AUSTRALIAN FOREST DEVELOPMENT INSTITUTE

(A.F.D.I.)

NEW ZEALAND FARM FORESTRY -

AGROFORESTRY STUDY TOUR

NEW ZEALAND (NORTH ISLAND)

20 APRIL - 3 MAY, 1985

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1. INTRODUCTION

I was one of 14 Australians on a tour arranged to include the annual conference of the N.Z. Farm Forestry Association, held in Hamilton April 22-28.

Theme of the conference was:

"Farm forestry and the landscape"

This is a very much broader perspective than producing trees for profit on farms, although the conference did include trees as farm crops producing a farm income from timber, fruit and nut crops, fodder and seed.

Amenity plantings did figure largely in discussions, as did the use of trees with horticulture (production and shelter).

From a personal point of view I would have preferred to have spent more time with officers of the N.Z. Forest Service and the Forest Research Institute. (Itinerary: Appendix I).

2. SUMMARY

I will concentrate my observations primarily on the role of trees in agroforestry.

With any observations made, the differing conditions between New Zealand and Western Australia have to be taken into consideration, particularly rainfall, altitude and soil type.

Radiata pine for shelter and timber production is the most widely used species in New Zealand agroforestry. Generally the aim is to produce a 6 metre butt log with a small diameter knotty core and fast grown mature clear wood of 80-100cm diameter.

However, there is a tremendous appreciation of the role, and value that quality hardwood timbers have in the practice of agroforestry. Favoured species include *Acacia melanoxylon* (Tasmanian blackwood) *Juglans nigra* (black walnut), and the *Eucalyptus botryoides, saligna, regnans, delegatensis* and *fraxinoides*.

It is widely accepted that the most efficient and productive shelterbelts are rows of two, one production (radiata or suitable hardwood progressively pruned to at least 6 metres) and, on the windward side, a slower growing low shelter species such as *Cryptomeria japonica* (Japanese cedar), *Thuya* sp. (book-leaf pine), *Cupressus* sp. *leylandii* or *macrocarpa*.

Fencing is essential to protect any shelterbelt tree plantings from grazing by stock. Electric fencing is the most widely used and by far the cheapest. This has particular significance for the protection of windbreak plantings in W.A. For radiata timber production protection against grazing is essential in the first two to three years, after which grazing must be closely monitored to prevent bark damage.

Early and regular pruning is necessary to restrict the diameter size of the knotty core. There is diversity of opinion among N.Z. growers about the most efficient regime needed to minimize the knotty core and maximize the growth rate.

The answer to this problem can often be obtained with the use of the Forest Research Institute's predictive computer programme, SILMOD, which is quoted and used extensively by F.R.I. officers and, to a lesser degree, by forest extension officers and farmers. I consider we should be looking at developing a similar programme for W.A.

A great deal of research on agroforestry has been carried out jointly by F.R.I. and Ministry for Agriculture and Fisheries officers. Both departments, agriculture and forestry, agree on the value of active ongoing agroforestry policy research and demonstration plots.

In general, in the North Island, timber markets are available within a reasonable distance. Some sawmillers expressed doubts regarding strength properties and excessive taper, resultant from the present emphasis of producing open grown clear timber.

Farmers are very interested in fodder trees and a great deal of experimental work is being carried out at the National Plant Material Research Centre, Palmerston North, particularly with willows and poplars.

Another item of interest was the research centre's work on windbreaks for horticultural blocks using minimum width mechanical fan pruning carried out to 8-16 metres.

Seed collection on a commercial basis is practised and could be a commercial possibility in W.A., particularly in the wheatbelt.

For any agroforestry schemes, farmers were very aware of costs of production and potential return. For extension officers it behoves us to be equally aware.

To summarize, there are many and varied forms of agroforestry being practised on the North Island by a very keen and dedicated band of farm foresters. However, they are scattered and there is still potential timber and land area resource not being utilized. At present agroforestry is not widely practised but is on the increase.

From the Forest Service radiata plantations sighted on tour, the present plantation silvicultural system is for early pruning and culling to a final stocking around 200 stems per hectare.

Radiata is used extensively in house construction, farm fencing (almost picket fencing), transmission poles, railway sleepers, landscape gardening and domestic fuel.

3. TOUR REPORT

A visit to Neil Barr's property 'Beresford' at Kaukapakapa, renewed our friendship on his home ground, and was indeed an auspicious start to the tour.

'Beresford' has a 1150-1500mm rainfall at 60m a.s.l., on rolling to hilly country. Neil started planting of shelterbelts in 1938. He is now utilizing home-grown *Eucalyptus saligna* and *botryoides* and *Acacia melanoxylon* for furniture making, breaking down the logs on a portable saw powered by the farm tractor. Saw some 32-year-old *Eucalyptus botryoides* grown in a gully situation which had very good growth. Neil has sold some 25-year-old eucalypts as piles and poles at $40 each, and to date has netted $6,000 from 1.0-1.5 hectares.

The McCallum brothers were on site to demonstrate their capabilities with their patented pruning ladders and jack saw. With a 1.2 metre ladder they could prune to 4 metres and with a 2.4 metre ladder to 6 metres (Appendix IV).

A 2 hectare plot of three-year-old radiata cuttings in kikuyu grass were being heavily grazed by a mob of sheep. No tree damage was noticed.

Neil demonstrated his form pruning technique in this plot.

The tour passed through 20-year-old radiata stand which had been pruned to 6 metres, on the way to the farmhouse. At the house there was a selection of furniture made from hardwood timber grown on the farm.

Next day, en route to Hamilton to register at the Farm Forestry Association Annual Conference, we stopped off at Dick Endt's tropical fruit nursery just out from Auckland.

There was an amazing variety of tropical fruits and plants, mainly from South America. They included papaya, pepino, feijoa, babaco, walnut, tamerillos, bamboo varieties, custard apples, evergreen cherries, macadamia, and kiwi fruit. Fortunately, the feijoa was ripe and available and I had a very pleasant introduction to this fruit.

After a late afternoon registration at the Waikato Motor Motel we were welcomed by the Chairman of the local Waikato Municipal Council and the Waikato Farm Forestry Association Chairman, David McNeil.

The conference was officially opened by David Butcher, M.P., Parliamentary Under-Secretary to the Minister for Forests. He spoke at length on the important role the farm forester has to play, and was followed by dinner and a talk on the geology of Waikato Basin by Professor Michael Selby.

The first field day (Appendix III) included a morning coach trip through Cambridge past the millionaire's mile - horse stud country worth around $5,000 or more per hectare.

The first stop was at McLaren Falls arboretum, located in the catchment reserve of the Wairoa river hydro-electric power scheme. The arboretum was created, planted and is maintained by the Tauranga Tree Society. The 60 hectare arboretum property now has over 500 tree species. The country is very picturesque, steep but with well laid out paths. Fortunately the route wandered downhill, and picnic lunch was served by the waterfalls on the lower slopes of the arboretum.

After lunch it was onto 'Birchlands', the McNeil's family farm situated on the western slopes of the Kaimai range. The farm consists of 324 hectares, of which 84 are bush and 24 are planted (20 radiata and four mixed). This property is primarily a dairy farm, but also runs sheep and two small mobs of red and fallow deer. The deer enclosure is landscaped and includes dams on which a wide range of waterfowl are raised.

The main forestry interest and point for discussion was a single row radiata pine shelterbelt planted in 1980 and being tended in conjunction with F.R.I. forest officers. At four-years-old the best stems were pruned to 2 metres (in my opinion 18-24 months too late). The remaining trees were fan pruned to minimize shading of pasture.

Shelterbelt - McNeil's Farm

In discussion later with F.R.I. officers, it was made clear that the intention is to retain all trees at the 3 metre spacing. The best formed will eventually be pruned to 6 metres and the remainder will continue to be fan pruned. Nutrition will be adequate from adjoining pasture. They are not worried about gaps, particularly when two adjoining trees are pruned. I accept this premise as it is a shelter-belt, but it would not be acceptable for a windbreak with such gaps in the lower canopy.

The first after dinner speaker was K.W. Vernon of Gallagher Electrics who spoke on electric fences for trees. I consider greater use could be made of electric fencing in W.A. and have arranged for the W.A. represent-ative to contact me.

Dr Ron Kilgour (scientist, Ruakuru) later spoke on farm animals and trees. A very interesting aspect of his talk concerned farm animals' behavioural reaction to trees.

Lastly - Harry Bunn (retired O.I.C., F.R.I.) Rotorua, spoke on 'target' silviculture, for me the most interesting subject to date. He emphasized that growers must have a very definite idea of what sort of tree they were aiming to produce as the end product and the need to aim all silvicultural work to that end.

It was a cool start next morning with a real good Scotch mist and visibility down to 20 paces. First visit was to John (President of N.Z.F.F.A.) and Bunny Mortimer's 20 hectare property, Taitua. The Mortimers took over the property in 1971 and started planting trees. There are now over 300 species, and this property would epitimize the conference theme 'farm forestry and the landscape'. Nevertheless, it is agroforestry with Charolais cattle being bred and a few horses run on the property. Tree fodder species utilized include gleditsia, poplar and willow. *Eucalyptus saligna* planted in 1981 is used for firewood production, and black walnut is being grown as a fine timber species. A block of radiata on the property has been thinned and fencing material was being debarked on site with a portable machine - a chainsaw type engine with a round flailing implement in place of the saw and bar - very efficient for this small-scale operation (Appendix IV).

In a mixed block of *Eucalyptus regnans*, *saligna* and radiata pine planted in 1977, the eucalypts had overtopped the radiata and had formed course branching. The radiata was unthinned. From my observations, such a mixture would require an earlier planting of radiata and a cull at two years before planting the eucalypts and fertilizing.

Two interesting species from China were *Pawlonia tomentosa* and *catalpa*, growing quite well.

At Whatawhata Hill Country research station, Ross Ellion (Director of Agriculture and Fisheries) spoke on the conflict there had been between agriculturists and foresters over the concept of agroforestry. There is much more agreement today and trees are considered as another farm crop which will provide an additional return.

Trials with radiata pine planted in 1970 for agroforestry on steep dry hill country were also sighted, but time did not permit an on-site inspection.

Their summary after 13 years:

1. Clear objectives and a high standard of farm management are required.
2. Trees grow faster on farmland than 'traditional' forest sites.

3. A high standard of silviculture is essential.
4. Slash does constrain agricultural production over the first 10 years.
5. Good livestock performance requires low tree densities.

The tour left Whatawhata and passed through some very rugged and picturesque country to return towards Hamilton and Tohetauhau, another property of the Mortimers. This 112 hectare property was purchased in 1964. Planting began in 1965 and continued through to 1970; 35ha planted under a farm forestry loan scheme and 10ha outside the scheme. Financial returns on this plantation have not been satisfactory to the owners and there was much discussion on what silvicultural work should have been carried out and more on what should be undertaken in the future.

F.R.I. officers were adamant that, given the owners' requirements and expectations, various options should be run through the SILMOD computer model so that regimes could be evaluated in advance.

One dominant tree had been felled, sawn and laid out to show the various grades of timber obtained. The majority were of the opinion that the plantation should be thinned to 100 stems per hectare and the remaining crop carried through to clear felling at 25-30 years, depending on the most advantageous financial return.

There were no field trips on the Thursday and the morning was devoted to workshops - two from four available. I chose: ' Efficient Shelter plus High Quality Timber'. One view was given by Jeff Tombleson (F.R.I.), and another by Peter Smail (farmer, South Island since 1953).

The salient points made were:

1. Shelterbelts occupy some of the most productive land in N.Z.
2. Management of shelterbelts can combine both timber production and shelter.
3. Single row shelterbelts have been shown to be the most profitable.
4. The potential shelterbelt resource in N.Z. exceeds 1 million hectares.
5. Shelterbelt timber could be worth at least $50,000 per kilometre.
6. 95% of shelterbelts are unmanaged at present.
7. No-one as yet has made money from a 'shelter' species other than radiata pine.
8. Many people do not like radiata pine.
9. Conflicting advice is provided on most aspects of shelterbelt silviculture.
10. Farmers are still not convinced or motivated in planting and managing shelterbelts for a profit.

Meaty stuff, to the point and convinced he is right. I commend his attitude, as a positive approach is essential, but I considered him rather inflexible.

Peter Smail -

1. Plant primarily for shelter - timber is a perk.
2. Recommends a 50% permeable shelter.
3. Shelter is effective for 18 times tree height, and there is 60% improvement in dry matter feed for 12 times tree height.
4. Orientation is important to maximize sunlight on both sides of belt. Does not consider any pasture is lost against trees.
5. Prunes every other tree if suitable and fan prunes the rest.
6. Recommended a complimentary planting of second species, i.e. *Cedrus*, *Thuga* or *Cupressus torolosa*, on windward side.
7. For shelter after lambing, open agroforestry was recommended; initial planting at 300 stems per hectare, thinned to 150 s.p.ha.
8. Complete weed control at time of planting is essential for successful establishment. Electric fencing is essential.

Very practical comments from a farmer who has learned by experience. In the overall, I got the same message from both speakers. One can have protection and production. This must be pursued with vigour in our Esperance windbreak planting.

The second workshop I attended was: 'Silviculture & Timber', and the speakers were Piers McLaren of F.R.I., and Ray Grant, a sawmiller with 25 years experience.

Piers McLaren:

1. New Zealand prunes more than any other country.
2. Unpruned radiata is one of the worst timbers.
3. Radiata clean wood is one of the best.
4. Do not judge radiata on old silvicultural regimes, do not condemn it now until you can observe the results of recent pruning.
5. Getting it right is easy (i.e. small branching), getting it wrong is hard work (large branching).
6. Butt logs (33% volume 60% value), should determine silvicultural regime.
7. Grow pruned stands at low stocking on reasonable sites (no more than 200 s.p.ha). Seedling planting ratio 4:1, cuttings 3 to 2:1. Take great care at time of planting. Thin early and get down to final crop as soon as possible. When pruning, leave 3-4 metres green crown and use a diameter gauge 8-10cm to ascertain pruning height. This should give a maximum diameter of 21cm knotty core.

A very good resume of a silvicultural regime for sawlog production, i.e. less volume, more profit. Given in a very positive manner. He recommended strongly for growers to use the SILMOD computer programme to view the alternatives available. I would like to see this Department giving early consideration to this facility.

Ray Grant:

1. Purchase by weight and sell by volume.
2. Governing factors are the quality of the log (whether peeler, timber or pulp) and the distance of the resource from the sawmill; pulpwood can only be transported a short distance.
3. Generally, sawmills are now very specialized.
4. Woodlots supply only a small percentage of total supply.
5. Generally, log quality is variable and it is very difficult to assess standing timber quality. It is hoped future supplies will improve.
6. The estimated final return from the green sawn timber decides what purchase price will be paid. No great profit in actual sawmilling; profit comes after seasoning and dressing.

Ray's comments give the foresters something to think about. In discussion he made the comment that sawmillers prefer to obtain supplies from large areas. He looks forward to purchasing a large diameter, clean open-grown butt log timber and does not foresee any problems in disposing of second logs as boxwood timber. Predicts a much higher stumpage from cleanwood trees.

One quote made during the open resume on 'Managing the Farm Landscape' was "Land is borrowed from children rather than inherited from parents".

The A.G.M. of the N.A.F.F. Association was held that afternoon. The after dinner speaker was Guy Salmon (Director - Joint Campaign for Native Forests) and he gave a very reasoned and balanced talk which was appreciated by an audience more at the other end of the spectrum.

After a day indoors it was pleasant to be off to the countryside on Friday. The day started at Garth Cumberland's farm, 13km south of Te Kuiti; 333 hectares, 150-360m a.s.l. and 1800mm rainfall. The Cumberlands have been on the farm since 1975 and started planting that year.

For the first five years surplus funds were used for an annual planting programme. Over the next five years, 1981-85, funds went on the maintenance of these plantings, and planting will now continue as funds permit.

Cumberland homestead

Plantings were carried out in blocks to break up bare paddocks for stock shelter, and in an unwatered paddock. Species used in block plantings included radiata pine and mixtures of *Eucalyptus fraxinoides* and *delegatensis* with some radiata. Amenity planting was also carried out around the homestead.

Pinus radiata

Eucalypts

The radiata is being managed on an open agroforestry regime with final stocking of 100 s.p.ha, at year five. Early pruning was delayed but is now carried out on time using a 12-13cm diameter gauge every six months. The trees will eventually be pruned to 6 metres.

Predicted returns (SILMOD) of the P.75 radiata pine on a 28-year rotation - including grazing - should be double the gross return from grazing alone.

It was a very interesting morning, followed by a scenic drive through the Pureara State Forest Park. Lunch at Pureara preceded a stroll along the Totara Track through tall podocarp rain forest with kahitatea, matai and some particularly fine specimens of *Podocarpus totara*.

The return to Hamilton was by another scenic route.

This was the official end of the Conference, but we did have a social wind-up; a Barvarian evening complete with a German brass band, good beer and wine and a sing-song. Midway through the evening it was put on 'the Aussies' to get out and give a rendering of 'Waltzing Matilda'! I was first to be introduced as a dinkie-di Aussie with a dinkum Aussie accent!! A very enjoyable evening with a pleasant group of people.

Next day was an optional visit to the Tikitere agroforestry trials near Rotorua. We packed our bags and were on the road again.

Tikitere is a joint agroforestry trial (with input from the Ministry of Agriculture and Fisheries (M.A.F.) and N.Z. Forest Service (N.Z.F.S.) staff). It commenced in 1973 on 93 hectares of land leased from Tasman Pulp & Paper Co.

The 1973 planting of radiata pine was at five densities of s.p.ha, 400, 300, 100, 50 and nil; in 2 hectare plots with 28 metre buffers and four replicates. Sheep were run and managed to simulate hill country conditions. The trees were planted at five times final crop density and pruned to 6 metres in four to five lifts.

Tikitere agroforestry - 50 stems per hectare

Tikitere agroforestry - 100 stems per hectare

Summary of their major findings to date:

1. Successful integration of farming and forestry requires clear objectives and high standard of management.
2. Trees grow faster on farmland than comparable forest sites.
3. A high standard of silviculture is essential to produce high value sawlogs.
4. Slash and tree competition are the major effects on agricultural production in the first 10 years.
5. Livestock performance is little affected by trees up to 100 s.p.ha. Above 200 s.p.ha livestock performance declines.

Further trials seen included P.74 radiata pine established in a double row 3.5 metres apart, with 1.5 metre spacing between trees and 28 metres grazing between rows. Reduced to final crop spacing of 100 s.p.ha, this layout increased grazing capacity but reduced tree size.

Finally, we saw a P.83 radiata pine cuttings trial planted at final crop ratio 3:1, using various layouts; single, double and triple rows and groups, and protected by electric fencing. One example I found of particular interest was the protection of single trees with one wire 30cm from the ground (illustrated below).

Tikitere - electric fencing to protect single trees

In the afternoon we visited shelterbelt demonstration plots at Kakaroa. Here Jeff Tombleson of the F.R.I. expounded the now famous Waikiti sheterbelt story where the farmer netted $16,500 from a .545 kilometre belt of 22-year-old radiata pine (with western red cedar) - equivalent to a return of $30,000 per kilometre. Tombleson stated that if all trees had been pruned the return would have been around $50,000 per kilometre. Cross sections of trees from the Waikiti shelterbelt showed width of growth rings, the ideal small knotty core and a low grade late pruned large knotty core.

Demonstration shelterbelts on site included P.78 *Eucalyptus regnans*, planted 3.5 metres apart and pruned, with a supplementary row of *Cryptomeria japonica* planted 1.5 metres apart on the windward side. It was estimated the stumpage for *Eucalyptus regnans* will double that received for radiata pine.

Kakaroa

P.78 *Eucalyptus regnans* with *Cryptomeria japonica*

Next was P.78 radiata 2 metres apart, 500 to kilometre, with *Cryptomeria* again as the supplementary species. The regime was for all radiata to be pruned, but it was agreed in effect, that only well formed trees, showing great promise should be pruned. In both cases the cryptomeria were very effective as the lower shelterbelt.

Other demonstration radiata shelterbelts included a variety of treatments: normal pruning; no pruning; fan pruning 40% total height one side; internodal to 2.7 metres; alternate tree and fan pruning, and control.

A shelterbelt mixture of radiata and larch was not considered suitable because larch is deciduous.

An interesting comment made when discussing the efficiency of electric fencing noted that it always worked well for cattle, but that sheep should be introduced to it just after they have been shorn.

Sunday, we had a leisurely start and spent most of the day travelling to Taupo. En route we stopped at Te Puke, a kiwi fruit growing area, and wandered around Trevor Lennard's honey locust plantation. Planted 7 metres apart in 1958, the trees provide good food value and still permit good pasture to grow.

Between Taupo and Napier there are large N.Z. radiata plantations, high pruned and stocked around 200 s.p.ha. The plantations were only treated about 50 metres either side of the road! It was either window dressing or a fuel reduced buffer zone. The 150 kilometre journey was mostly through very rugged terrain.

From Napier we travelled to Havelock North and the Haora farm of John Aitken. With neighbouring landowners, John has formed a joint forest venture, the Tuki Tuki Scheme. Farm forestry as practised in Finland is the basis of John's agroforestry philosophy.

We had a look over the plantings of a neighbour, Peter Ormond of Kawika farm. Peter has 580 hectares planted at 600 s.p.ha (P.79 and P.84) and protected with electric fencing on land which would only carry three ewes per hectare. There will be no grazing until year four and, at the time of first pruning with secateurs, Peter will cull to 150 s.p.ha and prune progressively to 6 metres. He anticipates a yield of 15-20m^3 per hectare.

John Aitken has 500 hectares with 160 hectares under radiata willed to his children. His pruning regime will commence at year four to the height of the first winter whorl, providing a diameter of 14cm has been attained at the base of the pruning lift. Thereafter he will prune the winter whorl formed three years previously, with the same diameter proviso. This regime will mean a larger knotty core than was acceptable in previous regimes cited, but John insists his method will maintain greater overall growth and thus produce a larger log quicker. I would say the pruning range would be

between 10 and 14cm diameter maximum, and I still advocate form pruning which he does not accept.

A very interesting stop and certainly food for thought.

Agroforestry - John Aitken's Haora Farm

At the National Plants Materials Centre, Palmerston North, the main objective is soil conservation, i.e. evaluate, develop and release improved plant materials for land stabilization, erosion control, river control and shelter. The Centre also carried out research into multiplication, establishment and management techniques, and diseases of soil conservation plants.

On a tour around the 32 hectare nursery we saw a large variety of trees being grown, but the emphasis was on the multiple use of trees for shelter, shade and fodder.

Main species include poplars, willows, alders, eucalypts, casuarinas, cupressus, robina, elms and bamboos. Also of interest was the mechanical high pruner mentioned earlier. Powered from a 70 h.p. tractor, the five circular saws or flails fan prune 8 to 15 metres, depending on model size. Present price of $NZ50,000 includes modifications.

It was interesting when leaving Palmeston North to see a house frame built entirely of radiata timber.

Yet another scenic drive through Woodsville, Masterton and Tinui brought us to Jim and Airini Pottinger's farm 'Anerley', where the group spent the night.

Next morning, at 210-390 metres a.s.l., the air was quite brisk! We saw some 30-year-old radiata pine, unpruned, which had been sold for $20m³ at stump. Jim Pottinger is not a keen radiata farm forester and so his forest blocks are much more diversified.

The shelterbelts planted since 1979 are mainly *Eucalyptus fraxinoides* and/or *cordata*, with supplementary species N.Z. flax and/or *Oleria traversii* (Chatham Island Ake Ake) taking the belt to 3 metres wide with electric fencing.

Oldest plantings (1952-66) carried out by the Pottingers were mainly conifers: radiata, Douglas fir, redwoods, larch, spruce, cedar and some eucalypts. Other areas on the farm are indigenous bush which have been fenced off and protected from grazing.

General view of Anerley farm. The homestead roof is just visible among the trees, left middle.

More recent plantings are mainly *Eucalyptus fraxinoides, regnans* and *Acacia melanoxylon*, with some radiata and protection by two electric wires. The first species has produced a profit from seed collection; one tree felled and limbed produced 4 kilograms of seed at $225 per kilogram.

Jim Pottinger makes extensive use of electric fencing. One solar unit should service 24 kilometres of wire, and costs $1,400 per unit with a large battery.

Poplars are used as a source of feed in drought years. Pruned last year and two years ago, nine trees a day provided feed for 140 cattle.

It was a most pleasant and interesting day on this farm - a wonderful end to a most interesting tour. Airini and Jim Pottinger were pleased with the selection of W.A. posters sent on my return.

So to Wellington and a final dinner with some N.Z. Forest Extension Officers and staff from the N.Z. Ministry for Forests. One young man had been seconded to evaluate the possible amalgamation of the N.Z. Forest Service and Lands Department! It's catching!!

4. CONCLUSION & RECOMMENDATIONS

1. Agroforestry is the way to go if this Department wants farmers to plant trees and provide an input into the State's future timber resource.
2. The most suitable species will be pine, radiata or pinaster, according to climatic and soil conditions.
3. Cleanwood timber production should be the objective.
4. Agroforestry research and extension should be interdepartmental.

A C.A.L.M./Department of Agriculture working plan, or similar, should be formulated, accepted and formalized by the top policy groups of both Departments.

5. Agroforestry research is required:
   - i) to find the most suitable form of windbreak and shelterbelt, i.e. species, spacing, number of rows and the need for electric or conventional fencing.
   - ii) to find suitable hardwood timber species which could be recommended for growing on farms.

iii) to find the most efficient silvicultural system required to produce the maximum quantity of clean timber.

iv) to obtain factual data on the quality of pine timber grown under agroforestry conditions.

v) to provide facilities for wheatbelt farmers being encouraged to plant trees for seed production for sale in Australia and overseas.

6. Departmental agroforestry research and extension input should be concentrated initially in the South Coast Region.

7. The Department needs to build up the supply of pine cutting material suitable for sale to private/agroforestry planters.

8. Investigations should be instigated on the feasibility of planning a computer programme along the lines of the New Zealand Forest Service 'SILMOD'.

9. A computer programme needs to be prepared to record private timber plantings for future assessment of timber resource.

10. Consideration should be given as to whether the Department's agroforestry extension services would be best served by the Information, Silviculture or Timber Production Branch.

PETER RICHMOND
REGIONAL FORESTER

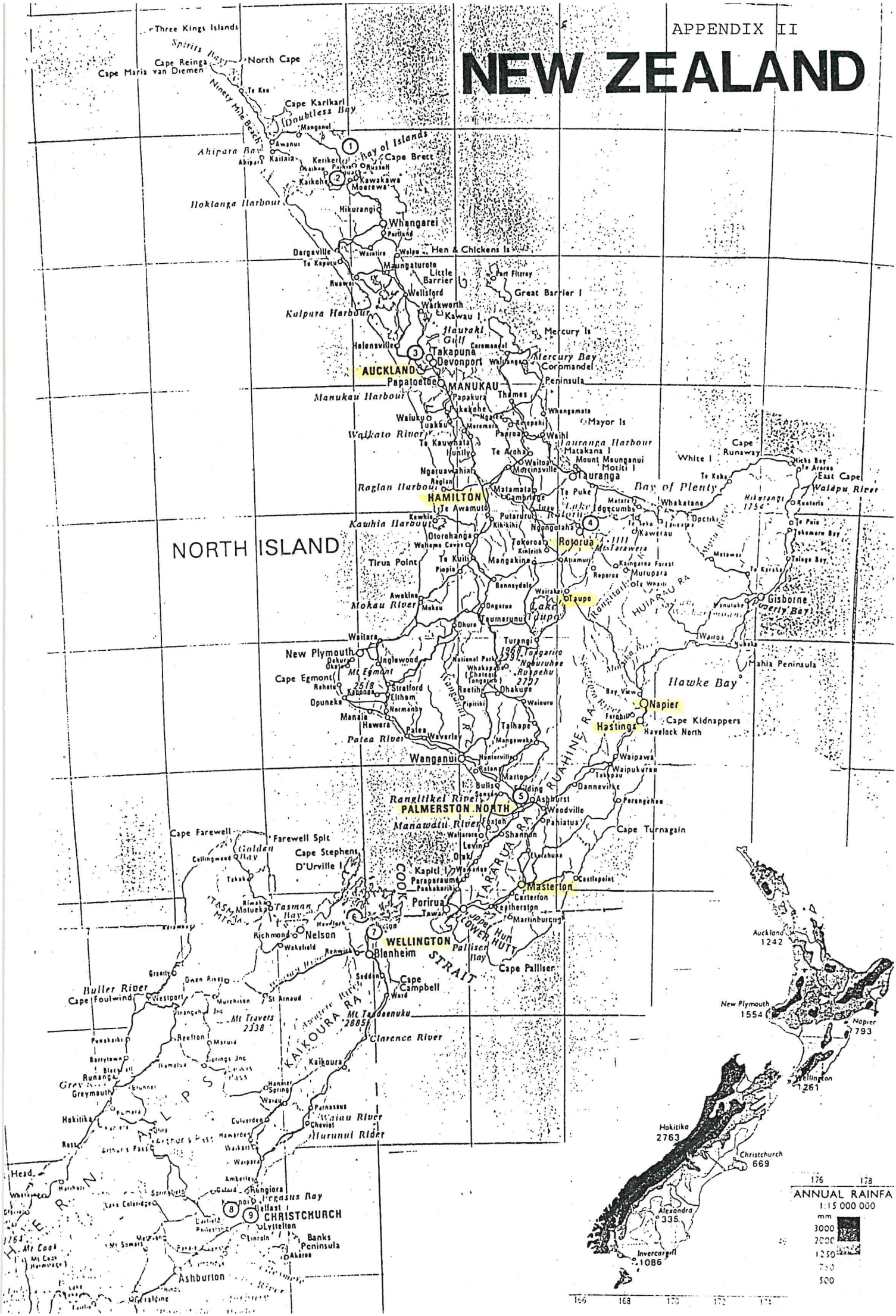
PJCR/me

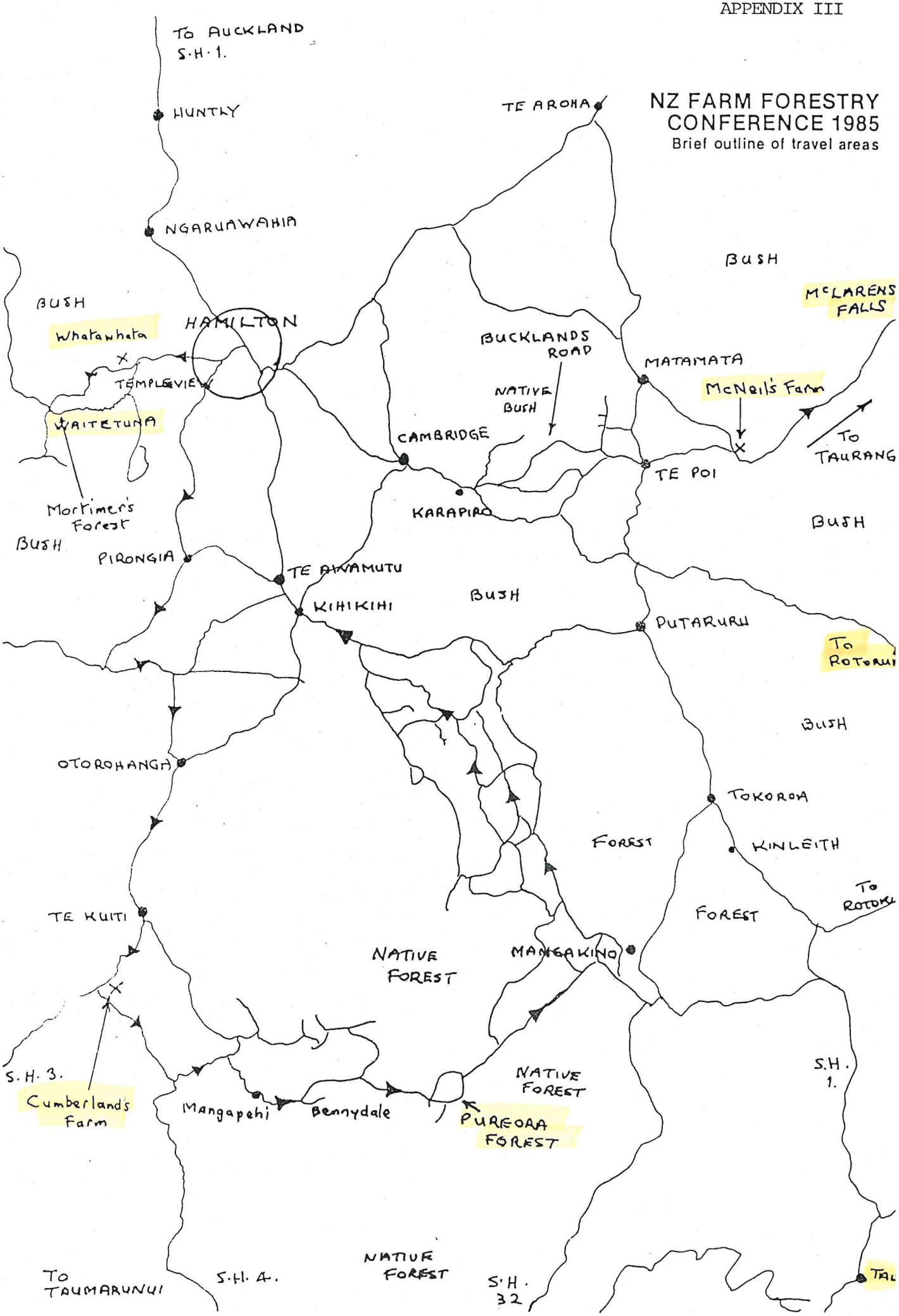
ITINERARY

Friday	19 April	Direct flight Perth to Auckland.
Saturday	20 April	R.V. Auckland and meet other members of group Free day.
Sunday	21 April	Visit Neil Barr's Farm 'Beresford' at Kaukapakapa.
Monday	22 April	Endt's tropical fruit nursery en route to Hamilton, register for N.Z. Farm Forestry Association Conference. Dinner and opening of Conference.
Tuesday	23 April	Field day and visit McLaren Falls arboretum, and McNeil's farm on the Kaimai ranges.
Wednesday	24 April	Field day. Visit Mortimer's farm at Taitua, thence to Whatawhata Hill country research station and to Mortimer's other property. Tokehautau at Waitetuna.
Thursday	25 April	a.m. Conference workshops. p.m. Annual General Meeting.
Friday	26 April	Field trip to the Cumberland farm at Te Kuiti, then to Pureora State Forest.
Saturday	27 April	Depart Hamilton for Rotorua, field day at Tikitere agroforestry trial, jointly conducted by N.Z. Forest Service and Ministry for Agriculture and Fisheries. In the afternoon to F.R.I. shelterbelt demonstration plots at Kataroa.
Sunday	28 April	Rotorua to agroforestry with honey locust at Te Puke, night at Lake Taupo.
Monday	29 April	Hastings via Napier to John Aitken's large-scale *Pinus radiata* agroforestry at Havelock North to Palmerston North.
Tuesday	30 April	National Plant Materials Centre, Palmerston North, then via Woodsville, and Masterton, to Jim Pottinger's farm 'Anerley' at Tinui.
Wednesday	1 May	Anerley farm with mixed plantings; emphasis on hardwoods - to Wellington.
Thursday	2 May	Free day in Wellington with official dinner.
Friday	3 May	Wellington Auckland to Perth via Sydney.

APPENDIX II

NEW ZEALAND




NZ FARM FORESTRY CONFERENCE 1985
Brief outline of travel areas
TO AUCKLAND S.H. 1.
HUNTLY
NGARUAWAHIA
TE AROHA
BUSH
McLARENS FALLS
BUSH
Whatawhata
HAMILTON
BUCKLANDS ROAD
MATAMATA
TEMPLEVIEW
NATIVE BUSH
McNeil's Farm
WAITETUNA
CAMBRIDGE
TO TAURANG
TE POI
Mortimer's Forest
KARAPIRO
BUSH
BUSH
PIRONGIA
TE AWAMUTU
KIHIKIHI
BUSH
PUTARURU
To ROTORUA
BUSH
OTOROHANGA
TOKOROA
FOREST
KINLEITH
TE KUITI
FOREST
To ROTORUA
NATIVE FOREST
MANGAKINO
S.H. 3.
NATIVE FOREST
S.H. 1.
Cumberland's Farm
Mangapehi
Bennydale
PUREORA FOREST
TO TAUMARUNUI
S.H. 4.
NATIVE FOREST
S.H. 32
TAU

PUBLICATIONS RECEIVED ON TOUR & AVAILABLE

1. N.Z. Farm Forestry Association conference papers, Hamilton 22-28 April, 1985.

2. Forest farming research at Tikitere - Handbook, 1984.

3. Ministry of Agriculture and Fisheries 'Aglink' leaflets:

   i) Forestry on Farms - Establishment & early management of agroforests.

   ii) Forestry on Farms - Management of established agroforests.

   iii) Cantral plateau agriculture - features & significance.

   iv) Bamboos for shelter - varieties & culture.

4. Waikite shelterbelt - a glimpse at the future.

5. Shelterbelt demo plots - Kakaroa.

6. Aokautere soil conservation centre:

   i) Guide to National Plant Materials Centre.

   ii) List of shelterbelts National Plant Materials Centre.

   iii) Willow biomass for sheep & deer fodder in N.Z.

7. John Aitken, N.Z. Farmer and Agroforester.

   i) Family based agroforestry.

   ii) Diameter related pruning of radiata pine.

   iii) A case history in farm forestry development.

   iv) Notes for A.F.D.I. visit to Tuki Tuki Valley, April, 1985.

   v) Copy of Agreement - between farmer, forestry consultant, accountant and solicitor - for an agroforestry operation.

8. High pruning ladder brochure

   McCallum Enterprises
   P.O. Box 101
   MATAKAWA, NORTH AUCKLAND
   NEW ZEALAND.

9. Radiata - post - pile - debarker brochure

   Johnstone Post Peelers
   Fillery Road
   R.D.5 HAMILTON
   NEW ZEALAND.

10. New Zealand Radiata Pine (N.Z. Forest Service).

NEW ZEALAND TOUR REPORT : DISTRIBUTION

1. Richmond

Crawley 2. Executive Director

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+ J.C. Gilchrist to see

Esperance 6. Klaus Tiedeman

+ Regional Offices Albany & Kalgoorlie

7. C.S.I.R.O. & Department of Agriculture officers of Agroforestry Working Group