 cmol (+)/100 g soil. Exchangeable acidity is present only in the surface horizon, being 0.07 cmol (+)/100 g soil in the 0-10 cm horizon, and decreasing to less than 0.05 cmol (+)/100 g soil in deeper horizons. The resultants of these changes in exchangeable cations are marked decreases in both ECEC and CEC with depth.

Particle size distribution of the soil profile shows no gravel in any horizon to 240 cm, and a decrease in coarse sand [from 13% to 2%] and silt [from 29% to 14%] with depth. By contrast, fine sand initially decreases from 13% in the 0-10 cm horizon to only 8% in the 60-90 cm horizon, followed by an increase to 13% in the 120-150 cm horizon and another decrease to 10% in the 210- 240 cm horizon. Clay increases markedly with depth, from 45% in the 0-10 cm horizon to 72% in the 60-90 cm horizon, and then remains relatively constant at 69% to 74% to at least 240 cm.

### **Flora and fauna**

Prior to inundation by the construction of Tinaroo Falls Dam in 1958, the area of land forming Pelican Point extended to the banks of the Barron River. While the original vegetation is not recorded, a comparison with today's landscape indicates that the original vegetation prior to its clearing in the early 1900's was Complex Notophyll Vine Forest Type 5b (Tracey, 1982), now referred to as Mabi Forest. The occurrence of a remnant Mabi Forest at nearby Kairi Research Station, and a few remaining fig trees at Pelican Point support the view that the volcanic soils of Pelican Point were covered by Mabi Forest.

The only other community possible based on the soils and rainfall regime is Eucalypt Open Forest consisting of the same species that currently occur on the metamorphic soils of the Galmarra association located immediately to the west of Pelican Point. The metamorphic soils are favourable for *Acacia celsa* and *Acacia cincinnata*, and the absence of these species from the intergully areas of the Galmarra association indicates that the area is too dry for these acacia species to regenerate naturally at Pelican Point. Hence, a Type 13 Vine Forest (Tracey, 1982) with these acacia species present is most unlikely at Pelican Point.

**Table 1:** Monthly climate averages [1913 to 2000] of QDPI Kairi Research Station, Atherton Tableland. [Source: Bureau of Meteorology, Melbourne.]

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean daily maximum temperature [°C]	28.2	27.4	26.3	24.8	22.9	21.4	21.0	22.5	24.6	26.9	28.3	28.8
Mean number of days when the maximum temperature equal to or above 40.0 °C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mean number of days when the maximum temperature equal to or above 35.0 °C	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3
Mean number of days when the maximum temperature equal to or above 30.0 °C	7.2	3.8	1.5	0.2	0.0	0.0	0.0	0.2	0.9	3.1	7.6	9.9
Highest daily maximum temperature [°C]	38.9	34.5	33.3	31.0	28.8	28.1	30.0	32.7	34.9	34.6	38.8	38.7
Mean daily minimum temperature [°C]	19.1	19.5	18.5	16.8	14.9	11.9	11.3	11.7	12.8	15.0	17.1	18.4
Mean number of days when the minimum temperature equal to or less than 2.0 °C	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.2	0.0	0.0	0.0	0.0
Mean number of days when the minimum temperature equal to or less than 0.0 °C	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Lowest daily minimum temperature [°C]	12.9	13.1	10.8	6.9	2.5	-0.5	-0.5	-0.5	2.5	5.5	8.6	10.3
Mean 9 AM air temperature [°C]	23.7	23.2	22.4	21.0	19.0	16.5	15.9	17.1	19.4	21.9	23.5	24.1
Mean 9 AM wet-bulb temperature [°C]	21.2	21.4	20.6	19.3	17.6	15.1	14.5	15.2	16.4	18.0	19.5	20.6
Mean 9 AM dew point temperature [°C]	19.7	20.3	19.5	18.1	16.6	14.0	13.3	13.8	14.1	15.3	16.9	18.7
Mean 9 AM relative humidity [%]	80	84	84	84	86	86	86	82	73	68	68	73
Mean 9 AM wind speed [km/hr]	10.2	10.4	11.6	12.9	12.1	10.4	11.3	11.5	13.0	13.5	12.3	12.0
Mean rainfall [mm]	248.2	264.0	256.2	102.2	59.9	38.5	26.8	24.8	19.2	29.9	73.6	135.0
Mean number of raindays	16.8	17.5	18.0	16.5	14.0	10.6	9.1	7.9	6.3	6.4	8.8	12.6
Highest monthly rainfall [mm]	1246.6	850.6	1049.8	373.5	163.7	113.0	75.7	142.5	87.6	176.1	276.8	479.8
Lowest monthly rainfall [mm]	30.0	19.2	18.9	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.1
Highest recorded daily rain [mm]	268.4	309.6	447.8	162.6	80.0	63.2	43.7	86.6	37.6	68.1	104.0	134.9
Mean daily sunshine [hr]	6.3	5.2	5.6	6.1	5.5	6.3	6.1	7.1	8.1	8.8	8.2	7.2
Mean daily evaporation [mm]	5.0	4.5	4.2	3.7	2.9	2.7	2.9	3.5	4.8	5.7	6.0	5.7

**Table 2:** Selected soil properties of a representative soil profile of the Tolga Series soils (Source: Laffan, 1988).

Classification:

(a) Great Soil Group: Eucchrozem-Krasnozem intergrade

(b) Principal Profile Form: Gn 3.11 to Gn 3.12

(c) Soil Taxonomy: Ustic Kandihumult

Chemical and physical properties:

Depth (cm)	0-10	23-30	60-90	120-150	210-240
pH (H <sub>2</sub> O)	6.2	6.4	6.4	5.9	5.7
pH (KCl)	4.9	5.4	5.9	5.2	5.3
E.C (mS/cm)	0.035	0.017	0.014	0.010	0.011
Org. C (%)	4.9	1.16	1.18		-
N (%)	0.19	-	-	-	-
Total P (mg/kg)	2000		1100	1200	1100
Total K (%)	0.25		0.2	0.2	0.23
Total S (mg/kg)	550	-	210	50	50
Total Fe (%)	12.7	15.1	14.2	14.2	13.6
Total Mn (mg/kg)	6050	4350	4180	2890	3880
Total Cu (mg/kg)	57	63	64	57	66
Total Zn (mg/kg)	146	90	146	155	161
<u>Exchangeable properties</u> (cmol [+]/100 g soil)					
Ca	10.5	2.99	2.18	2.04	1.91
Mg	3.55	1.33	1.78	1.37	1.46
K	0.97	0.48	0.39	0.38	0.19
Na	0.09	0.03	0.03	0.04	0.04
H + Al	0.07	<0.05	<0.05	<0.05	<0.05
ECEC <sup>1</sup>	15.2	4.9	4.4	3.9	3.7
CEC <sup>2</sup>	24	8	5	6	6
<u>Particle size</u> (%)					
Gravel	0	0	0	0	0
Coarse sand	13	4	2	3	2
Fine sand	13	10	8	13	10
Silt	29	24	17	15	14
Clay	45	62	72	69	74

Footnote 1: ECEC = Sum of basic and acidic cations

Footnote 2: CEC = Ammonium acetate CEC

The soil change from volcanic origin to metamorphic origin is reflected by the change in vegetation from Mabi Forest to Eucalypt Forest. The boundary interface of the two soil types is covered by the water of the western bay of Pelican Point. As the volcanic soil became shallower westwards towards the metamorphic Galmarra association, the Mabi Forest dominating most of Pelican Point probably gave way to the Eucalypt Open Forest. This is reflected by the native stand of *Imperata cylindrica* [Blady Grass] and a remnant *Lophostemon suaveolens* tree [swamp Mahogany] on the western edge of Pelican Point.

When planning of the project commenced in March 1992, Pelican Point had been used for grazing cattle for a number of years. The site was covered by a grassland of mixed *Brachiaria decumbens* [Signal Grass] and *Panicum maximum* [Guinea Grass], and the creeping tropical legume *Neonotonia wightii* [Glycine]. A few small exotic trees, and two remnant native figs, Superb Fig and Green Fig, occurred about the location of the old homestead and yards.

When TREAT took over the management of Pelican Point in 1993, it commissioned surveys of the birds and mammals that were inhabiting the site in order to measure the effects of revegetation on the bird and mammal life of the area into the future. The initial suite of 87 bird species [Appendix 2] was typical of local pasture, cleared areas and water impoundments.

While some mammals were recorded by people undertaking the bird surveys from 1994 onwards, the first small mammal survey did not commence until 1996 when the tree planting had been completed. These early recordings list six species as having been sighted or trapped on Pelican Point between 1994 and 1996: Northern Brown Bandicoot [*Isodon macrourus*], Grassland Melomys [*Melomys burtoni*], Canefield Rat [*Rattus sordidus*], House Mouse [*Mus musculus*], Wallaroo and Agile Wallaby. These are generalist species found in open country or disturbed areas, and it is reasonable to assume that all were probably present at Pelican Point when tree planting commenced in 1992 [Kay Dorricott, personal communication].

## REVEGETATION OF PELICAN POINT

### ***Aims and objectives***

There are many compelling reasons for planting trees, and the provision of places to live and food to eat for birds and animals is a good reason. Towards this end, the project aimed to establish different types of tree communities on about two-thirds of the 20.23 hectare site. The objective was to demonstrate the multiple benefits in revegetating sensitive areas and to subsequently manage the area for nature conservation, environmental education, and nature-based community recreation. The plan for planting trees conformed with various management and development plans, including the Lake Tinaroo-Danbulla Management Plan, Barron River Integrated Catchment Management Plan, and the Atherton Shire Development Plan.

### ***1991 plantings***

The flat, low lying nature of the site [Plate 2], and the generally windy conditions of the area [Table 1], were a matter of concern to QWRC who considered that these conditions would lead to erosion of the shoreline. They proposed to revegetate the shore above the high water level to counter soil erosion and to produce a demonstration area. The first tree planting took place on March 9, 1991, when a wind-break was planted in three blocks by TREAT members and community volunteers on the eastern side of the peninsular [Plot 1, Figure 2]. The holes for the 2,500 trees were dug by inmates of the Lotus Glen Correctional Centre using motorised augers loaned by QPWS and QDNRM. The tree species were selected with advice from tropical rainforest ecologists of CSIRO and QPWS. The young trees were grown specially at the Lake Eacham Regional Nursery of the QPWS by TREAT volunteers. No charge was made for the trees.

The wind-break, 1200 m long, was formed of 3 rows of trees with denser clumps, obtained by increasing the number of rows, at intervals. The rows were 2.5 m apart and the trees 2.0 m within the row. The species planted and their numbers are listed in Appendix 1. The trees were fertilised and mulched with hay, and a mobile pump provided water from the lake to ensure establishment and survival of the seedlings.

### **1994 plantings**

When TREAT took over the management of the project in 1993, the areas to be planted were marked out [Plate 3], and prepared for planting in 1994 by mowing and poisoning the grass, ripping, and digging the planting holes by motorised auger.

Two blocks of rainforest species were planted by TREAT and WTTPS on February 16—23, 1994 [Plot 2, Figure 2]. A third block of rainforest species was planted by TREAT on February 26 and March 2, 1994 [Plot 3; Figure 2]. These blocks were planted at densities between 1,850 and 2,600 trees/ha to a mixture of species [Appendix 1] found growing in nearby rainforest. The trees planted by TREAT were raised by TREAT volunteers working with the Lake Eacham Regional Nursery of the QPWS. Trees planted by WTTPS, organised by Mark Heaton, were grown in the Winfield Bridge Nursery.

Two blocks of Swamp Forest species [Plot 4, Figure 2; Appendix 1] and one block of tall Wet Sclerophyll Forest species [Plot 5, Figure 2; Appendix 1] were planted by TREAT on January 29 and February 12, 1994, at densities between 1,500 and 2,300 trees/ha.

QDNRM Forest Service planted seven blocks of tall Wet Sclerophyll species [Appendix 1] on February 4, 6 and 8, 1994 [Plots 6, 7 and 8, Figure 2]. These trees were planted on wider spacings, the density being approximately 425 to 650 trees/ha. This planting used more mechanical help, and trees were planted in rows as in a typical plantation. Help with labour for these forestry plantings was given by young people involved in the LEAP Scheme.

### **1995 plantings**

Two smaller blocks of Wet Sclerophyll/Swamp Forest were planted on the western side of Pelican Point [Plots 9 and 10, Figure 2] by QDNRM Forest Service on February 28, 1995. These species [Appendix 1] were chosen to withstand very wet conditions at times when the lake was full, and were planted at densities of 1,150 and 1,550 trees/ha respectively.

QDNRM Forest Service planted a large woodland block [Plot 11, Figure 2] at a density of 700 trees/ha and two smaller blocks of Wet Sclerophyll Forest [Plot 12, Figure 2, and a small area adjacent to the car-park] at densities of 1,100 and about 500 trees/ha respectively. These species [Appendix 1] were planted on February 28, 1995.

### **1996 plantings**

On February 17, TREAT planted a small block on the western edge of Plot 3 [Figure 2] to fill in a gap in the earlier plantings. The species used were not recorded.

### **Open grasslands and lake shore**

The grassed areas [unshaded on Figure 2] were left unplanted to provide habitat for birds, mammals and reptiles that prefer open grasslands [Plate 4].

The shore area of the lake was also left unplanted. According to the vagaries of the weather the lake sometimes covers the shore completely as in 1997, while at other times it is very low [Plate 3]. At low water the shore is covered with sedges, grasses and a mixture of forbs [Plate 5]. These do not become large and woody because they are killed by the periodic flooding. Roots and seeds remain in the soil and the plants grow again as the water level falls.

## **Management**

The area has been managed for nature conservation and environmental education with public access. The QDNRM Forest Service employed a consultant to prepare a concept plan, and also carried out accurate surveying and mapping. TREAT took over the management of the project in 1993, and coordinated the activities, including planting and management from 1993 to 1997, working with the QDNRM Forest Services, QWRC, QPWS Lake Eacham Regional Nursery, Atherton Shire Council, and WTTPS. The Project Manager during this phase was John Hall.

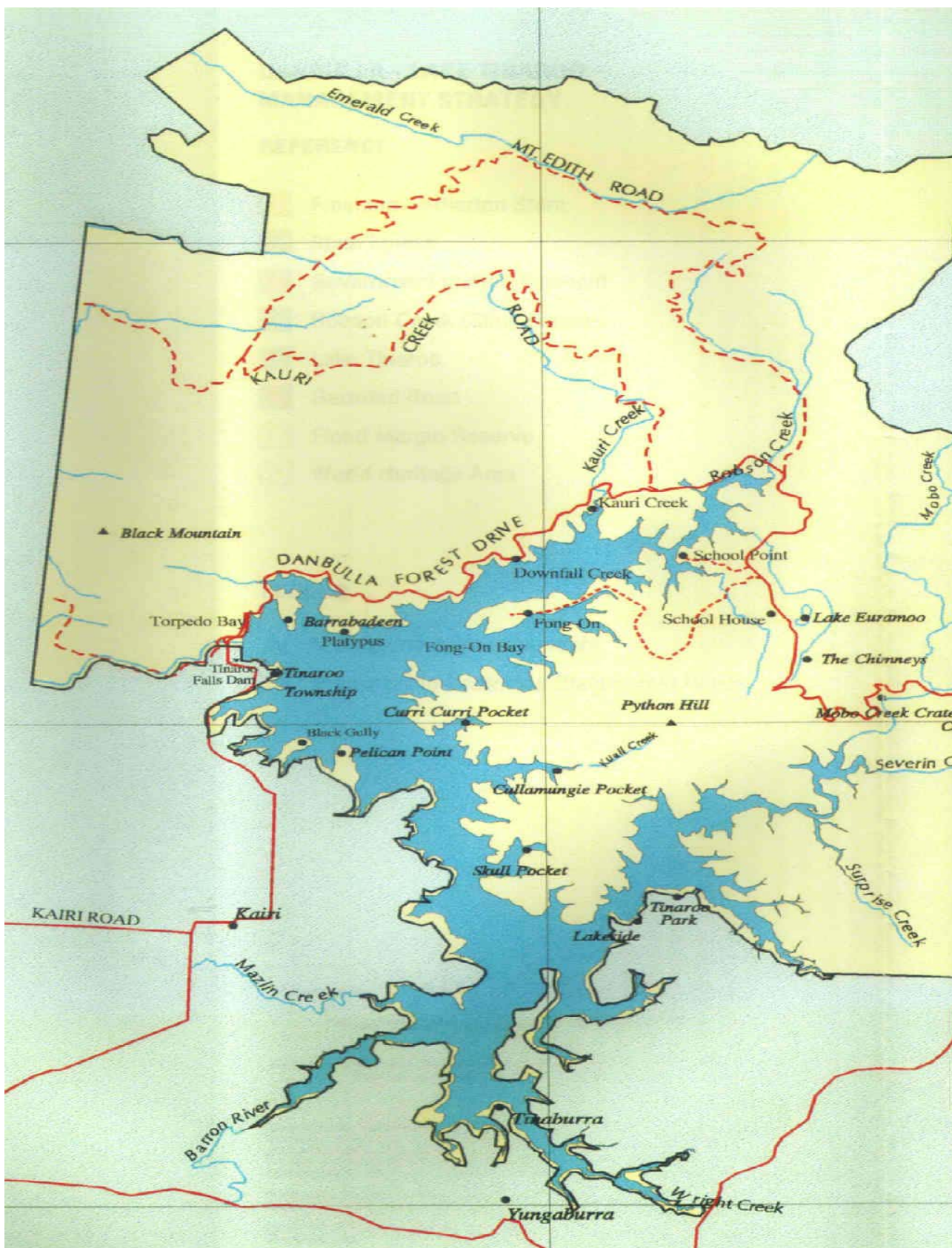
To ensure the growth of the trees considerable maintenance work was needed. The blocks of trees planted by the QDNRM Forestry Service were maintained by them, and TREAT and the Wet Tropics Tree Planting Scheme maintained their blocks.

For the wind-break blocks planted in 1991, the QWRC mowed round and between the rows of trees. Astrid and Hank Takken and John and Cynthia Hall did a great deal of detailed weeding and other maintenance after broilgas and cows damaged some trees.

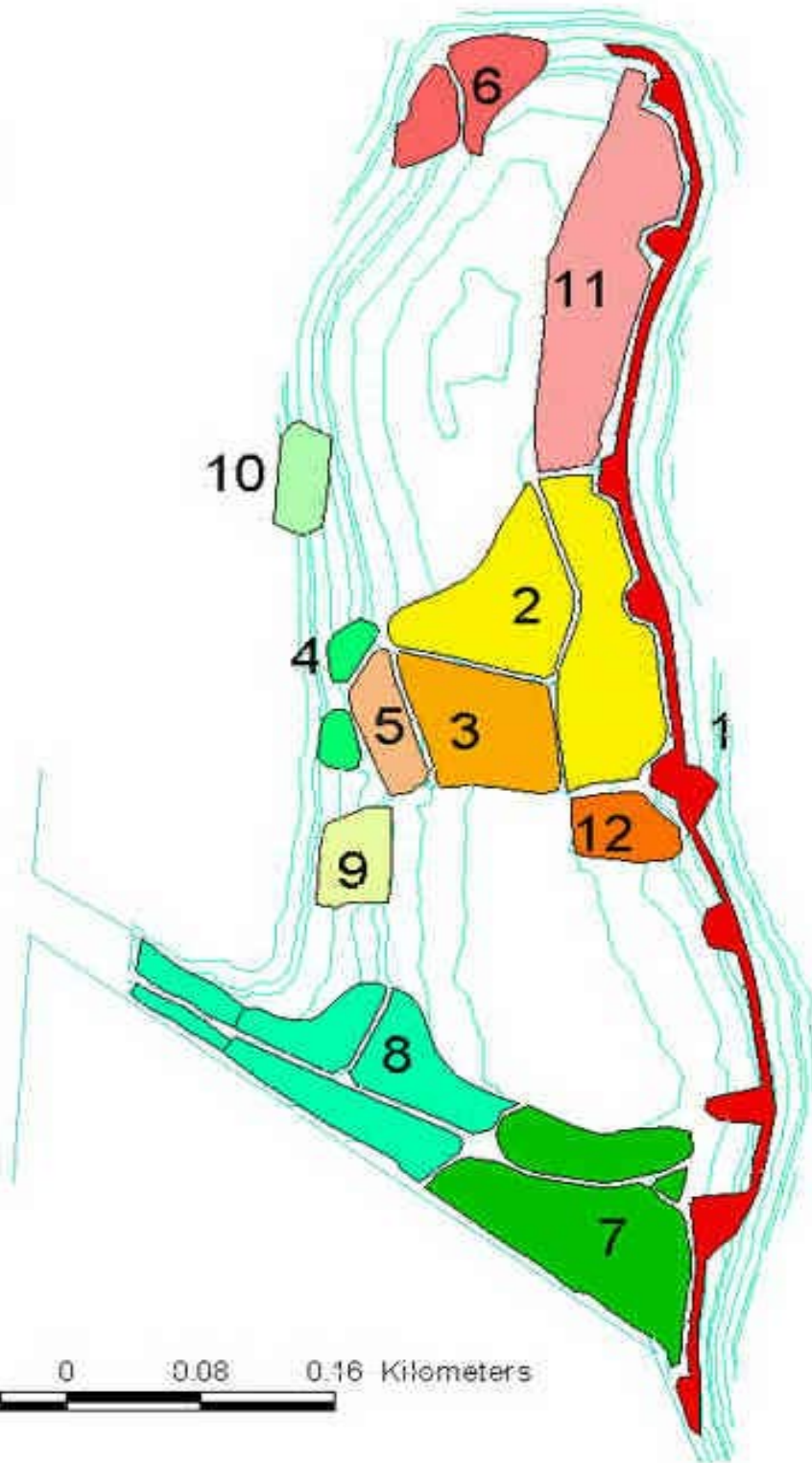
TREAT held field-days for routine maintenance during 1991. As a result, most of the species in the windbreak grew well and had established a thick row by March 1992. While some *Syzygium australe* developed sooty mould and many seedlings died, those that survived were well established by March 1992. The resulting wind-break effectively protected later plantings from winds and cyclonic influences.

In 1996, the 'Adopt-a-Plot' scheme was started by TREAT. Individuals and organizations agreed to adopt one of the blocks of trees and do periodic maintenance work such as weeding, mulching, and fertilising. Watering has never been necessary. Astrid Takken coordinated this scheme which was very effective in maintaining the blocks. For example, one notable block is the most northerly; a block of Wet Sclerophyll Forest that was adopted by the Tinaroo Environmental Education Centre. The school students cross the lake from the Centre to Pelican Point in canoes and work in the block and observe wallabies, birds and reptiles.

**Figure 1.** Location map of Pelican Point



**Figure 2:** Plan showing location of tree plots at Pelican Point. See Appendix 1 for area, species planted, and dates of planting of each plot.



### ***Monitoring of flora and fauna***

Throughout the revegetation phase [1991-1996], the area has been monitored by teams of TREAT volunteers, supervised by specialists in various fields. Principal areas of monitoring were tree growth and use of the site by birds and small mammals.

Tree growth: Eight photo-monitoring sites were established in April 1994. Over the next three years, photographs spanning a full 360 degree circle were taken every six months at each site. An additional 'one off' survey of tree growth in the eastern fringe (girth and height, by species) was completed in March 1994, three years after planting. These surveys were completed under the supervision of Tony Irvine.

Birds: A bird survey, by location, species and numbers, was commenced in early 1991 and is continuing on a regular basis under the supervision of Elinor Scambler.

Mammals: A survey of small mammals, carried out every 3—4 months, commenced in 1996. Small mammals were trapped over a 2-day period during each survey, and the species, sex, and location were recorded before ear-tagging and release. A 'one off' survey of bats that used or over-flew the site was completed in March 1997.

### ***Funding***

Funding for the project came from the Federal Government's National Landcare Program that provided funds on the basis that the local community made a significant contribution to the project as labour and loan of equipment. The total dollar value of the grant over four years was \$15,350.00. These funds were used to employ contractors for mowing and spraying; to purchase materials such as fencing, mulch-hay, chemicals, to monitor birds, bats and mammals; to undertake publicity and produce publications; and to purchase trees [The large majority of trees were donated by the QPWS Lake Eacham Regional Nursery, QDNRM Forestry Service, and the WTTPS Winfield Bridge Nursery].

TREAT members and other people from the community contributed 2,000 hours voluntary labour from 1993 to 1997. They were responsible for all planning and administration tasks, in addition to planting trees, undertaking the maintenance work, and assisting with the monitoring of birds, mammals, and trees, the latter included phenology, growth and vegetation structure.

### ***Future development***

TREAT's responsibility for leading and coordinating the project ended when the funds from the National Landcare Program finished on June 30, 1997. However, community volunteers, known as The 'Friends of Pelican Point' who had adopted plots during TREAT's 'Adopt-a-Plot' scheme, have continued beyond 1997 with their maintenance work, including mowing the walking tracks, and with monitoring of flora and fauna.

The QDNRM Resources Extension Branch took over the responsibility for management of Pelican Point in July 1997; this responsibility has since been transferred to Sunwater.

### **MEASURING POST-DEVELOPMENT SUCCESS OF REVEGETATION**

It is seldom that a large, compact area such as Pelican Point is revegetated in a coordinated manner to provide a nature-based recreation and education reserve. Through the use of diverse revegetation techniques, and by preserving grassland, sedge and lake-margin vegetation, Pelican Point had developed into a pioneer project in biodiversity. It had become an ideal site where inter-related long term ecological changes and planting successes and failures could be measured.

To build on the initial success of revegetation, documentation of the growth of the trees, and monitoring of the flora and fauna, TREAT proposed that monitoring should continue but with broader objectives, into a post-development phase.

## **Aims and Objectives**

The project aims were to use data collected during the development and post-development phases of the revegetation program:

- (1) To measure the success of revegetation of Pelican Point in terms of ecological change, species selection, species behaviour, planting densities, growth rates, flowering, fruiting and recruitment of species.
- (2) Based on the success level of the Pelican Point Revegetation Project, to publish and communicate information on techniques for monitoring Revegetation and on techniques for the ecological rehabilitation of similar areas.

The major objective was to record the success and failures of initial tree plantings at Pelican Point which had aimed at reproducing Woodland, Wet Sclerophyll, Swamp Forest and Rainforest communities together with a windbreak, all interspersed within and around agricultural grassland and a small portion of native grassland. The agricultural grassland is dominated by *Brachiaria decumbens* [Brachiaria], *Neonotonia wightii* [Glycine] and occasionally *Panicum maximum* [Guinea Grass]. The native grassland consisted entirely of *Imperata cylindrica* [Blady Grass] with an odd *Lophostemon suaveolens* tree [Swamp Box] present. The purpose of these plantings was not only to provide a diverse array of habitats for wildlife fauna in an area isolated by agriculture but also to provide an area suitable for recreation, wildlife studies and a demonstration of how some areas of the foreshores of Tinaroo Dam could be managed.

## **Management**

Vegetation monitoring was carried out between November 2001 and January 2002. The windbreak community was 11 years old, the wet sclerophyll and rain forest communities 8 years old, the swamp forests and woodlands 7 years old. The shoreline communities had been exposed for about 3-4 months, the agricultural grasslands were at least twenty years old and the native grassland appears to be a remnant patch of much older age.

Twenty three plots were set up for monitoring with the corner peg placed in the south west corner of each plot. Most of the plots were 20 m x 20 m in size but the narrowness of some planted communities resulted in some plots being 20 m x 10 m in size. Estimates were made of the canopy cover, the upper and lower leaf height of the canopy, litter cover and depth, the density of ground cover vegetation [1 m and less high], the shrub layer and the identity of the five most common species contributing to each layer. Diameter and height of vines was noted. The height of each individual planted tree/shrub was estimated, the diameter measured, the species named and the position within the plot recorded as well as the original planting density. The number of seedling recruits, their height and identity were also noted.

## **Funding**

A 4-year project [1998-2001], titled *Measuring the Post-development Success of a Revegetation Project*, commenced in 1998 with funding from NHT. The total cost of the project was \$38,150, of which NHT provided \$14,950, the remaining \$23,200 being the value of in-kind input by TREAT volunteers who undertook the surveys, and collected and collated field data.

## **OUTCOMES**

### **Success of revegetation methods**

Techniques involved monitoring growth rates and vegetation changes within the communities and studying phenological behaviour of the vegetation. These surveys were completed under the supervision of Tony Irvine, and a summary of results is included here; detailed findings and recommendations are the subject of later papers by Tony Irvine [Interested people should contact TREAT at the address on page 3].

The establishment and growth of the transplanted seedling trees were generally very good. Despite the deaths of *Syzygium australe* seedlings in the wind-break plantings of 1991, the subsequent growth of the surviving seedlings of *Syzygium australe* and other species [Appendix 1] had formed a discernible windbreak around the eastern shoreline by March 1994 [Plate 3]. These trees had grown sufficiently to provide effective protection for later plantings from winds and cyclonic influences. The outcomes of the successive plantings in 1994, 1995 and 1996 and the, good tree growth of these plantings are shown in aerial views of Pelican Point taken in June 1995 [Plate 6], and the ground view of the tree growth in a 3-year old densely planted forest [Plate 7] and a 3-year old Wet Sclerophyll Forest [Plate 8].

Original planting densities ranged between 425 trees/ha in a Wet Sclerophyll Forest plot to 2,625 trees/ha in a Rainforest. Generally the higher the planting density, the lower the percentage of vertical projected ground cover. In the four broadleaf, rainforest plantings, the planting densities ranged from 1,850 trees/ha to 2,625 trees/ha, and had ground covers of 0.5%, 1%, 1% and 4%.

Species selection can also influence the effect of planting density on ground cover. Thus a Wet Sclerophyll Forest plot dominated by *Eucalyptus grandis*, *E. pellita* and *E. reducta* and planted at the same order of density as the Rainforest plots [2,350 trees/ha] had a ground cover of 20%. This reflected the higher light reaching the forest floor under eucalypts compared to the broader leaf rain forest species.

Plots planted at much lower densities with species such as *Casuarina cunninghamiana*, *Araucaria cunninghamii*, *Acacia celsa* and *A. melanoxylon* prominent, showed marked effects on the ground cover. Wet Sclerophyll plot 7 had the lowest density of trees planted [425 trees/ha] but the combination of a prominent number of *A. melanoxylon* individuals combined with a prominent number of fast growing eucalypts such as *Eucalyptus pellita* and *E. grandis* and some broadleaf Rainforest species reduced the ground cover to 45%. Other plots with large numbers of *A. celsa*, *A. melanoxylon*, *Araucaria cunninghamii* and *Casuarina cunninghamiana* planted at densities of around 600 — 650 trees/ha also markedly reduced ground cover to estimates of 30%.

Species selection combined with site characteristics also showed marked effects on the ground cover. The two Swamp Forest plots which were planted at densities of 1,150 trees/ha and 1,550 trees/ha had very low ground cover estimates of 5% and 3%. This probably reflects the prolonged high water table which these plots experienced together with a prominent planted shrub/small tree layer of *Callistemon* species — *C. recurvus*, *C. viminalis*, *C. salignus* and *C. sp.* “Tinaroo” that thrived in the wet conditions, affecting overall, the ability of grass and herbs to maintain themselves in high densities in the ground layer.

Wet Sclerophyll Forest plot 8 and woodland plot 11 were planted at densities of 575 and 700 trees/ha respectively, and had grass ground covers estimated at 90—95%, and 80% respectively. These densities were equal to or greater than the open *Brachiaria decumbens* grasslands (75%, 70%, 60%, 40%) where grass cover was more clumped and the clumps were surrounded by a dead grass litter layer, particularly in the western plots. The native *Imperata cylindrica* grassland had an extremely dense cover estimated at 95% with a very low litter layer and a height of one metre which was twice as tall as the *B. decumbens* grasslands.

The ground litter cover was estimated to be most dense in plots planted with tree densities that were 800 trees/ha or greater, but there were indications that the nature of the litterfall of particular tree species also influenced the density of litterfall. Hence a dense litter layer could be produced from lower density plantings with species such as *Acacia celsa*, *A. melanoxylon*, *Casuarina cunninghamiana*, *Araucaria cunninghamii*, forming a prominent part of the planting. Except for *C. cunninghamiana*, all these species were prominent in Wet Sclerophyll Forest plot 6 which had an estimated litter cover of 65% and a planting density of 650 trees/ha.

Tree canopy cover estimates showed less correlation with the density of the initial planting and was influenced by the number of tree deaths per plot and also appeared to be influenced by species combinations and characteristics. There was a wide range in point estimates of cover within most plots.

The upper height of the canopy is strongly influenced by species selection and the densest planting of fast growing species resulted in the tallest canopy estimate of 24 metres [Plot 5, at 8 years]. The lower leaf height of the canopy descended to between 1—2 m. The woodland plot 11 had the highest lower-canopy estimate of 4 m.

The tallest height estimate was 26 m for a *Eucalyptus grandis* [Rose Gum] individual that had a measured diameter of 26.3 cm in the same densely planted plot of fast growing species [Plot 5, at 8 years, density 2,350 trees/ha]. Under these conditions the tree grew at an estimated rate of 3.25 m per year and diameter expanded at a rate of 3.9 cm per year.

The largest diameter measured was 40.3 cm for a *E. grandis* individual in plot 6 at 8 years old, density 650 trees/ha, representing an annual diameter increment of 5.04 cm per year.

The smallest individuals after eight years growth ranged between 0.8 m and 2.2 m tall, with annual growth increments of 0.1 to 0.3 m per year. Diameters of some of these individuals were below breast height and those at breast height were 0.4—1.6 cm representing diameter increments 0.05—0.2 cm per year. Some of these species grew slowly because they were overtopped and shaded such as a *Callistemon viminalis*, *Syzygium australe* and *Glochidion harveyanum* individuals. Others grew very slowly because site conditions overall tend to be marginal for them in terms moisture and soil aeration. These included, *Cardwellia sublimis*, *Dysoxylum rufum*, *Acmena resa*, *Syzygium cormiflorum*, *Xanthostemon whitei*. Some of these latter species have slow to medium growth rates under favourable conditions and certainly will not grow well in more unfavourable conditions. Some individuals may grow slowly due to the genetic makeup of the seed source [e.g. self fertilisation effects] and these factors could be operating in the performance of some *Acmena hemilampra* and *Corymbia citriodora* individuals.

In the windbreak plots which were 11 years old, the tallest tree, *Casuarina cunninghamiana* [River Sheoak], was estimated to be 15 m high and 30.5 cm diameter. The largest diameter of 34.8 cm also belonged to a *C. cunninghamiana* individual that was estimated to be only slightly smaller in height, 14 m tall. These performances represent height increments of 1.3 to 1.4 m per year and diameter increments of 2.8 to 3.2 cm per year.

Growth rates and growth form of planted species with five individuals or more over the 16 monitored planted plots was pooled as well as the performance of species at the different planting densities between plots.

Shoreline plots which are effected by the seasonal rise and fall of the waterline were mainly colonised by changing mixtures of grasses, sedges, forbs and perennial herbs. Forty eight seedlings of the exotic shrub, *Solanum torvum* [Devil's Fig] were recorded in the eastern shoreline plot towards the higher margin of the plot.

On the sixteen monitored planted-plots, there were a total of 1,012 seedling recruits recorded, producing an average of 63.3 seedlings per plot. The actual range was 3 to 204 seedlings per plot. Two windbreak plots had totals of 163 and 204 seedlings dominated by the germination of *Syzygium australe* seedlings [150 and 136] around the base of parent plants. Most of the seedling recruits come from trees or shrubs planted on the site and three exotic species that were scattered around the area consisting of two tree species *Psidium guajava* [Guava], *Solanum mauritianum* [Wild Tobacco] and shrub species *Solanum torvum* [Devil's Fig]. The establishment of seedlings below the canopy increases markedly when the ground cover density beneath the trees is reduced below 60%.

Twelve native species that were not immediately on the site and were not planted have sprung up within the plots. They consist of two ferns, *Christella dentata*, *Pteris tremula*, four vines, *Clematis glycinoides*, *Embella australiana*, *Maclura cochinchinensis*, *Parsonsia straminea*, five trees, *Breynia stipitata*, *Ficus opposita*, *Neolitsea brassii*, *Schefflera actinophylla*, *Wikstroemia indica* and one parasite *Dendrophthoe falcata* [a mistletoe]. Three exotic vines besides glycine [*Neonotonia wightii*], have been dispersed by animals into the plots, *Solanum seaforthianum* [Brazilian Nightshade], *Passiflora suberosa* [Corky Passionfruit] and *Cardiospermum halicacabum* [Balloon Vine]. Birds have also introduced exotic plants such as *Montanoa hibiscifolia* [Anzac Flower], *Cinnamomum camphora* [Camphor Laurel], *Coffea arabica* [Coffee] and fruitbats may have also introduced coffee as well as *Carica papaya* [Pawpaw].

Overall there are 123 planted species established on the site and a total of 228 species recorded on the site to date. Ecological changes within the plots are described. One noticeable change within the rain forest plots is the pioneer cover tree *Omalanthus novoguineensis* [Tropical Bleeding Heart] reaching old age [7—8 years at this site] and beginning to die. As they collapse and rapidly decay within the site they attract micro and macro flora and fauna as well as providing opportunities for surrounding longer lived tree species to grow more rapidly.

### **Phenology of trees**

The phenology study commenced in January 1997 after preliminary observations in December 1996 [Plate 9]. Observations were made at 4 – 6, occasionally 7 – 8 week intervals for three years. Most of the plantings surveyed were three years old, but three plots, 9, 10 and 11, were two years old. The aim of the study was to record the flowering and fruiting times and patterns of the planted species as well as the grasses and weeds encountered on the site during the surveys. Flowers and fruit are regarded as potential resources for fauna and an aim was to see whether peaks in flowering and fruiting were associated with increases in bird and mammal numbers. Insects would also be markedly influenced by the new foliage, flower and fruit resources but were not monitored.

The method of sampling involved surveying the communities distributed along the main circular walk at Pelican Point. Flowering categories were divided into two classes, -1/3M Bud (minus one third mature bud) to Mature Bud (class 1) and Open Flower (class 2). The fruit was divided into three classes -1/3M fruit to 1/2M Fruit (class 3), 1/2M to 2/3M (class 4) and 2/3+M (two thirds plus mature fruit) to Mature Fruit (class 5).

The flowering and fruiting amounts were estimated as a visual percentage proportional to the amount of foliage on the plant. Once this estimate was made then the percentage proportions of this estimate were made for the flower and fruit phases to equal the total estimate. The overall estimate of the reproductive phases could be say 50% and this 50% may consist of 5% class 1 phase, 10% flower [class 2], 30% [class 4], 5% Mature Fruit [class 5]. Up to five performing individuals were recorded for trees and shrubs sampled at each site and one example for each weed species seen during the site survey.

Eight sites were visited each time and were called Wet Sclerophyll South [Plots 7, and 8]; Grass Block South; Rainforest [Plots 2, and 3], North East Woodland [Plot 11], North West Shoreline, Tall Wet Sclerophyll [Plot 5, combined with 4], Swamp Sclerophyll Forest [Plot 9] and Weeds which were recorded on the site overall.

The life forms of all species recorded flowering or fruiting were classified into tree, shrub, vine, creeper, herb, parasite and fungi. The fruit types were classified into four types, fleshy, woody, parchy/soft capsular and burr/sticky.

Results showed that many weedy species including grasses, forbs, perennial herbs, shrubs, trees, creepers and vines were continuously in some reproductive phase throughout the three years observations. Some of the planted trees and shrubs began flowering and fruiting within two to three years after planting. The earliest fleshy-fruited planted trees/shrubs producing fruit were *Scolopia braunii* [Brown Birch] and *Syzygium australe* [Creek Satinash] at three years. Flowers of the soft capsular fruited species *Tristaniopsis exiliflora* [Kanuka Box] and flowers together with very immature woody capsules of *Melaleuca armillaris* [Collared Paperbark] appeared two years after planting. *Callistemon recurvus* [Recurved Bottlebrush], *C. viminalis* [Drooping Bottlebrush] showed all phases from buds to 2/3rds mature fruit at age 2. These two *Callistemon* species were prolific performers and most if not all five reproductive-phase categories were present on some individuals at each sampling visit.

The prolific flowering of the *Callistemons* in the Tall Wet Sclerophyll blocks and the Swamp Sclerophyll block resulted in high numbers of honeyeaters being recorded in these areas during the bird surveys. Acacia species such as *A. flavescens*, *A. mangium* and *A. simsii* were also flowering two years after planting.

Other rain forest species that began to flower and fruit early besides *Scolopia braunii* and *Syzygium australe* were *Omalanthus novoguineensis* [Tropical Bleeding Heart], *Melicope elleryana* [Spermwood], *Glochidion harveyanum* [Harvey's Buttonwood], *Glochidion philippicum* [Philippine Buttonwood] and *Alphitonia petriei* [Sarsaparilla].

The earliest eucalypt species to begin flowering and producing immature capsules were *E. pellita* [Red Mahogany] and *E. grandis* [Rosegum] at age three. *Allocasuarina* and *Casuarina* commenced also at age three.

The long development time of the woody capsular species, such as in *Eucalyptus*, *Callistemon*, *Melaleuca*, *Leptospermum*, *Baeckea*, *Allocasuarina* and *Casuarina* species meant fruit was continuously being recorded. One of the problems with taller growing species was estimating the maturity phase of fruiting capsules.

*Brachiaria decumbens* the major grass on the site has its main performance in the wet season months of January through to April and drops off in the winter and dry season months. Populations of rodents and seed eating birds will be compared with the behaviour of this grass.

The phenological performance of some of the more prominent tree and shrub species is presented. Many of the rain forest species had not produced flowers or fruits at the cessation of the study, five years after planting. Several of the rain forest species that had flowered and fruited were showing some seasonal patterns and were beginning to establish seedlings in the rain forest understorey, the wet sclerophyll and swamp forest plots. These seedlings had markedly increased in numbers in year 8 as shown in the vegetation monitoring work. The flower and fruiting resources of the community as a whole did not show marked seasonal peaks probably due to the wide diversity of species and life forms monitored.

The changes in the profile of the plots, the successful flowering and fruiting of many tree and shrub species and the establishment of seedlings, some of which have moved into sapling tree size classes [2.5 cm plus diameters] together with the establishment of 12 native species that were not immediately on site indicates considerable success of the initial plantings. Eight of the new native species have fleshy fruits which are bird dispersed. The resources provided by the plantings are attracting birds as indicated by the arrival of these new species of native plants and the bird surveys which show a large increase in the number of bird species recorded. Most of the mammal species recorded to date are grassland mammals but one trapping of the White-tailed Rat [*Uromys caudimaculatus*] could be the beginnings of rain forest mammals utilising the site. The resources could attract blossom bats and spectacled flying foxes. The plantings are also used for shelter by some of the grassland mammals such as the Agile Wallaby.

The establishment of four native vine species on site is the beginning of the rain forest plantings becoming real rain forest i.e. vine forest communities. The density of planting in the woodland community may ultimately convert this community over time to an open forest or even wet sclerophyll forest community.

The plantings are attracting recreational use by the community, by birdwatchers, wildlife tours and both primary and tertiary educational groups. The design is providing a wide diversity of habitats with a wide diversity of plant life forms. There is considerable information for foresters, seed harvesters, farm forestry and revegetation groups in terms of planting densities, species composition of plantings and their effect on understorey cover, species growth rates, flowering and fruiting times and age to fruiting. All these uses and outcomes indicate that the plantings have had considerable post development success in achieving the initial aims of the plantings.

### ***Bird surveys***

On-going surveys of the birds living on, or using Pelican Point have been conducted since October 1991 by TREAT volunteers, members of Birds Australia, and local residents. The data have been assembled under the guidance of Ornithologist, Elinor Scambler, and are based on RAOU guidelines. A summary of the findings is reported here; comprehensive data are the subject of a separate report by Elinor Scambler and people requiring further information on these surveys should contact TREAT [See page 2 for address of TREAT].

Up to June 2001, 97 twenty-minute site-based surveys have been carried out on 25 dates from 1994 to 1997 and 2000 to 2001, plus additional special surveys and incidental recordings by local residents, TREAT members and experienced birdwatchers. All recordings have been discussed with the observers and vetted by independent authorities [Les Moore and Glenn Holmes]. The Pelican Point database now contains 4,200 records totalling over 24,000 individual birds sighted by about 60 observers.

Changes in the Pelican Point avifauna 1991-2001 can be viewed in three different ways: number of species (i.e. the "richness"); mix of species; and numbers of individual birds.

### **Species richness**

TREAT members Alan Gillanders and Cynthia Hall recorded 56 bird species in October 1991 and May 1992, with Pelican Point neighbour David Foster contributing an extra 31 from his observations to December 1993 [Appendix 2]. From the first formal survey in January 1994 to June 2001, 81 new records brought the species list to 185 [Appendix 3].

List expansion since January 1994 can be broadly attributed to two factors. Firstly, observation hours increased due to both planned surveys and birdwatching visits, with a published bird list making new sightings more likely to be reported. For example, additions of unusual migratory waders and cryptic crane and rail species are probably due to this increased effort on the site, including the 1996-7 and 1997-8 wet season visits of a Little Ringed Plover, a rarity in Australia which attracted national attention.

Secondly, available habitat on the site changed as planted trees grew, replacing some pasture. This factor is related both to increasing number of species and the mix of birds on the site.

### **Species mix**

There has been a significant proportional shift in the Pelican Point avifauna towards birds from forest habitats. In 1993, 76% were pasture and wetland species, with 24% being forest species. The ratio is now 54% pasture and waterbirds to 46% forest species.

In the 1993 “forest” group, about 50% are normally found in drier eucalypt forest — birds such as Bush Stone-curlew, Pale-headed Rosella, Forest Kingfisher, Noisy Friarbird and Black-faced Cuckoo-shrike. Another ten of the 21 can be found in wetter areas, including rainforest; birds such as Rainbow Lorikeet, Spangled Drongo, Mistletoebird and Silvereye. Only one of the Pelican Point 1993 forest species has strong links with rainforest — the Brown Cuckoo-Dove.

The 2001 “forest” group of 85 has 36 from drier forests, 36 from mixed wetter eucalypt/rainforest, and 13 rainforest species. Across these three categories, there are more species of honeyeaters, cuckoos and small above-ground insectivores. The wetter forest additions include three species potentially threatened in the Wet Tropics by changed burning regimes leading to rainforest invasion of wet sclerophyll; White-cheeked and White-naped Honeyeaters and Eastern Yellow Robin. New rainforest birds include Grey Goshawk, Emerald Dove, Brown Gerygone, Spectacled and Black-faced Monarchs as well as the Wet Tropics endemic Macleay’s Honeyeater.

In 1993, only two species, the Brown Cuckoo-Dove and Silvereye, were likely to spread at least some seeds of fleshy fruits. By 2001, this suite of potential rainforest dispersers had grown to thirteen, although one of them, the Topknot Pigeon, is still the only Pelican Point species that has been seen flying low over the site, but never landing.

### Numbers of individual birds

The number of individual birds peak strongly around October each year. This coincides with the maximum presence of migrants plus overall breeding activity, which increases conspicuous bird behaviour. Waterbird numbers are influenced by wetland conditions regionally. As well, the numbers of shoreline birds show patterns related to the rise and fall of Tinaroo water levels and hence the abundance of water plants and muddy edges for feeding. Many forest species show increases in relative abundance that reinforce their growing importance in the species mix. Fluctuations in numbers of some grassland birds, in particular Golden-headed Cisticola and Tawny Grassbird, suggest complex interactions between rainfall and the area of weedy edge/sedge on the site. No species is known to have been lost from Pelican Point since 1994, although White-necked Heron and Singing Bushlark, both uncommon in Tablelands pastures, have not been recorded since 1997.

### **Small mammal surveys**

In 1996, Les Moore, Zoologist, initiated a three-year survey of the small mammals using the area. The survey is continuing with TREAT members under the supervision of QPWS staff and consultants. The object was to monitor the use and re-invasion of the area by small mammals in an attempt to evaluate the efficacy of rehabilitation plantings for native fauna [Plate 10; Plate 11]. A summary of the results of these surveys is presented here; comprehensive data are given in separate reports by Zoologist, Kay Dorricott; people requiring further information on these survey should contact TREAT [See page 2 for address of TREAT].

Trappings were completed on: 12-13th December 1996; 20-21st March 1997; 21-22nd June 1997; 28-29th October 1997; 11-12th February 1998; 23-24th June 1998; 29-30th September 1998; 8-9th December 1998; 9-10th March 1999; 8-9th June 1999; 28-29th September 1999; and 7-8th December 1999. The number of species trapped has increased each year, from four in the 1996-97 year, to 7 in 1998, and 12 in 1999 [Appendix 4].

*Melomys burtonii* was the most common small mammal over the 3 years of the study, and appeared to increase slightly in numbers, 113 being trapped in 1996, 188 in 1998, and 184 in 1999 [Appendix 4]. *Isoodon macrourus* maintained a steady population, about 30 being trapped each year. By contrast, the rodents, *Mus musculus* and *Rattus sordidus*, showed a marked decrease in numbers trapped over the 3-year study period. Thus, 21 *Mus musculus* were trapped 1996, whereas only 5 were trapped in 1999. For *Rattus sordidus*, 147 were trapped in 1996 but only 56 were trapped in 1999.

The site is frequently inhabited by Agile Wallabies from the surrounding agricultural grasslands. With no connecting tree corridors to adjacent rainforest or open eucalypt forests, there has been little chance for accretion of new species of small mammals. Therefore the species mix are generalist species often found in open country or disturbed areas.

### **Bat survey**

A 'one off' survey of the bat population was made in March 1997 by Zoologists Chris Clague and Olivia Whybird. The ultra-sonic and visual survey noted 32 "bat passes" and two visual sightings in a 45 minute sample. Eight species were identified, the most common being the Little Bentwing bat; the majority were flying high above ground [above 10 m] and did not appear to be feeding. The activity recorded is considered to be low for an open forest system, the nearest comparison being that of cleared agricultural land.

### **Other vertebrates and invertebrates recorded**

During the bird surveys, there were a number of incidental recordings of other vertebrates and invertebrates. These include snakes [6], toads and frogs [2], turtle [1], moths [3], butterflies [23], cicada [1], and spiders [1]. The complete list of species is given in Appendix 5.

### **Public use**

Pelican Point can be reached from the Kairi—Tinaroo Road by travelling down Malcolm Road and Foster Road. Vehicles can be left in the car-park, and walking tracks enable visitors to traverse the area and observe the growth of the trees and the numerous birds and other wildlife. A Visitor Information Board has been erected to show the walking tracks available within Pelican Point, and some of its history and outstanding features [Plate 12].

In 1997, the public began to use Pelican Point as a recreation area in which there are special opportunities for exercise and experiencing wallabies, Melomys, water birds, honey-eaters, birds of prey, butterflies and much more, as well as the growing trees. Clubs interested in the natural world hold field-days there and individual bird-watchers visit. Pelican Point is also used by wildlife tourist companies and by educational groups, including the University undergraduates of the School for Field Studies [based in Boston, USA] and the School for International Training [based in Philadelphia, USA].

In May 1997, an Arbor Week activity was organised at Pelican Point jointly by TREAT and QDNRM. Over a two-day period, 7,200 school children from seven Tableland primary schools visited the area and joined in 5 different activities arranged by the various organizations [Plate 13]. The program was repeated in the following year. Different activities arranged by the various organizations. The program was repeated in the following year.

## **FUTURE PLANNING**

As an example of cooperation between members of the publicly organised community bodies and many government agencies, Pelican Point is probably unique. The provision of funds by the Federal Government through the National Landcare Program and the work of many individuals and organizations has made it possible.

Sunwater is currently responsible for the management and future development of Pelican Point. It is hoped that the community and the governments will together ensure the natural development of Pelican Point into the future.

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**Plate 1:** Aerial view of Pelican Point [centre of photo] looking from the western shore of Lake Tinaroo.



**Plate 2:** View of Pelican Point from the south. Note the low lying, flat topography of the site.



**Plate 3:** Aerial view of Pelican Point in March 1994. Note the well established windbreak from the 1991 planting and the markings indicating tree plots to be planted in 1994.



**Plate 4.** Open Grassland for use by Sarus Cranes, Brolgas, and animals that prefer open spaces.



**Plate 5.** Open grassland on the edge of Lake Tinaroo. Note the background of sedges, forbs and grasses growing on the exposed shoreline of the lake.



**Plate 6.** Aerial view of Pelican Point, June 1995. Note the low level of the water in Lake Tinaroo, the well established windbreak [bottom of photo] planted in 1991, the established Rainforest [centre of photo] and less well established blocks of Wet Sclerophyll Forest [extreme left and right of photo] all planted in 1994, and the recently planted blocks of Swamp/ Wet Sclerophyll Forest [top, red coloured areas].



**Plate 7.** A block of Rainforest species, planted in March 1994 at approximately 2,600 trees per hectare. Photographed in March 1997.



**Plate 8.** A block of Wet Sclerophyll Forest species, planted in March 1994 at approximately 700 trees per hectare. Photographed in March 1997.



**Plate 9.** A TREAT volunteer collecting data in a 3-year old mixed woodland as part of a tree phenology survey.



**Plate 10.** Small mammal survey, October 1997. TREAT volunteers photographing the contents of a pit-fall trap before removing trapped animals.



**Plate 11.** Small mammal survey, October 1997. Ear-tagging a captured mammal before release.



**Plate 12.** Use of the revegetated Pelican Point by the public. A Visitor Information Board has been erected near the car park to assist the public to enjoy the site.



**Plate 13.** Use of the revegetated Pelican Point by the public. Joan Wright leads a group of school children during Arbor Day to explore the various species planted in the different blocks.

## Appendix 1

Trees planted at each location at Pelican Point over the period March, 1991 to February, 1996.

### 1991 PLANTINGS

#### WINDBREAK

Plot 1; 1.21 hectares; 2,656 trees; 8 species; Planted by TREAT 21 March, 1991.

Species	No. trees
<i>Eucalyptus tereticornis</i> (Forest Red Gum)	150
<i>Eucalyptus pellita</i> (Red Mahogany)	250
<i>Eucalyptus torelliana</i> (Cadagi)	400
<i>Casuarina cunninghamiana</i> (River Sheoak)	950
<i>Syzygium australe</i> (Creek Satinash)	586
<i>Acacia celsa</i> (Brown Salwood) & <i>Acacia melanoxylon</i> (Blackwattle)	220
<i>Grevillea baileyana</i> (Bailey's Silky Oak)	100

### 1994 PLANTINGS

#### RAINFOREST

Plot 2; 11.1 hectares; 5,132 trees; 66 species. Planted by WTTPS and TREAT 16—23 February, 1994.

Species	No. trees
<i>Acacia celsa</i> (Brown Salwood)	326
<i>Acmena smithii</i> (Lilly Pilly)	124
<i>Acmena resa</i> (Red Eungella Satinash)	22
<i>Acmenosperma claviflorum</i> (Trumpet Satinash)	190
<i>Agathis robusta</i> (Kauri Pine)	126
<i>Alloxylon flammeum</i> (Flame Silky Oak)	29
<i>Alphitonia petriei</i> (Sarsaparilla)	55
<i>Alstonia scholaris</i> (Milky Pine)	156
<i>Argyrodendron peralatum</i> (Red Tulip Oak)	17
<i>Argyrodendron trifoliolatum</i> (Brown Tulip Tree)	25
<i>Arytera lautereriana</i> (Corduroy Tamarind)	64
<i>Brachychiton acerifolius</i> (Flame Tree)	173
<i>Blepharocarya involucrigera</i> (Rose Butternut)	152
<i>Buckinghamia celsissima</i> (Ivory Curl Tree)	66
<i>Castanospora alphanthii</i> (Brown Tamarind)	5
<i>Cardwellia sublimis</i> (Northern Silky Oak)	42
<i>Castanospermum australe</i> (Black Bean)	160
<i>Chionanthus ramiflorus</i> (Northern Olive)	8
<i>Cryptocarya hypospodia</i> (Northern Laurel)	161
<i>Cryptocarya triplinervis</i> 'sensu lato' (Tableland Laurel)	73
<i>Cupaniopsis anacardioides</i> (Beach Tamarind)	23
<i>Darlingia darlingiana</i> (Brown Silky Oak)	159
<i>Diploglottis diphylostegia</i> (Northern Tamarind)	55
<i>Dysoxylum muelleri</i> (Miva Mahogany)	67
<i>Emmenosperma alphitonioides</i> (Bonewood)	71
<i>Euroschinus falcata</i> (Pink Poplar)	32
<i>Ficus</i> sp. (5 species)	10
<i>Flindersia acuminata</i> (Silver Silkwood)	2
<i>Flindersia bourjotiana</i> (Qld Silver Ash)	98
<i>Flindersia schottiana</i> (Floppy-leaved Ash)	100
<i>Flindersia brayleyana</i> (Qld Maple)	164
<i>Gmelina fasciculiflora</i> (White Beech)	30
<i>Grevillea baileyana</i> (Bailey's Silky Oak)	45
<i>Guioa acutifolia</i> (Pointed-leaf G'üioa)	119
<i>Litsea leafeana</i> (Bollywood)	147
<i>Mallotus philippensis</i> (Philippine kamala)	214
<i>Mischocarpus grandissimus</i> (Large-leaf Mischocarp)	5
<i>Melicope elleryana</i> (Spermwood)	47
<i>Omalanthus novo-guineensis</i> (Tropical Bleeding Heart)	99

<i>Pararchidendron pruinatum</i> (Tulip Siris)	154
<i>Phaleria clerodendron</i> (Scented Phalaria)	60
<i>Pilidistigma tropicum</i> (Apricot Myrtle)	83
<i>Pittosporum ferrugineum</i> (Rusty Pittosporum)	108
<i>Prunus turneriana</i> (Almondbark)	27
<i>Scolopia braunii</i> (Brown Birch)	36
<i>Sloanea macbrydei</i> (Grey Carabeen)	28
<i>Stenocarpus sinuatus</i> (Fire Wheel Tree)	88
<i>Syzygium australe</i> (Creek Satinash)	142
<i>Syzygium cormiflorum</i> (Bumpy Satinash)	31
<i>Syzygium kuranda</i> (Kuranda Satinash)	108
<i>Terminalia sericocarpa</i> (Damson)	163
<i>Tetrasynandra pubescens</i> (Small-leaved Tetra Beech)	70
<i>Toona ciliata</i> (Red Cedar)	37
<i>Zanthoxylum ovalifolium</i> (Oval-leaf Yellowwood)	10
<i>Callitris macleayana</i> (Brush Cypress)	71
<i>Eucalyptus acmeniodes</i> (White Mahogany)	75
<i>Eucalyptus cloeziana</i> (Gym pie Messmate)	75
<i>Eucalyptus resinifera</i> (Highland Mahogany)	50
<i>Eucalyptus grandis</i> (Rose Gum)	100
<i>Glochidion philippicum</i> (Philippine Buttonwood)	50
<i>Lophostemon confertus</i> (Brush Box)	75
Miscellaneous	29

**Plot 3;** 0.4 hectare; 1,100 trees; 29 species; Planted by TREAT 26 February and 2 March, 1994

<u>Species</u>	<u>No. trees</u>
<i>Acronychia acidula</i> (Lemon Aspen)	20
<i>Acmena smithii</i> (Lilly Pilly)	20
<i>Acmena hemilampra</i> (Blush Satinash)	35
<i>Agathis robusta</i> (Smooth-bark Kauri Pine)	45
<i>Alstonia scholaris</i> (Milky Pine)	20
<i>Brachychiton acerifolius</i> (Flame Tree)	30
<i>Blepharocarya involucrigera</i> (Rose Butternut)	35
<i>Castanospora alphandii</i> (Brown Tamarind)	20
<i>Cardwellia sublimis</i> (Northern Silky Oak)	20
<i>Castanospermum australe</i> (Black Bean)	10
<i>Cryptocarya mackinnoniana</i> (McKinnon's Laurel)	15
<i>Darlingia darlingiana</i> (Brown Silky Oak)	35
<i>Diploglottis diphylostegia</i> (Northern Tamarind)	30
<i>Elaeocarpus angustifolius</i> (Blue Quandong)	5
<i>Flindersia schottiana</i> (Floppy-leaved Ash)	55
<i>Flindersia brayleyana</i> (Qld Maple)	40
<i>Gmelina fasciculiflora</i> (White Beech)	20
<i>Grevillea baileyana</i> (Bailey's Silky Oak)	30
<i>Glochidion harveyanum</i> (Harvey's Buttonwood)	45
<i>Guioa acutifolia</i> (Pointed-leaf Guioa)	300
<i>Melicope elleryana</i> (Spermwood)	50
<i>Omalanthus novo-guineensis</i> (Tropical Bleeding Heart)	250
<i>Stenocarpus sinuatus</i> (Fire Wheel Tree)	30
<i>Scolopia braunii</i> (Brown Birch)	30
<i>Syzygium angophoroides</i> (Swamp Satinash)	30
<i>Syzygium kuranda</i> (Kuranda Satinash)	20
<i>Terminalia sericocarpa</i> (Damson)	30
<i>Toona ciliata</i> (Red Cedar)	25
<i>Xanthostemon whitei</i> (Red Penda)	45

## **SWAMP FOREST**

**Plot 4;** 0.51 hectare; 14 species; Planted by TREAT 29 January and 12 February, 1994

<u>Species</u>	<u>No. trees</u>
<i>Melaleuca leucadendra</i> (White Paperbark)	170
<i>Melaleuca bracteata</i> (Black Paperbark)	103
<i>Melaleuca viminalis</i> (Paperbark)	432
<i>Callistemon recurvus</i> (Recurved Bottlebrush)	93
<i>Leptospermum petersonii</i> (Lemon-scented Tea Tree)	119
<i>Acacia flavescens</i> (Red Wattle)	120
<i>Acacia simsii</i> (Sim's Wattle)	46
<i>Eucalyptus intermedia</i> (Pink Bloodwood)	90
<i>Eucalyptus tereticornis</i> (Forest Red Gum)	1150
<i>Casuarina cunninghamiana</i> (River Sheoak)	40

## **WET SCLEROPHYLL FOREST**

**Plot 5;** 12 species; Planted by TREAT 29 January and 12 February, 1994

<u>Species</u>
<i>Acacia simsii</i> (Sim's Wattle)
<i>Callistemon viminalis</i> (Weeping Bottlebrush)
<i>Callistemon recurvus</i> (Recurved Bottlebrush)
<i>Casuarina cunninghamiana</i> (River Sheoak)
<i>Eucalyptus grandis</i> (Rose Gum)
<i>Eucalyptus pellita</i> (Red Mahogany)
<i>Eucalyptus reducta</i> (Mountain Stringybark)
<i>Eucalyptus tereticornis</i> (Forest Red Gum)
<i>Melaleuca bracteata</i> (Black Paperbark)
<i>Pittosporum ferrugineum</i> (Rusty Pittosporum)
<i>Scolopia braunii</i> (Brown Birch)
<i>Syzygium australe</i> (Creek Satinash)

**Plot 6;** 0.4 hectare; 350 trees; 11 species; Planted by QDNRM Forest Service 8 February, 1994

<u>Species</u>	<u>No. trees</u>
<i>Acacia celsa</i> (Brown Salwood)	20
<i>Acacia mangium</i> (Broadleaf Salwood)	20
<i>Acacia melanoxylon</i> (Blackwood)	20
<i>Araucaria cunninghamii</i> (Hoop Pine)	50
<i>Alstonia scholaris</i> (Milky Pine)	20
<i>Eucalyptus reducta</i> (Mountain Stringybark)	40
<i>Eucalyptus grandis</i> (Rose Gum)	40
<i>Eucalyptus pilularis</i> (Blackbutt)	40
<i>Eucalyptus torelliana</i> (Cadagi)	50
<i>Eucalyptus intermedia</i> (Pink Bloodwood)	20
<i>Grevillea baileyana</i> (Bailey's Silky Oak)	30

**Plot 7;** 1.21 hectare; 1,024 trees; 19 species; Planted by QDNRM Forestry Service 6 February, 1994

<u>Species</u>	<u>No. trees</u>
<i>Acemena hemilampra</i> (Blush Satinash)	100
<i>Eucalyptus intermedia</i> (Pink Bloodwood)	40
<i>Eucalyptus acmanoides</i> (White Mahogany)	40
<i>Eucalyptus cloeziana</i> (Gympie Messmate)	40
<i>Eucalyptus pellita</i> (Red Mahogany)	40
<i>Eucalyptus reducta</i> (Mountain Stringybark)	40
<i>Eucalyptus tereticornis</i> (Forest Red Gum)	40
<i>Eucalyptus torelliana</i> (Cadagi)	80
<i>Eucalyptus grandis</i> (Rose Gum)	80
<i>Eucalyptus resinifera</i> (Highland Mahogany)	40
<i>Araucaria cunninghamii</i> (Hoop Pine)	60
<i>Acacia celsa</i> (Brown Salwood)	40
<i>Acacia mangium</i> (Broadleaf Salwood)	40
<i>Acacia melanoxylon</i> (Blackwood)	80
<i>Alstonia scholaris</i> (Milky Pine)	40
<i>Grevillea baileyana</i> (Bailey's Silky Oak)	80
<i>Lophostemon suaveolens</i> (Swamp Mahogany)	40

<i>Polyscias elegans</i> (Silver Basswood)	64
<i>Casuarina torulosa</i> (Forest Sheoak)	40

**Plot 8;** 1.62 hectares; 860 trees; 11 species; Planted by QDNRM Forestry Service 4 February, 1994  
[a small area adjacent to the car-park was planted 28 February, 1995]

<u>Species</u>	<u>No. trees</u>
<i>Acacia flavescens</i> (Red Wattle)	80
<i>Casuarina littoralis</i> (Black Sheoak)	80
<i>Casuarina torulosa</i> (Forest Sheoak)	80
<i>Eucalyptus creba</i> (Narrow-leaved Ironbark)	150
<i>Eucalyptus moluccana</i> (Grey Box)	80
<i>Eucalyptus tessellaris</i> (Carbeen)	80
<i>Eucalyptus citriodora</i> (Lemon-scented Gum)	130
<i>Eucalyptus pellita</i> (Red Mahogany)	50
<i>Eucalyptus resinifera</i> (Highland Mahogany)	50
<i>Grevillea pteridifolia</i> (Fernleaf Woodland Oak)	80

## 1995 PLANTINGS

### SWAMP / WET SCLEROPHYLL FOREST

**Plot 9;** 0.1 hectare; 258 trees; 13 species; Planted by QDNRM Forest Services 28 February, 1995.

<u>Species</u>	<u>No. trees</u>
<i>Melaleuca leucadendra</i> (Large White Paperbark)	25
<i>Melaleuca bracteata</i> (Black Paperbark)	25
<i>Callistemon recurvus</i> (Recurved Bottlebrush)	20
<i>Callistemon salignus</i> (White Bottlebrush)	15
<i>Callistemon viminalis</i> (Weeping Bottlebrush)	25
<i>Callistemon</i> sp. (Tinaroo Bottlebrush)	25
<i>Eucalyptus intermedia</i> (Pink Bloodwood)	9
<i>Eucalyptus tereticornis</i> (Forest Red Gum)	25
<i>Syzygium australe</i> (Creek Satinash)	25
<i>Casuarina cunninghamiana</i> (River Sheoak)	25
<i>Melaleuca armillaris</i> (Honey Myrtle)	15
<i>Tristaniaopsis exiliflora</i> (Kanuka Box)	15
<i>Leptospermum brachyandrum</i> (Short-stamen Tea Tree)	3

**Plot 10;** 0.1 hectare; 258 trees; 13 species; Planted by QDNRM Forest Services 28 February, 1995

<u>Species</u>	<u>No. trees</u>
<i>Melaleuca leucadendra</i> (Large White Paperback)	25
<i>Melaleuca bracteata</i> (Black Paperbark)	25
<i>Callistemon recurvus</i> (Recurved Bottlebrush)	20
<i>Callistemon salignus</i> (White Bottlebrush)	15
<i>Callistemon viminalis</i> (Weeping Bottlebrush)	25
<i>Callistemon</i> sp. (Tinaroo Bottlebrush)	25
<i>Eucalyptus intermedia</i> (Pink Bloodwood)	9
<i>Eucalyptus tereticornis</i> (Forest Red Gum)	25
<i>Syzygium australe</i> (Creek Satinash)	25
<i>Casuarina cuminghamiana</i> (River Sheoak)	25
<i>Melaleuca armillaris</i> (Honey Myrtle)	15
<i>Tristaniaopsis exiliflora</i> (kanuka Box)	15
<i>Leptospermum brachyandrum</i> (Short-stamen Tea Tree)	3

## WOODLAND

**Plot 11;** 0.61 hectare; 733 trees; 16 species; Planted by QDNRM Forest Service 28 February, 1995

<u>Species</u>	<u>No. trees</u>
<i>Acacia celsa</i> (Brown Salwood)	60
<i>Acacia flavescens</i> (Red wattle)	30
<i>Acacia mangium</i> (Broadleaf Salwood)	50
<i>Eucalyptus creba</i> (Narrow-leaved Ironhark)	140
<i>Eucalyptus moluccana</i> (Grey Box)	23
<i>Eucalyptus citriodora</i> (Lemon-scented Gum)	50
<i>Eucalyptus pellita</i> (Red Mahogany)	50
<i>Eucalyptus resinifera</i> (Highland Mahogany)	50
<i>Eucalyptus torelliana</i> (Cadagi)	80
<i>Eucalyptus reducta</i> (Mountain Stringybark)	80
<i>Eucalyptus erythrophoia</i> (Red Bloodwood)	31
<i>Eucalyptus raveretiana</i> (Black Ironbark)	20
<i>Eucalyptus leptophleba</i> (Molloy Box)	30
<i>Eucalyptus melliodora</i> (Yellow Box)	24
<i>Eucalyptus tessellaris</i> (Moreton Bay Ash)	15

## WET SCLEROPHYLL FOREST

**Plot 12;** 0.2 hectare; 220 trees; 13 species; Planted by QDNRM Forest Service 28 February 1995

<u>Species</u>	<u>No. trees</u>
<i>Eucalyptus intermedia</i> (Pink Bloodwood)	10
<i>Eucalyptus acmenoides</i> (White Mahogany)	20
<i>Eucalyptus cloeziana</i> (Gym pie Messmate)	25
<i>Eucalyptus pellita</i> (Red Mahogany)	15
<i>Eucalyptus grandis</i> (Rose Gum)	25
<i>Eucalyptus resinifera</i> (Highland Mahogany)	20
<i>Eucalyptus tereticornis</i> (Forest Red Gum)	25
<i>Eucalyptus torelliana</i> (Cadagi)	15
<i>Araucaria cunninghamiana</i> (Hoop Pine)	20
<i>Acacia celsa</i> (Brown Salwood)	15
<i>Acacia mangium</i> (Broadleaf Salwood)	10
<i>Alstonia scholaris</i> (Milky Pine)	15
<i>Acmena hemilampra</i> (Blush Satinash)	5

## Appendix 2

### Birds recorded as living on or using Pelican Point over the period October 1991 to May 1992.

C & B Number*	Common Name	C & B Number*	Common Name
1000	Brown Quail	30100	Silver Gull
1700	Magpie Goose	30600	Gull-billed Tern
1800	Plumed Whistling-Duck	30700	Caspian Tern
1900	Wandering Whistling-Duck	33300	Brown Cuckoo-Dove
2400	Black Swan	36000	Red-tailed Black-Cockatoo
3000	Australian Wood Duck	37100	Sulphur-crested Cockatoo
3100	Cotton Pygmy-goose	37300	Rainbow Lorikeet
3200	Green Pygmy-goose	37400	Scaly-breasted Lorikeet
3400	Pacific Black Duck	39000	Pale-headed Rosella
3700	Grey Teal	42600	Channel-billed Cuckoo
4100	Pink-eared Duck	42700	Pheasant Coucal
4200	Hardhead	43700	Barn Owl
4300	Australasian Grebe	45400	Little Kingfisher
4500	Great Crested Grebe	45600	Laughing Kookaburra
13100	Darter	45700	Blue-winged Kookaburra
13200	Little Pied Cormorant	45900	Forest Kingfisher
13500	Little Black Cormorant	46300	Rainbow Bee-eater
13600	Great Cormorant	48700	Red-backed Fairy-wren
13800	Australian Pelican	55500	Noisy Friarbird
14200	White-faced Heron	68400	Grey Fantail
14300	Little Egret	68700	Willie Wagtail
14500	White-necked Heron	68800	Spangled Drongo
14700	Pied Heron	68900	Black-faced Cuckoo-shrike
14800	Great Egret	69100	White-bellied Cuckoo-shrike
14900	Intermediate Egret	71000	Australian Magpie
15900	Glossy Ibis	72200	Torresian Crow
16000	Australian White Ibis	73500	Singing Bushlark
16100	Royal Spoonbill	75400	Red-browed Finch
16300	Yellow-billed Spoonbill	76100	Chestnut-breasted Mannikin
16400	Black-necked Stork	77200	Mistletoebird
16800	Black-shouldered Kite	77500	Welcome Swallow
17200	Black Kite	77700	Tree Martin
17300	Whistling Kite	78300	Tawny Grassbird
17400	Brahminy Kite	78900	Golden-headed Cisticola
17500	White-bellied Sea-Eagle	79300	Silvereye
17600	Spotted Harrier		
17700	Swamp Harrier		
18800	Black Falcon		
19000	Nankeen Kestrel		
19100	Sarus Crane		
19200	Brolga		
20700	Purple Swamphen		
20900	Dusky Moorhen		
21200	Eurasian Coot		
25300	Sharp-tailed Sandpiper		
26400	Comb-crested Jacana		
26700	Bush Stone-curlew		
27100	Black-winged Stilt		
28800	Red-kneed Dotterel		
29000	Masked Lapwing		

\*C&B Number = is the standard reference for Australian birds taxonomic order (Christidis, L. and Boles, W.E. 1994. *The taxonomy and species of birds of Australia and its territories*. Royal Australasian Ornithologists Union, Hawthorn East, Victoria)

### Appendix 3

#### Birds recorded as living on or using Pelican Point over the period October 1991 to May 2002.

<u>C &amp; B Number*</u>	<u>Common Name</u>	<u>C &amp; B Number*</u>	<u>Common Name</u>
900	Stubble Quail	18800	Black Falcon
1000	Brown Quail	19000	Nankeen Kestrel
1100	King Quail	19100	Sarus Crane
1700	Magpie Goose	19200	Brolga
1800	Plumed Whistling-Duck	19500	Buff-banded Rail
1900	Wandering Whistling-Duck	19800	Bush-hen
2400	Black Swan	20000	Baillon's Crake
2900	Radjah Shelduck	20400	White-browed Crake
3000	Australian Wood Duck	20700	Purple Swamphen
3100	Cotton Pygmy-goose	20900	Dusky Moorhen
3200	Green Pygmy-goose	21200	Eurasian Coot
3400	Pacific Black Duck	21400	Red-backed Button-quail
3700	Grey Teal	21600	Red-chested Button-quail
4100	Pink-eared Duck	22200	Latham's Snipe
4200	Hardhead	22500	Black-tailed Godwit
4300	Australasian Grebe	23500	Common Greenshank
4400	Hoary-headed Grebe	25300	Sharp-tailed Sandpiper
4500	Great Crested Grebe	26400	Comb-crested Jacana
13100	Darter	26700	Bush Stone-curlew
13200	Little Pied Cormorant	27100	Black-winged Stilt
13400	Pied Cormorant	27400	Pacific Golden Plover
13500	Little Black Cormorant	27700	Little Ringed Plover
13600	Great Cormorant	28600	Black-fronted Dotterel
13800	Australian Pelican	28800	Red-kneed Dotterel
14200	White-faced Heron	29000	Masked Lapwing
14300	Little Egret	30100	Silver Gull
14500	White-necked Heron	30600	Gull-billed Tern
14700	Pied Heron	30700	Caspian Tern
14800	Great Egret	32000	Whiskered Tern
14900	Intermediate Egret	33200	Spotted Turtle-Dove
15000	Cattle Egret	33300	Brown Cuckoo-Dove
15300	Nan keen Night Heron	33400	Emerald Dove
15900	Glossy Ibis	34500	Peaceful Dove
16000	Australian White Ibis	34600	Bar-shouldered Dove
16100	Straw-necked Ibis	35100	Superb Fruit-Dove
16200	Royal Spoonbill	35700	Topknot Pigeon
16300	Yellow-billed Spoonbill	36000	Red-tailed Black-Cockatoo
16400	Black-necked Stork	36900	Little Corella
16600	Osprey	37100	Sulphur-crested Cockatoo
16700	Pacific Baza	37300	Rainbow Lorikeet
16800	Black-shouldered Kite	37400	Scaly-breasted Lorikeet
17000	Square-tailed Kite	37700	Little Lorikeet
17100	Black-breasted Buzzard	39000	Pale-headed Rosella
17200	Black Kite	41600	Brush Cuckoo
17300	Whistling Kite	41800	Fan-tailed Cuckoo
17400	Brahminy Kite	42000	Horsfield's Bronze-Cuckoo
17500	White-bellied Sea-Eagle	42100	Shining Bronze-Cuckoo
17600	Spotted Harrier	42200	Little Bronze-Cuckoo
17700	Swamp Harrier	42300	Gould's Bronze-Cuckoo
17800	Brown Goshawk	42400	Common Koel
17900	Grey Goshawk	42600	Channel-billed Cuckoo
18300	Wedge-tailed Eagle	42700	Pheasant Coucal
18400	Little Eagle	43000	Barking Owl
18500	Brown Falcon	43100	Southern Boobook
18600	Australian Hobby	43700	Barn Owl

<u>C &amp; B Number*</u>	<u>Common Name</u>
43900	Tawny Frogmouth
44400	Large-tailed Nightjar
44800	White-rumped Swiftlet
45000	White-throated Needletail
45300	Azure Kingfisher
45400	Little Kingfisher
45600	Laughing Kookaburra
45700	Blue-winged Kookaburra
45900	Forest Kingfisher
46100	Sacred Kingfisher
46300	Rainbow Bee-eater
46400	Dollarbird
48700	Red-backed Fairy-wren
51300	Large-billed Scrubwren
52300	Brown Gerygone
53100	Fairy Gerygone
53200	White-throated Gerygone
55300	Helmeted Friarbird
55500	Noisy Friarbird
55600	Little Friarbird
56300	Macleay's Honeyeater
56500	Lewin's Honeyeater
56700	Graceful Honeyeater
57100	Yellow-faced Honeyeater
57600	Yellow Honeyeater
59000	White-throated Honeyeater
59100	White-naped Honeyeater
59400	Brown Honeyeater
59900	White-cheeked Honeyeater
61200	Dusky Honeyeater
61400	Scarlet Honeyeater
62100	Lemon-bellied Flycatcher
63200	Eastern Yellow Robin
66100	Golden Whistler
66400	Rufous Whistler
66600	Little Shrike-thrush
66900	Grey Shrike-thrush
67100	Black-faced Monarch
67300	Spectacled Monarch
67800	Leaden Flycatcher
67900	Satin Flycatcher
68200	Magpie-lark
68300	Rufous Fantail
68400	Grey Fantail
68700	Willie Wagtail
68800	Spangled Drongo
68900	Black-faced Cuckoo-shrike
69000	Barred Cuckoo-shrike
69100	White-bellied Cuckoo-shrike
69400	White-winged Triller
69500	Varied Triller
69800	Olive-backed Oriole
69900	Figbird
70000	White-breasted Woodswallow
70600	Black Butcherbird
70900	Pied Butcherbird
71000	Australian Magpie
71100	Pied Currawong
72200	Torresian Crow
73500	Singing Bushlark

<u>C &amp; B Number*</u>	<u>Common Name</u>
73700	Richard's Pipit
74700	Double-barred Finch
75400	Red-browed Finch
75900	Nutmeg Mannikin
76100	Chestnut-breasted Mannikin
77100	Yellow-bellied Sunbird
77200	Mistletoebird
77500	Welcome Swallow
77700	Tree Martin
77800	Fairy Martin
78000	Clamorous Reed-Warbler
78300	Tawny Grassbird
78900	Golden-headed Cisticola
79300	Silvereye
80500	Common Myna

\*C&B Number = is the standard reference for Australian birds taxonomic order (Christidis, L. and Boles, W.E. 1994. *The taxonomy and species of birds of Australia and its territories*. Royal Australasian Ornithologists Union, Hawthorn East, Victoria)

**Appendix 4**  
**Small mammals trapped on Pelican Point between December 1996 and December 1999**  
**[Number trapped in parenthesis].**

<u>December 1996 to October</u> <u>1997</u>	<u>February 1998 to December</u> <u>1998</u>	<u>March 1999 to December 1999</u>
<i>Isoodon macrourus</i> [27]	<i>Isoodon macrourus</i> [29]	<i>Isoodon macrourus</i> [31]
<i>Melomys burtoni</i> [113]	<i>Melomys burtoni</i> [188]	<i>Melomys burtoni</i> [184]
<i>Mus musculus</i> [21]	<i>Mus musculus</i> [4]	<i>Mus musculus</i> [5]
<i>Rattus sordidus</i> [147]	<i>Rattus sordidus</i> [80]	<i>Rattus sordidus</i> [56]
<i>Uromys caudimaculatus</i> [1]	<i>Rattus</i> sp. [4]	<i>Rattus fuscipes</i> [1]
	<i>Mus</i> sp. [3]	<i>Rattus rattus</i> [5]
	<i>Peramales nasuta</i> [6]	<i>Peramales nasuta</i> [5]
		<i>Demarisia psammophis</i> [1]
		<i>Lampropholis delicta</i> [1]
		<i>Lymnodynastes peronii</i> [6]
		<i>Antechinus flavipe</i> [1]

**Appendix 5**  
**Incidental recordings of other vertebrates and invertebrates on Pelican Point**

Reptiles and amphibians

Carpet Python; Red-bellied Black Snake; a dark grey snake with red belly [not identified]; a black snake [not identified]; Common Brown Snake; Yellow-faced Whipsnake; Cane Toad [*Bufo marinus*]; Striped Marsh Frog; Turtle [not identified].

Butterflies

Australian Rustic; Big Greasy; Blue Argus; Blue Tiger; Blue Triangle; Brown Soldier; Cairns Birdwing; Common Brown Ringlet; Common Eggfly; Common Grass Yellow; Common Jezebel; Dingy Bush Brown; Dingy Ring; Evening Brown; Lemon Migrant; Lesser Wanderer; Little Greasy; Meadow Argus; Orange Bush Brown; Orchard; Small Grass Yellow; Ulysses; Union Jack.

Moths

Zodiac [*Alcides zodiaca*], *Nyctemera baulus*, *Utertheisa pulchelloides*.

Cicada

Red Roarer [*Psaltoda aurora*].

Spider

Golden Orb Weaver [*Nephila pilipes*].