Session 1
Paper (b)

RESOURCES FOR CABLE LOGGING

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To enable the consideration of application of cable logging in the exotic forests of New Zealand we have to describe the current and future resources in terms of forests and people.

SECTION A - FOREST RESOURCES

1. HAULER LOGGING AREA

The best overall description of the plantation resource in New Zealand is the National Exotic Forest Description (Novis et al, 1988 and Burrows et al, 1987). The 1987 publication identifies the "Hauler Terrain" area by age class. This is the forest area "on which the preferred method of logging will be by hauler". The forest owner supplying the data identifies hauler area based on length and degree of slope and soil and other site characteristics. For this seminar the age classes of significance are those planted 1961-75.

Figure 1 illustrates the proportions of hauler terrain maturing (i.e. reaching age 30) over the next 15 years.

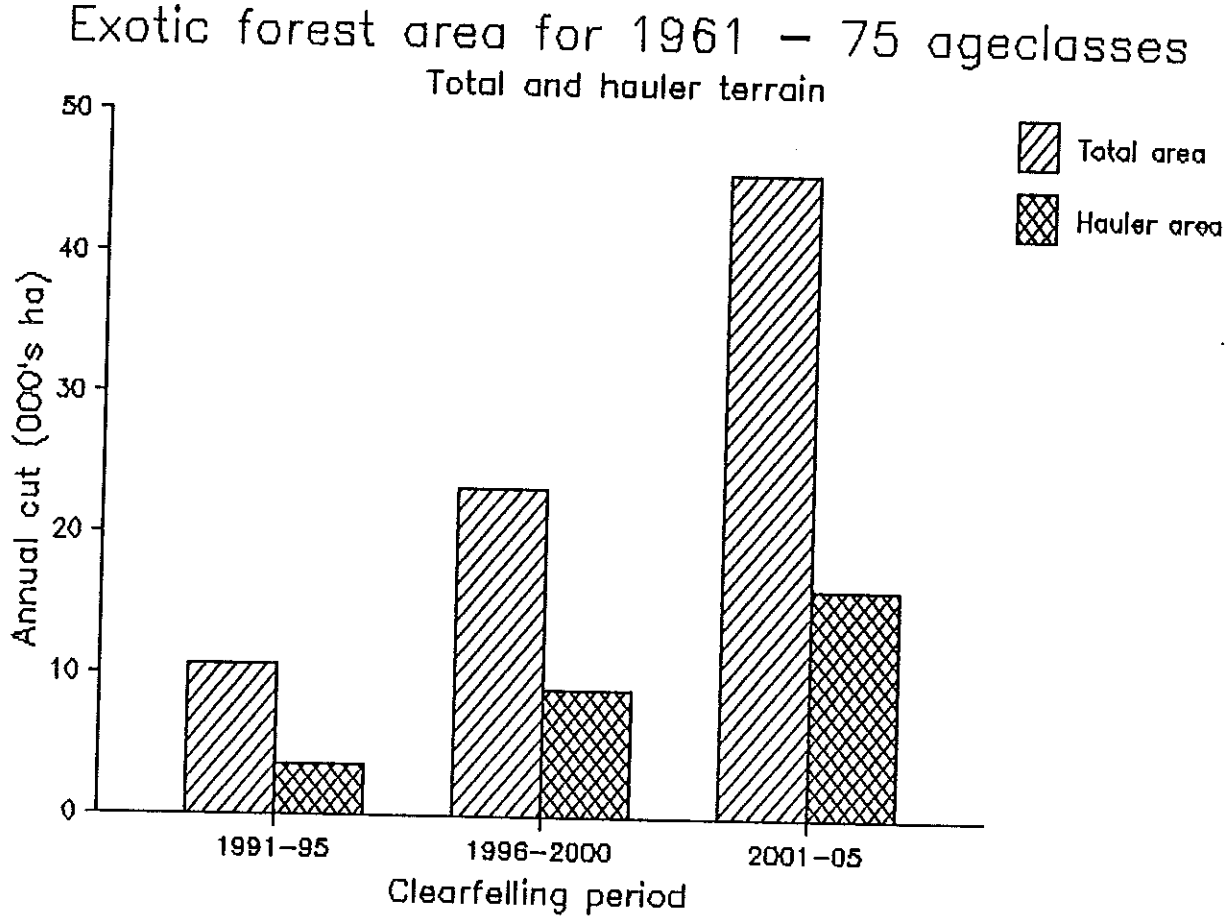


FIGURE 1

Table 1 further describes the hauler areas in terms of absolute and proportional areas and the expected yield. (An average yield at age 30 of 530 m^3 per ha is used. This yield is a weighted average of the total stem volume regional yields defined in Novis et al (1988), less 15% for harvesting and other losses).

There is a dramatic increase in hauler terrain maturing from the mid 1990's. On this basis the expected yield from hauler logging in the period 2001-05 could be as much as we are presently harvesting from all forest areas in New Zealand.

TABLE 1 : HAULER TERRAIN AREA AND YIELD, 1991 TO 2005

Period	*Area (ha/annum)*	*Hauler Terrain Proportion (%)*	*Yield (m^3/annum)*
1991-95	*3,600*	*34*	*1.9 million*
1996-2000	*9,000*	*41*	*4.8 million*
2001-05	*16,200*	*35*	*8.9 million*

2. REGIONAL VOLUME PROJECTIONS

a) The identification and use of data from the NEFD to predict future hauler logging requirements is subject to some significant assumptions:

i) The initial classifications of areas as hauler terrain. For the areas we are interested in, the basic classification was done 7 to 20 years ahead of the likely harvesting of these areas. Classifications are arbitrary and perceptions of what is hauler and what is ground based change over time.

ii) That stands will be harvested at age 30.

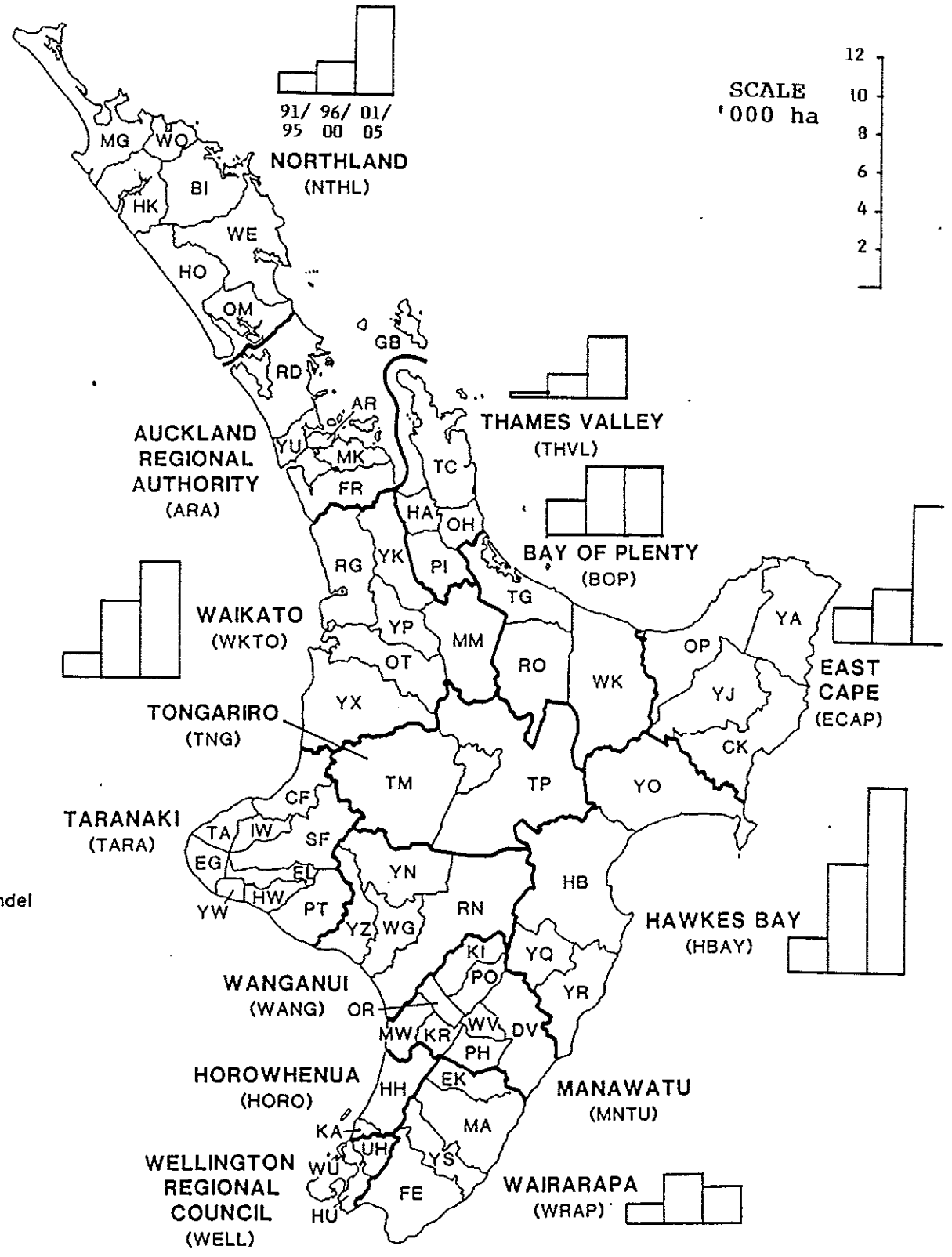
iii) That yields from hauler stands will be similar to the average regional yields.

In addition the predictions take no account of markets or the relative economics of harvesting and transportation. The location of planning districts with significant hauler terrain is shown on maps (1) and (2) with NEFD-based assumptions of yield for 1991/95, 1996/2000 and 2001/2005.

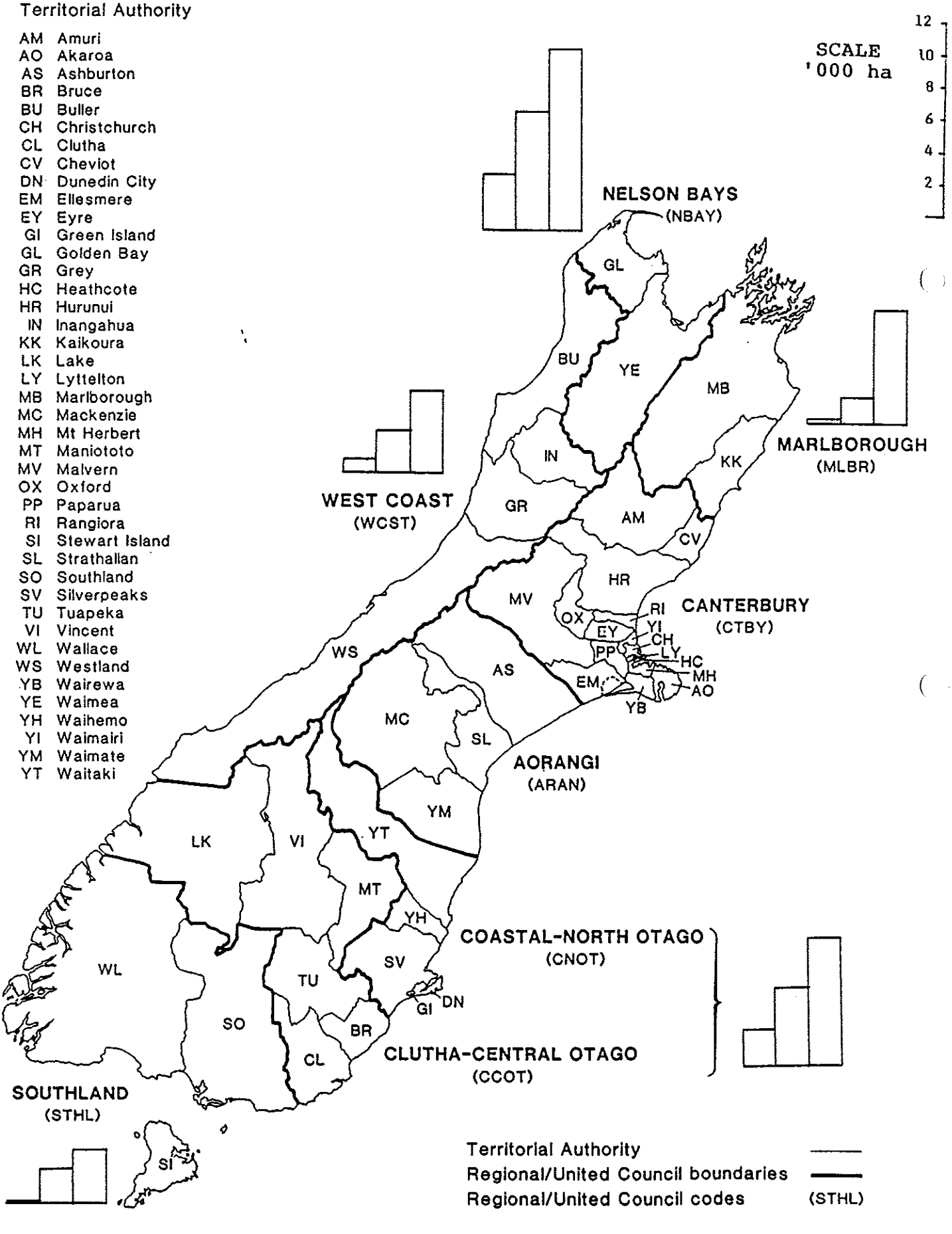
b) To check the predictions using the NEFD, the cable logging intentions of a number of companies in certain regions were queried. The regions selected were Northland, Thames-Coromandel, Hawkes Bay and Otago. In each region only the major companies (private and state) were surveyed, as they accounted for most of the harvesting likely before the year 2000 (note that extensive planting by smaller private owners did not start until after 1970).

Figures 2, 3, 4 and 5 illustrate the planned cable harvesting volumes for the regions selected. In addition

MAP 1 - HAULER LOGGING AREAS FOR SELECTED NORTH ISLAND REGIONS - AREAS MATURING (Age 30) IN FIVE YEAR PERIODS : 1991/95, 1996/2000, AND 2001/2005



MAP 2 - HAULER LOGGING AREAS FOR SELECTED SOUTH ISLAND REGIONS - AREAS MATURING (Age 30) IN FIVE YEAR PERIODS : 1991/95, 1996/2000, AND 2001/2005



the expected cut using the NEFD data and regional yield figures are shown for comparison. There are a number of variations from projections when specific planning is compared to these.

i) Northland: Planned harvesting volumes out to 1995 conform reasonably closely to the average NEFD predicted yield. Cable harvesting is at a low level in reasonably mature, well experienced operations. However, from 1995 the planned cut greatly exceeds the expected maturity. This is due to major private forest owners anticipating clearfell of stands as early as 15 and 20 years old.

ii) Thames-Coromandel: Planned hauler logging volumes greatly exceed the NEFD yield through to 2000. This seems to be due to a very conservative estimate of the proportion of hauler logging in the NEFD - only 25 to 40% of the area. In hindsight this prediction is clearly too low, given the relative steepness of terrain and the general sensitivity of harvesting to soil, water and aesthetic considerations.

iii) Hawkes Bay: Planned volumes are close to the average NEFD yield through to 1995, but are well short for the next period. This seems

FIGURE 2 - PROJECTED HAULER CUT FOR NORTHLAND REGION

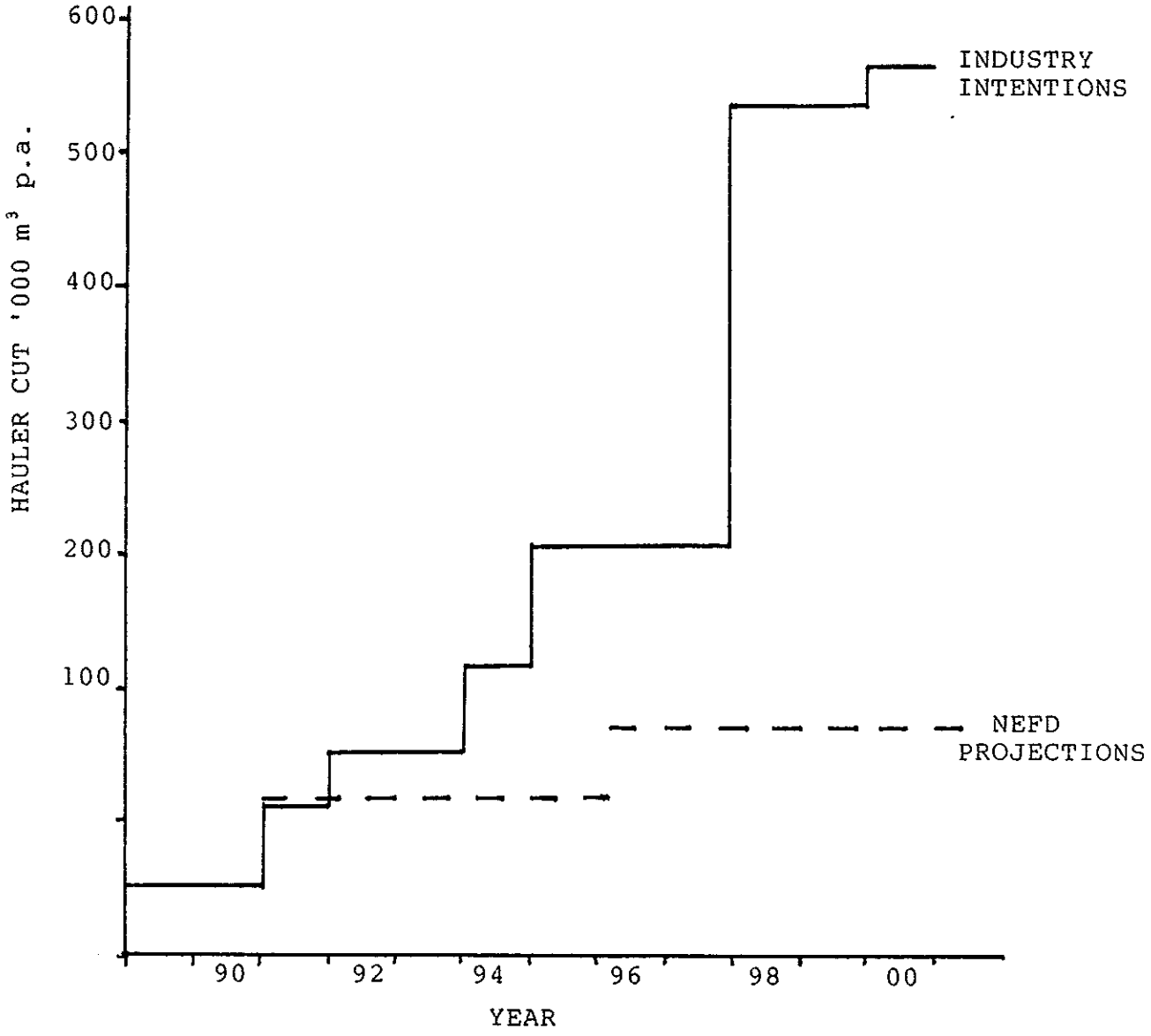


FIGURE 3 - PROJECTED HAULER CUT FOR THAMES/COROMANDEL

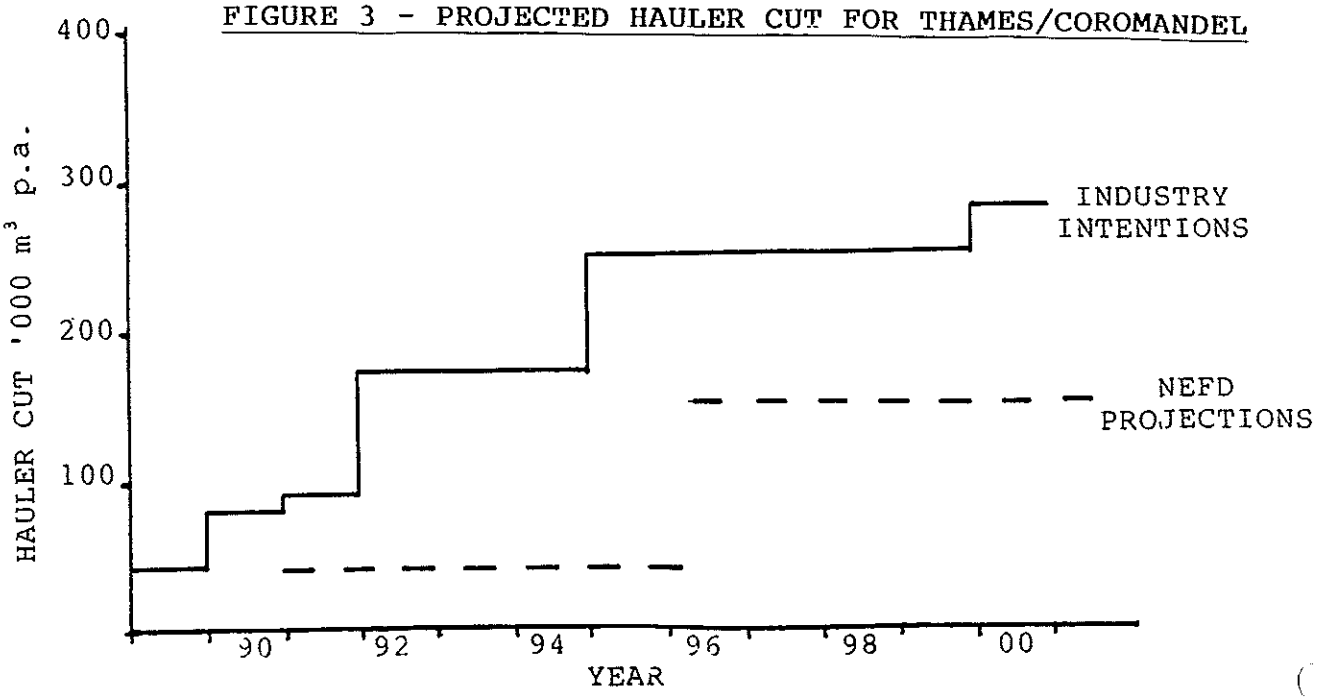


FIGURE 4 - PROJECTED HAULER CUT FOR HAWKES BAY REGION

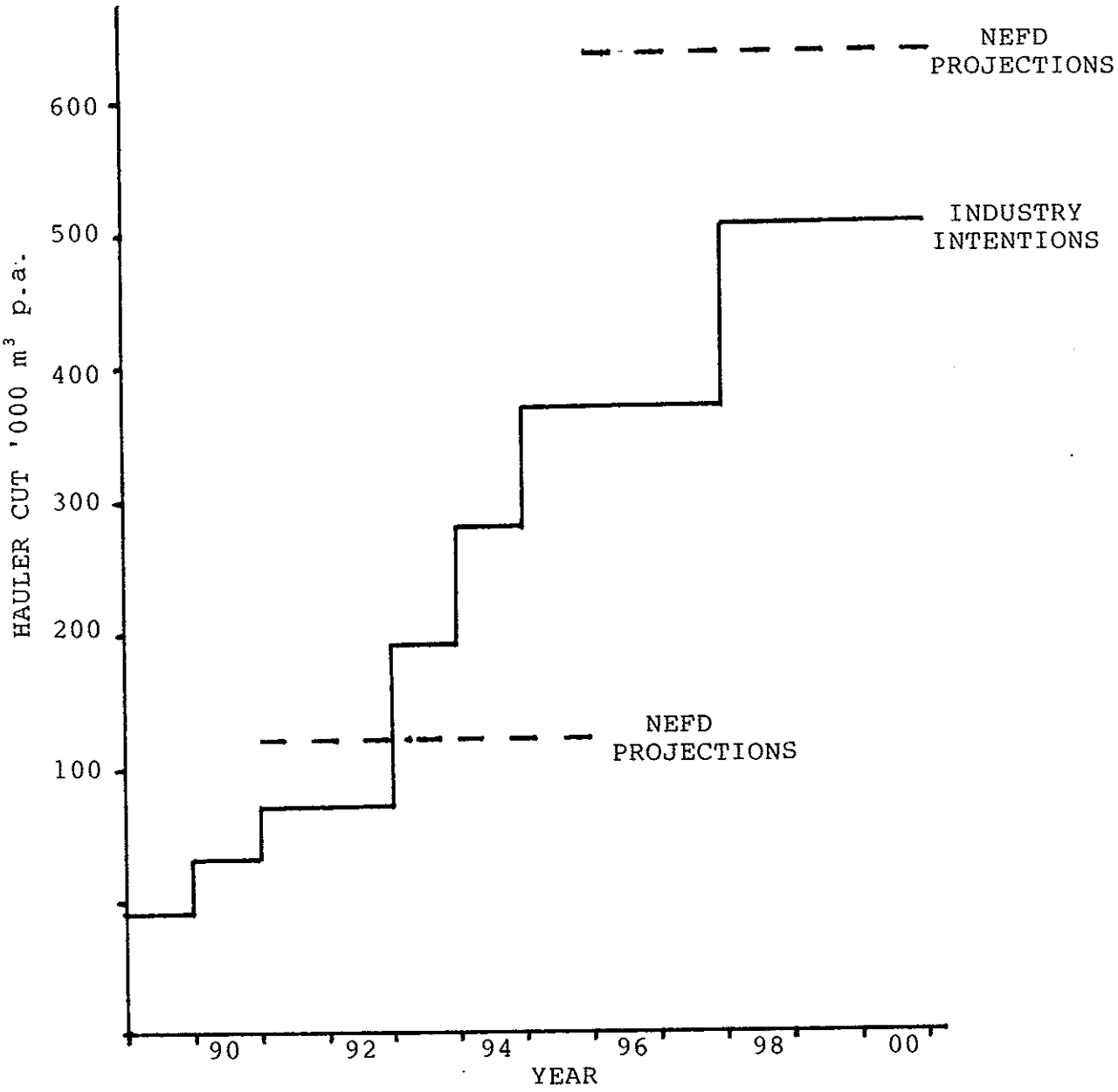
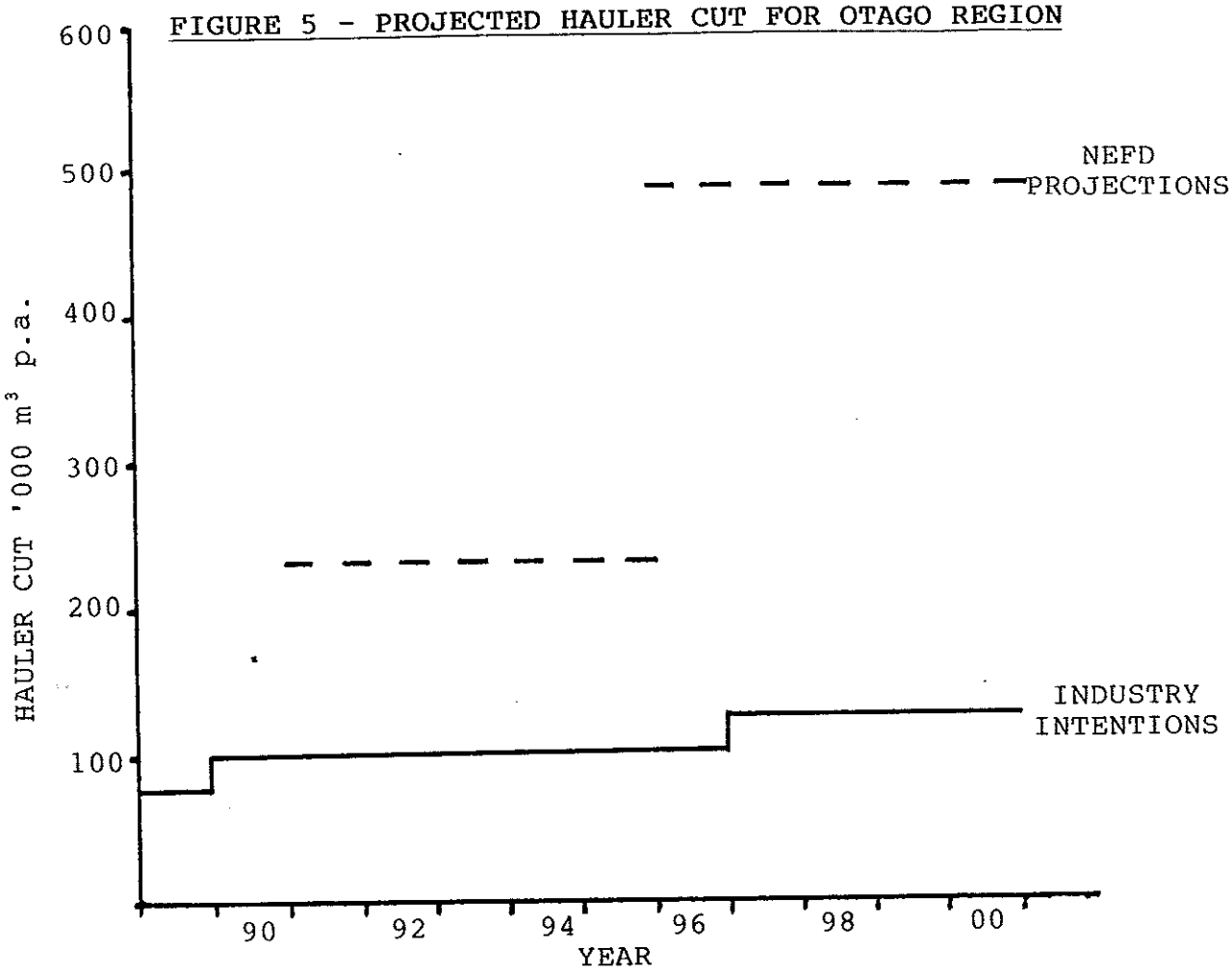


FIGURE 5 - PROJECTED HAULER CUT FOR OTAGO REGION



mostly due to the expectation of the major private forest owner in the region, that cable logging in their forests will comprise only about 30 percent of the cut, against the NEFD allocation of 70 percent for the whole region.

iv) Otago: Planned hauler volumes are only about half the NEFD prediction for the first period and only about a quarter for the second. This appears to be due again to the expectation now that hauler terrain will comprise a much smaller proportion, 20 to 30 percent, of logging than the 60 to 70 percent anticipated previously.

c) The foregoing illustrates how difficult it is to predict the likely areas of hauler terrain from broad forest descriptions, well ahead of the logging planning.

The predictions given earlier then for hauler logging out to 2005 should only be taken as very broad indications.

3. OWNERSHIP AND SIZE OF HOLDING

a) The national data on exotic forest has been, in the past, shown in reference to the State as versus private for ownership. From 1988 data we can develop the following as set out in Table 2.

TABLE 2

Ownership	*Area Total*	*Species Radiata*	*D. fir*	*Others*
State (NZFC)	*593,000*	*493,000*	*55,000*	*45,000*
Other (Private)	*621,000*	*578,000*	*10,000*	*33,000*
	1,214,000	*1,071,000*	*65,000*	*78,000*

b) The holding size has been derived primarily from information updated by NEFD. As the inventory of small lots has not been accurately updated, the 1984 data have been utilised on the basis of the ownership spread at that date.

Of the non-state areas, 75% are owned by companies and joint ventures while local authorities own 8%, partnerships, group ownership (including Maori incorporations) own 4% and the remainder are private persons, i.e. 13%.

Of these, approximately 31% are on hauler terrain and this has been more specifically described in the 1986 NEFD data attached in Appendix I by region.

By United Councils, the size of hauler terrain holdings have been derived for hauler sites greater than or less than 600 ha per 5 year planning period (600 ha per 5 year period has been chosen as the area required to support a high producing hauler crew full time. For areas less than 600 ha, the hauler will have to move between holdings or overcut for a period and move out). In most regions the bulk (80% or better) of hauler terrain is in holdings greater than this minimum (see Appendix 2).

For the age classes 1961-75, the NEFD annual cut in thousands of ha per annum is shown on Figure 6 by selected regions or United Council areas.

It is interesting to note the importance of Hawkes Bay, Nelson and Otago as hauler logging areas, greater even than the Bay of Plenty. The largest proportional increases will be in East Cape, Hawkes Bay, Marlborough and Southland, areas with no traditional experience of cable logging.

4. SILVICULTURAL TREATMENT

For the 1961-75 age classes the data for four main silvicultural regimes is presented in Figure 7 for all operational types. We would expect hauler country to be more difficult to treat for intensive pruning regimes due to impedance and lower manday productivity.

It is therefore likely that in excess of 80% of hauler country for these age classes is minimum tending without pruning or production thinning, i.e. it will be of lower stumpage value than more intensive silvicultural regimes.

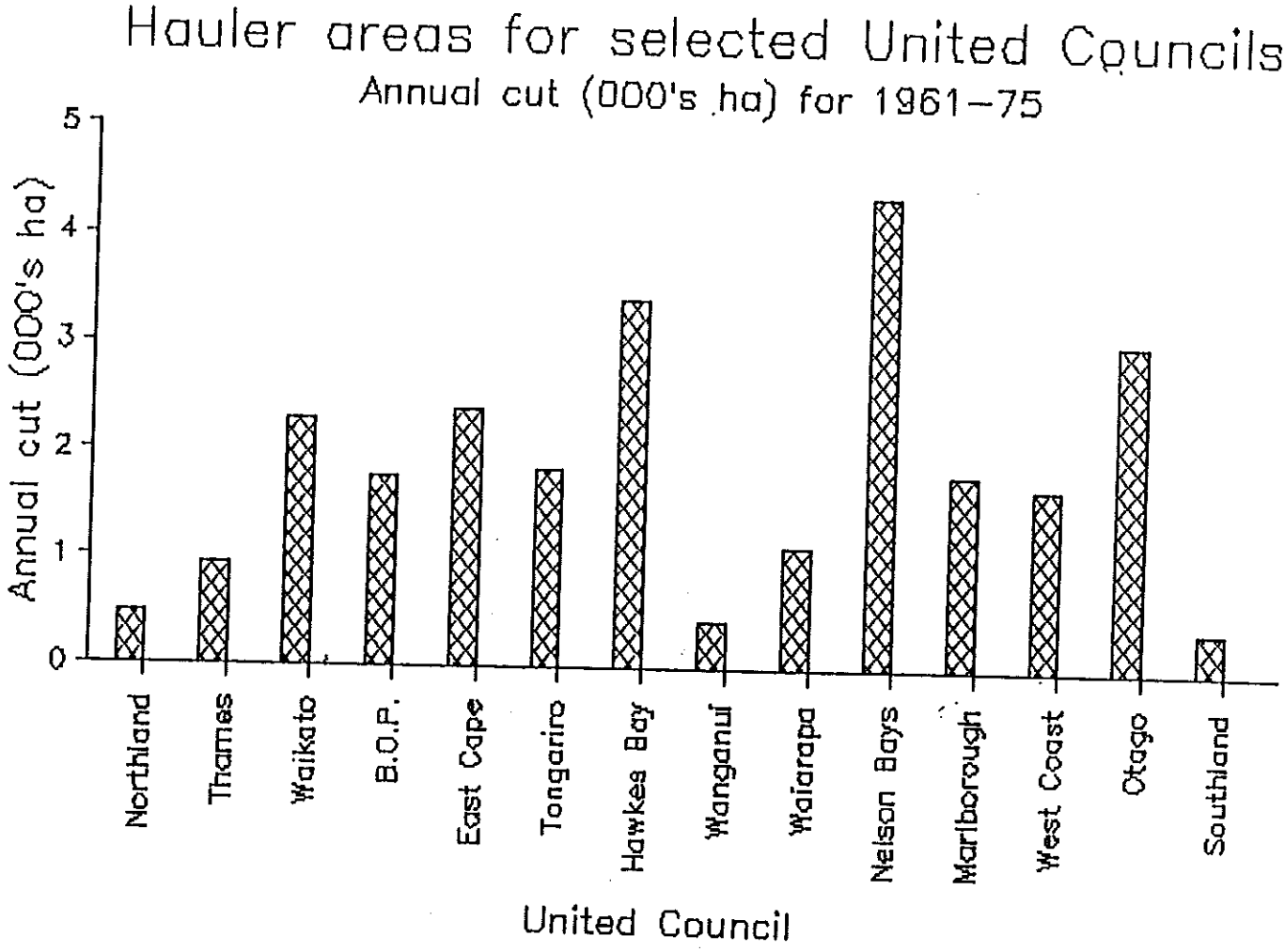


FIGURE 6

5. ROADING REQUIREMENTS

The same age classes have been analysed as to the needs for roading access into the stands. As expected, Figure 8 shows that Northland, Hawkes Bay, Nelson and Marlborough have high proportions of stands unroaded and as these are also hauler regions, a high proportion of hauler country is as yet unroaded. This, although indicative of high logging cost, also indicates that new planning with new technology is an option allowing flexibility in application of methods. One aspect of interest is that almost all Otago areas appear to be adequately roaded although this may be a data error to be vetted.

6. PLANNING SPECIFICS

In attempting to provide more data on tree size, tree characteristics, soil type, soil sensitivity to erosion and the like, it has been necessary to undertake specific analysis of regions and John Galbraith developed data for Hawkes Bay to illustrate the likely development pattern. Sandy Hampton of Carter Holt Harvey Forests and Chris Nelson of Timberlands were the basic providers of the information.

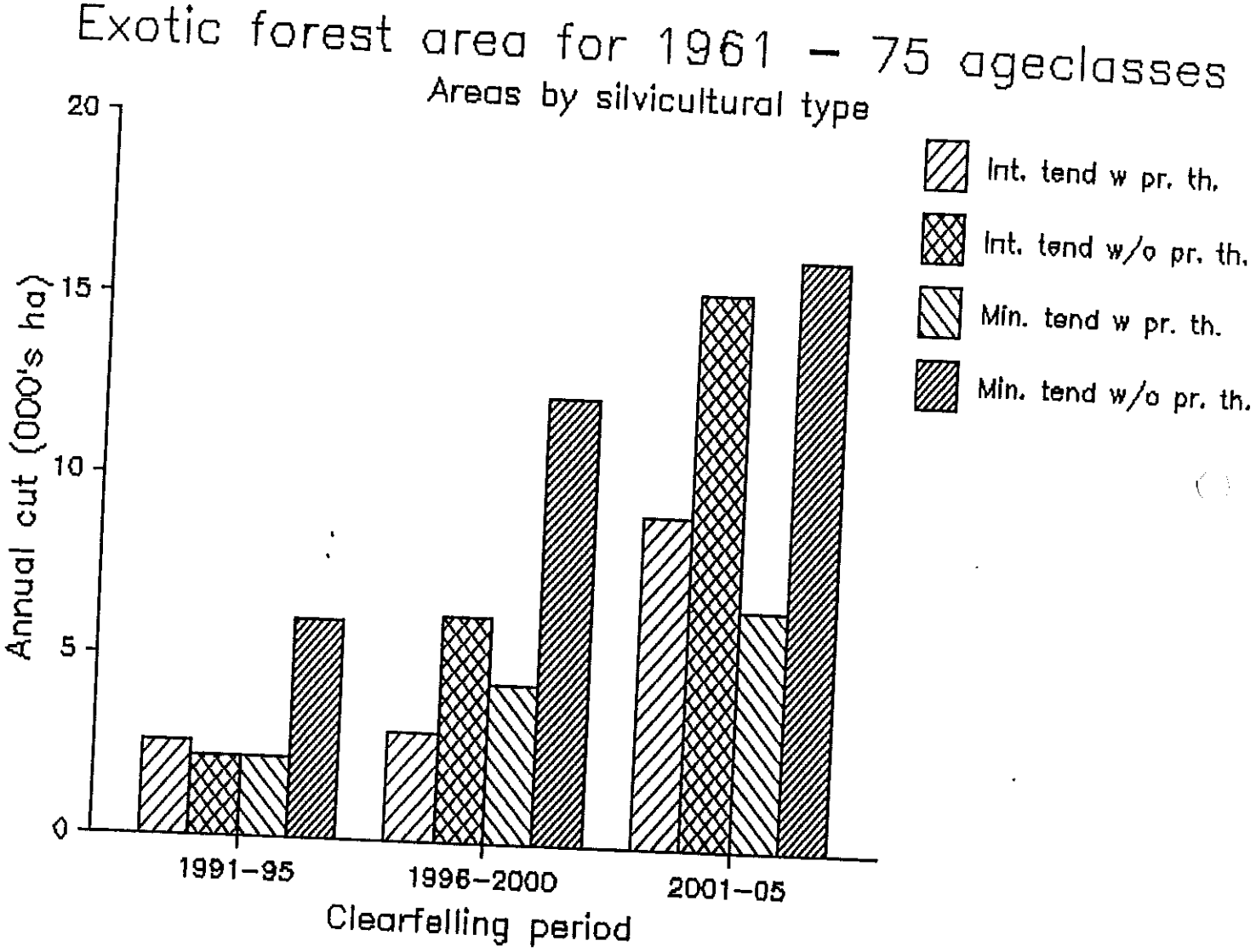


FIGURE 7

Conclusions reached include:

a) Soil and water protection will be of paramount importance, particularly near the coast. The involvement of the Catchment Board in the past means they have an intelligent appreciation of the options available and so long as they are involved early in the planning process, there are expected to be few problems in execution of hauler logging.

b) Tree size will vary by regime from 2.0 to 2.5 m^3 each, through to an average of 4 m^3 with some understocked stands up to 8 m^3 per tree.

c) Restocking will be a consideration in using the hauler with no slash burning expected to be required or desired.

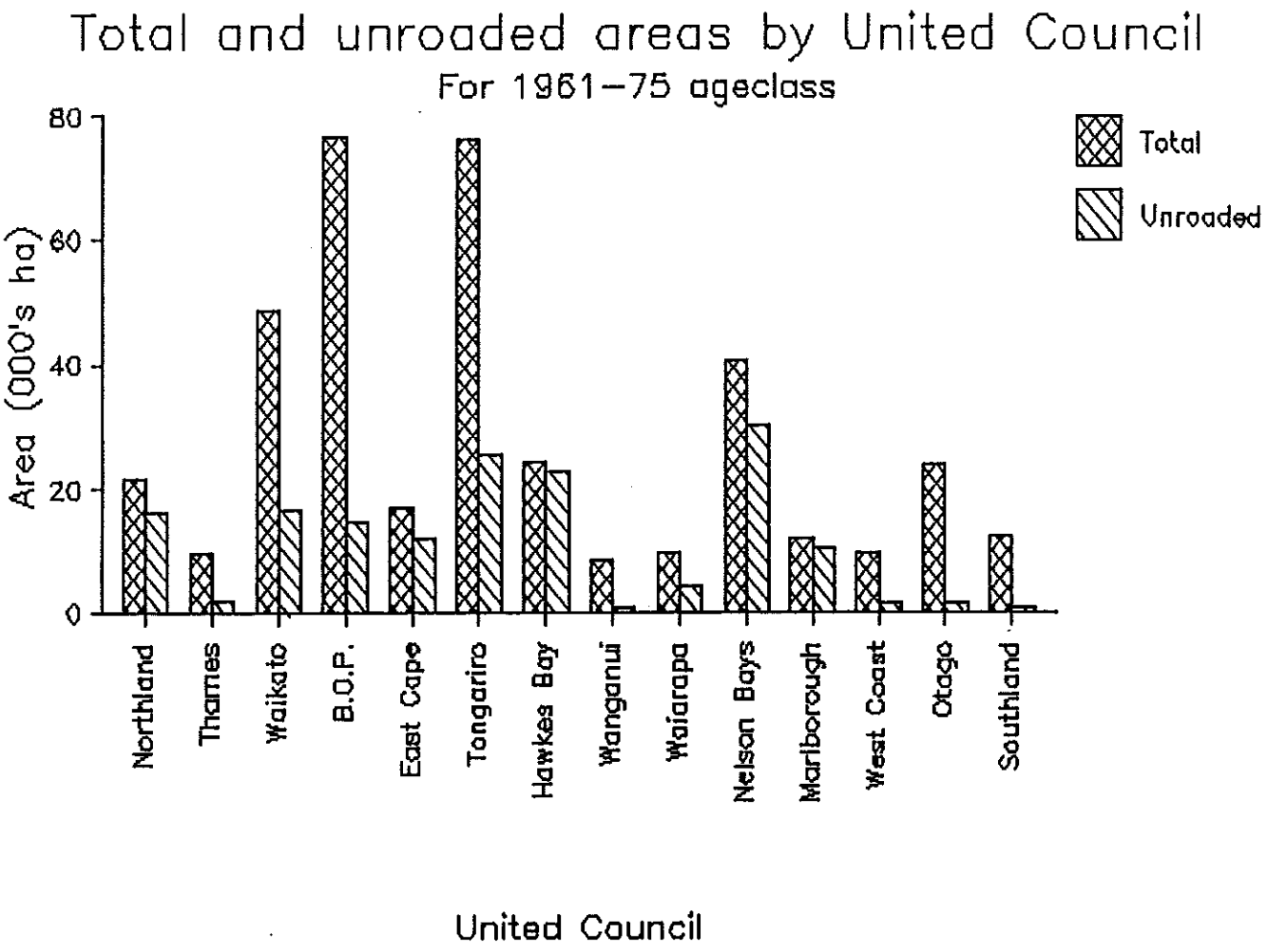


FIGURE 8

The requirement to use haulers on sensitive sites may be due to the local problems of roading particularly if mid-slope access is precluded or road metal cost is expected to be excessive. Northland and East Cape regions are examples of this problem where integration of logging methods to optimise combined roading and extraction costs will need detailed planning.

SECTION B - PEOPLE RESOURCES

1. CABLE OPERATIONS PROFILE

In the heyday of indigenous logging a majority of operators employed haulers. As tractors were increasingly utilised haulers declined in popularity.

a) Production

From a survey of current operations we can describe the main characteristics of 1989 cable logging.

The present total production from cable operations in exotic forests is around 5800 tonnes per day or nearly 1.4 million tonnes p.a.

This is approximately 16% of the total exotic cut in the country.

b) Cable Equipment

The 52 cable haulers in New Zealand (all operational machines, although not all are working at present) can be classified under the following broad headings:

TABLE 3

27 m Integral towers (11 Madills, 1 Washington, 1 Berger)	*2 drum*	*13*
20-22m Integral towers (2 Westminster, 1 Bellis, 1 Lotus)	*3 drum*	*4*
(4 Wilson, 2 Dispatch, 1 Bellis)	*2 drum*	*7*
15 m Integral towers (4 Madill 071, 1 Ecologger II)	*4 drum*	*5*
Swing boom (2 Washington 88. 1 Skagit SJ7, 3 Skagit SJ4)		*6*
Light Integral 15 m tower (1 Ecologger I, 1 little Giant, 1 RB22, 1 Hayes)		*4*
Independent Spar Haulers (6 Dispatch, 1 Westminster, 1 Washington, 1 Hayes)	*3 drum*	*9*
(1 Wilson, 2 Dispatch)	*2 drum*	*3*
		52

Much of the fleet could charitably be called vintage. Only five machines - two Washington 88's, one Ecologger II, one Lotus IV and one Bellis, have been purchased new in the 1980's. Most of the Madill 009's and 071's and the 127 Washington were purchased between 1967 and 1975.

The Wilson and Dispatch haulers are of varying vintage, at least half are pre-1970. Many were originally indigenous log haulers (some even steam powered!) before being refitted with air controls, improved clutches and brakes and about half with integral towers.

The average age of the fleet is probably around 20 years.

2. MANPOWER

The total logging workforce is estimated at approximately 2600 with only about 2% being female.

Of this workforce, at present there are an estimated 280 people working in 43 different exotic clearfell cable logging operations around the country. All are separate contracts so there are 43 contractors included in the total number of people above. This includes felling and loading personnel as well. Manday productivity varies from around 15 m^3 per manday to over 40, (again including felling and loading) the average being 21 m^3 per manday.

The characteristics of these 280 people is presumed similar to the logging workforce as surveyed by Gaskin, Smith and Wilson, i.e. the age will average 31 years and the average time in logging will be 7 years. For 1989 this means the cable logging force needs to recruit at least 50 people per annum and the training needs will be greater than for the average logger.

Hauler drivers are considered the operators needing most training and the fellers, breakers out and rigging personnel need to have above average fitness, co-ordination and workskills.

3. TRAINING

It has been recognised that this quality of personnel will require specific training. Courses provided in the past 10 years have been well patronised and the numbers of people who have been through these courses are as follows:

a) LIRA Cable Course from 1979 to 1988:

Rotorua	- 195
Nelson	- 45
Southland	- 10
Total	- 250

25/yr

b) Harvest Planning Course - 1985 to 1988:

- 90

30/yr

c) Computing Software Courses 1987, 1988:

- 51

25 yr

d) The Golden Downs cable logging practical course (one course):

- 10

10/yr

e) NZ Forest Engineering Institute. First Course 1988/89:

- 26

26/yr

In addition there have been various components of cable logging in the courses run by the Forestry Training Centre.

Of the above courses only the LIRA and Golden Downs courses were specifically for cable logging, but the Harvest Plan-

ning and NZFEI courses have a heavy emphasis on cable operations too.

The general response from industry management surveyed was that the spread of technical and management training available for cable logging was adequate. In addition the basic components of operator training are available too and could be organised as required in specific regions.

4. SUPERVISION AND PLANNING

The degree of experience and alternative technique know-how is higher for cable operations and the projection is of rapidly increasing demand. At this stage there are probably less than 30 active supervisory personnel in the industry who can supplement the hauler supervisory capacity of 50 currently engaged in this branch of logging.

The planner workload is also rapidly increasing at a time when there is a relative dearth of skilled experienced planners who can apply developing computer-based skills for the major planning needs which can be concluded from the forest resource data in Section A.

THE FUTURE

In assessing the likely solutions in future cable logging in New Zealand, we need to take note of experience in other countries and particularly to note the processes which influence their decisions. From this we may be able to make some intelligent assumptions as to where our industry is likely to head.

1. CULTURE

In any advanced society with a stable forest industry based on an established and sustainable forest growth, there are methods acceptable to that society for reasons of environment protection, costs of wood in the market place and available skills traditional to that community. These may have limited application in New Zealand. Examples are central Europe, Japan and Washington State Olympia peninsular.

2. SAFETY

Mechanisation has been seen as a method of reducing manpower requirements and reducing accident hazard. Hauler operations have a high risk of accident and mechanisation is more difficult. Thus there is a considerable interest in developing alternatives to haulers or reducing the need for cable solutions by adapting tractor techniques.

Utilising high technology solutions such as helicopter logging or increasing manday cable productivity may reduce the exposure of the work force to hazard.

3. MOBILITY

Cable methods with short set-up or shift times will enable smaller coupes and demand lesser annual production than the presently perceived requirement of a minimum of 40,000 m^3

to be economically viable. A mobile specialist gang could work a series of small forests on a periodic cut basis.

4. PRODUCTIVITY

J Galbraith in his 1987 paper showed the difference in labour and machine productivity of New Zealand to Oregon and Washington cable operators. This pointed to a probable productivity lift to 300 m³/machine day and a doubling of labour productivity. Length cutting and trimming on the cutover would assist this trend. At present a hauler pulling a 2 m³ tree size (the expected minimum size) will produce 30,000 m³ per annum. We should expect a progressive lift to 60,000 m³/annum/machine.

5. FUTURE REQUIREMENTS

In 1982 Viv Donovan projected the hauler requirements to be as follows:

TABLE 4

	1991/95	*1996/2000*
Small hauler	*50*	*80*
Large hauler	*90*	*140*

He projected also a trend away from present bias for high lead 2 drum gear to 3 drum with longer spans, better brakes and suspension capability using hydraulic and mechanical interlock.

The "small haulers" included the then current fleet of small truck-mounted thinnings haulers with a design capacity of 1 tonne. Hauler thinning has subsequently been phased out but the early clearfell intentions of a number of forest owners will maintain a market for smaller machines.

In Table 1, we have noted the NEFD expectation of hauler production. The increase from present levels is 35% in 1991/95 while in 1996/2000 NEFD expects three times present hauler production.

If we presume increased productivity in present and new operations, these increases will not be as spectacular. Also the survey of regional specific planning shows a generally more sober appreciation of requirement.

Table 5 below sets out my projection of the levels we should plan for as a minimum. Small haulers are expected to produce 80-100 m³/day, large to produce 180-250 m³/day.

TABLE 5

	Machines		*Production*			*Contractors*	*Plan-*
	Small	*Large*	*(million m³)*	*Men*	*Crews*	*Supervisors Technicians*	*ners*
1991/1995	*15*	*30*	*1.6*	*340*	*45*	*85*	*8*
1995/2000	*25*	*70*	*4.0*	*600*	*75*	*150*	*13*
2001/2005	*30*	*105*	*7.0*	*1000*	*131*	*250*	*22*

The expectation of a 50% increase in manday productivity by 2001/2005 should be regarded as an achievable target, in which machine productivity increases will be driven by capital cost and improved technology.

6. RECRUITMENT AND TRAINING

Basic training in logging will be required for 50, 90 and 150 people per annum for each five year period.

Supervisor and specialist skills will be required at an additional 22, 38 and 60 per annum for each period. The forestry degree planning course can probably be expected to provide planning formal training either from the School of Forestry or by the NZFEI course.

REFERENCES

Burrows, G., Curtis, A., McGregor, F. and Novis, J. 1987 : "A National Exotic Forest Description System". New Zealand Forest Council Working Paper No. 32.

Donovan, V.F. 1982 : "Prediction of Machine Requirements". In Proceedings of the 1982 LIRA Logging Machinery Seminar pp 13-17.

Galbraith, J.E. 1987 : "Cable Logging Productivity in New Zealand : How do we Compare?" Paper presented to the NZ Forest Owners Association Conference, Blenheim.

Novis, J., Turland, J. and Collins, J. 1988 : "A National Exotic Forest Description". (Edition 5) Ministry of Forestry.

Table 4 NET PRODUCTIVE EXOTIC STOCKED FOREST AREA BY REGIONAL/UNITED AND COUNTY COUNCIL AND AGE CLASS as at 1/4/86

Area (ha) that is Hauler Terrain

County Name	Age Class (years) 1- 5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-50	51-60	61-80	AGE CLASS TOTAL
Northland United Council												
Bay of Islands	4.939	2.114	813	369	270	219	54	13	25	5	0	8.822
Hokianga	1.998	2.358	865	37	128	151	72	68	27	0	0	5.704
Hobson	1.462	302	349	61	84	17	1	33	296	33	0	2.636
Mangonui	606	201	0	0	0	0	0	0	0	0	0	807
Otamatea	78	178	116	76	24	34	41	7	124	2	0	679
Whangarei	7.431	3.158	2.173	950	563	311	108	74	10	11	8	14.798
Whangaroa	963	1.163	236	114	6	15	4	48	1	0	0	2.548
	17.477	9.474	4.551	1.607	1.075	747	280	243	482	50	8	35.994
Auckland Regional Authority												
Franklin	0	0	0	0	0	0	0	0	0	0	0	0
Great Barrier	0	0	0	0	0	0	0	0	0	0	0	0
Manukau	0	0	0	0	0	0	0	0	0	0	0	0
Rodney	747	1.758	893	490	232	5	20	4	22	4	3	4.178
Waitemata	0	0	0	0	0	0	0	0	0	0	0	0
	747	1.758	893	490	232	5	20	4	22	4	3	4.178
Thames-valley United Council												
Hauraki Plain	0	0	0	0	0	0	0	0	0	0	0	0
Ohinemuri	40	55	122	106	42	0	0	6	0	0	0	370
Piako	0	10	98	0	0	0	0	0	0	0	0	108
Thames-Coromandel	3.370	4.549	3.026	1.107	253	82	134	403	0	0	0	12.923
	3.409	4.614	3.246	1.213	294	82	134	409	0	0	0	13.400
Waikato United Council												
Matamata	1.827	2.309	3.811	3.523	695	112	15	20	36	1.311	91	13.750
Otorahanga	0	245	221	93	3	0	0	0	0	0	0	562
Raglan	0	255	434	0	0	0	0	0	0	0	0	689
Waikato	557	508	630	461	325	281	228	162	0	0	0	3.151
Waipa	0	0	0	0	0	0	0	0	0	0	0	0
Waitomo	83	796	944	97	245	128	41	6	0	0	0	2.338
	2.466	4.113	6.040	4.173	1.267	520	283	188	36	1.311	91	20.490
Bay of Plenty United Council												
Rotorua	895	861	627	329	156	109	442	77	14	179	92	3.780
Tauranga	357	308	636	86	121	47	28	51	61	0	0	1.696
Whakatane	2.463	2.523	2.259	3.043	1.538	795	413	46	0	464	60	13.603
	3.716	3.692	3.521	3.458	1.815	950	884	175	75	643	151	19.080

Table 4 cont. NET PRODUCTIVE EXOTIC STOCKED FOREST AREA BY REGIONAL/UNITED AND COUNTY COUNCIL AND AGE CLASS as at 1/4/86

Area (ha) that is Hauler Terrain

County Name	Age Class (years) 1- 5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-50	51-60	61-80	AGE CLASS TOTAL
East Cape United Council												
Cook	10,498	3,573	1,135	488	331	116	0	0	0	0	0	16,140
Opotiki	6,318	1,589	339	3	7	0	0	0	0	0	0	8,256
Waiapu	9,007	5,669	3,189	268	0	0	5	4	0	0	0	18,142
Waikohu	1,273	2,701	2,657	2,019	1,467	27	6	27	0	0	0	10,177
	27,096	13,531	7,320	2,778	1,805	143	11	31	0	0	0	52,715
Tongariro United Council												
Taumaranui	1,271	1,972	685	116	1	0	0	0	0	0	0	4,045
Taupo	1,716	2,244	5,507	2,401	475	282	24	83	86	1,053	57	13,926
	2,987	4,216	6,192	2,517	476	282	24	83	86	1,053	57	17,971
* Hawkes Bay United Council												
Hawkes Bay	4,351	4,941	6,114	3,601	579	86	58	37	0	0	0	19,766
Wairoa	8,545	8,369	3,453	2,047	1,102	360	162	4	3	0	0	24,045
Waipawa	137	48	8	8	25	79	37	5	0	0	0	345
Waipukurau	0	0	0	0	0	0	0	0	0	0	0	0
	13,033	13,357	9,575	5,656	1,706	524	257	46	3	0	0	44,156
* Taranaki United Council												
Clifton	21	47	7	4	2	2	0	0	0	0	0	83
Egmont	0	0	0	0	0	0	0	0	0	0	0	0
Eltham	6	3	0	0	0	0	0	0	0	0	0	9
Hawera	17	19	4	9	0	0	0	0	0	0	0	49
Inglewood	79	113	36	0	0	1	5	0	0	0	0	234
Patea	42	39	12	0	4	0	0	0	2	0	0	98
Stratford	954	441	251	300	347	455	31	0	2	0	0	2,781
Taranaki	5	0	0	0	0	0	0	0	0	0	0	5
Waimate West	0	0	0	0	0	0	0	0	0	0	0	0
	1,124	662	310	313	353	458	36	0	4	0	0	3,260
* Wanganui United Council												
Rangitikei	246	214	6	10	0	1	0	0	0	0	0	476
Wanganui	1,143	1,311	948	906	343	0	0	4	8	0	0	4,663
Waimarino	1,634	1,349	0	0	1	0	0	0	2	0	0	2,986
Waitotara	304	391	22	6	0	0	0	0	0	0	0	723
	3,327	3,265	976	922	344	1	0	4	10	0	0	8,849

Table 4 cont. NET PRODUCTIVE EXOTIC STOCKED FOREST AREA BY REGIONAL/UNITED AND COUNTY COUNCIL AND AGE CLASS as at 1/4/86

Area (ha) that is Hauler Terrain

County Name	Age Class (years) 1- 5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-50	51-60	61-80	AGE CLASS TOTAL
* Manawatu United Council												
Dannevirke	138	83	44	0	0	0	0	0	0	0	0	264
Kiwitea	20	120	37	0	2	1	0	0	0	0	0	180
Kairanga	2	154	53	0	0	0	0	4	0	0	0	213
Manawatu	0	0	0	0	0	0	0	0	0	0	0	0
Oroua	47	16	0	0	0	0	0	0	0	0	0	63
Pahiatua	0	42	29	0	0	0	0	0	0	0	0	71
Pohangina	49	59	1	4	29	0	0	5	0	0	0	147
Woodville	27	15	0	0	10	0	0	0	6	0	0	58
	282	489	164	4	41	1	0	9	6	0	0	996
* Horowhenua United Council												
Horowhenua	569	372	314	88	26	0	0	0	0	0	0	1.367
	569	372	314	88	26	0	0	0	0	0	0	1.367
* Wairarapa United Council												
Eketahuna	6	56	64	14	0	0	0	0	0	0	0	140
Featherston	24	183	213	354	91	0	0	0	0	0	0	864
Masterton	1.909	1.676	1.377	2.147	967	174	117	0	0	0	0	8.366
Wairarapa South	157	210	309	114	0	28	0	0	0	0	0	817
	2.095	2.124	1.962	2.629	1.058	202	117	0	0	0	0	10.186
* Wellington Regional Council												
Hutt	50	42	107	0	0	0	0	0	21	0	0	220
Kapiti	0	85	54	42	0	0	0	0	0	0	0	180
Upper Hutt	199	603	190	173	153	55	0	0	26	0	0	1.398
Wgtn. Urban	0	0	0	0	0	0	0	0	136	0	0	136
	248	730	350	215	153	55	0	0	183	0	0	1.934
Nelson Bays United Council												
Golden Bay	0	0	0	0	0	0	0	0	0	0	0	0
Waimea	10.375	10.988	11.101	7.321	3.459	633	70	11	186	287	0	44.430
	10.375	10.988	11.101	7.321	3.459	633	70	11	186	287	0	44.430
Marlborough United Council												
Kaikoura	0	0	0	0	0	0	0	0	0	0	0	0
Marlborough	10.100	6.267	7.145	1.596	318	127	16	52	69	19	0	25.709
	10.100	6.267	7.145	1.596	318	127	16	52	69	19	0	25.709

Table 4 cont. NET PRODUCTIVE EXOTIC STOCKED FOREST AREA BY REGIONAL/UNITED AND COUNTY COUNCIL AND AGE CLASS as at 1/4/86

Area (ha) that is Hauler Terrain

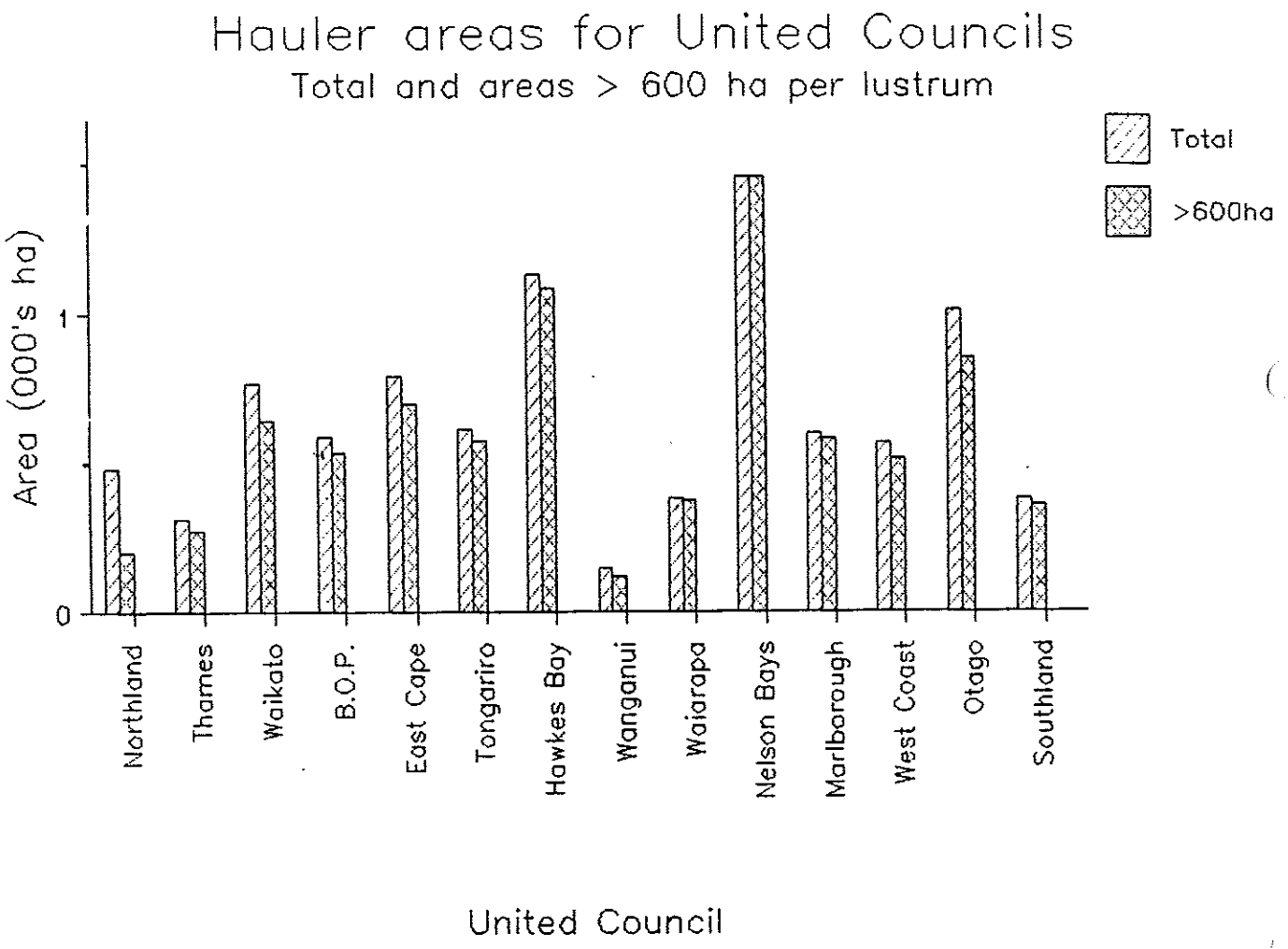
County Name	Age Class (years) 1- 5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-50	51-60	61-80	AGE CLASS TOTAL
Canterbury United Council												
Amuri	101	0	47	142	0	0	0	0	0	0	0	290
Akaroa	0	0	0	0	0	0	0	0	0	0	0	0
Cheviot	0	0	0	0	0	0	0	0	0	0	0	0
Ellesmere	0	0	0	0	0	0	0	0	0	0	0	0
Eyre	0	0	0	0	0	0	0	0	0	0	0	0
Heathcote	0	0	0	0	0	0	0	0	0	0	0	0
Hurunui	439	764	362	88	67	0	0	0	0	0	0	1.721
Lyttelton	0	0	0	0	0	0	0	0	0	0	0	0
Mt Herbert	0	0	0	0	0	0	0	0	0	0	0	0
Malvern	0	0	0	0	0	0	0	0	0	0	0	0
Oxford	0	0	0	0	0	0	0	0	0	0	0	0
Paparua	0	0	0	0	0	0	0	0	0	0	0	0
Rangiora	0	0	0	0	0	0	0	0	0	0	0	0
Wairewa	0	0	0	0	0	0	0	0	0	0	0	0
Waimairi	0	0	0	0	0	0	0	0	0	0	0	0
	540	764	409	230	67	0	0	0	0	0	0	2.011
Aorangi United Council												
Ashburton	0	0	0	0	0	0	0	0	0	0	0	0
Mackenzie	0	0	0	0	0	0	0	0	0	0	0	0
Strathallan	467	541	414	339	195	16	0	0	0	0	0	1.972
Waimate	1.410	768	0	0	0	0	0	0	0	0	0	2.178
	1.877	1.309	414	339	195	16	0	0	0	0	0	4.151
West Coast United Council												
Buller	380	269	83	0	0	0	0	0	0	0	0	732
Grey	1.986	2.967	3.681	1.765	586	270	69	72	0	0	0	11.396
Inangahua	585	643	350	179	61	63	43	55	13	0	0	1.992
Westland	395	1.391	975	611	182	7	0	0	0	0	0	3.561
	3.346	5.271	5.088	2.555	829	340	112	127	13	0	0	17.681
Coastal/Nth Otago United Council												
Silverpeaks	3.326	2.353	1.242	848	122	8	15	9	22	14	0	7.959
Waihemo	17	19	5	6	1	9	10	3	0	1	0	71
Waitaki	1.027	578	338	295	365	174	114	11	5	4	5	2.916
	4.370	2.950	1.585	1.150	489	191	139	22	27	19	5	10.946

Table 4 cont. NET PRODUCTIVE EXOTIC STOCKED FOREST AREA BY REGIONAL/UNITED AND COUNTY COUNCIL AND AGE CLASS as at 1/4/86

Area (ha) that is Hauler Terrain

County Name	Age Class (years) 1- 5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-50	51-60	61-80	AGE CLASS TOTAL
Clutha/Cntrl Otago United Council												
Bruce	948	2,840	3,889	2,157	933	276	138	46	8	1	0	11,235
Clutha	180	608	674	244	13	20	20	10	18	1	1	1,789
Lake	52	15	2	5	33	1	15	5	12	0	0	139
Maniototo	3	3	1	1	0	3	3	0	0	0	0	15
Tuapeka	2,812	3,771	1,681	1,370	788	470	318	38	33	766	488	12,536
Vincent	36	9	10	7	6	1	5	0	2	3	2	81
	4,031	7,247	6,256	3,783	1,774	771	499	99	72	772	492	25,795
Southland United Council												
Southland	1,637	1,495	1,682	847	198	76	59	13	2	230	1	6,239
Wallace	3,373	1,530	1,664	1,222	72	86	53	21	6	9	0	8,035
	5,010	3,025	3,346	2,068	270	162	111	34	8	239	1	14,274
NEW ZEALAND TOTALS	118,223	100,217	80,759	45,102	18,047	6,208	2,993	1,537	1,282	4,397	808	379,573

* The privately owned components of the data for the administrative area of this regional / united council are as at 1.4.85.


Hauler areas for United Councils
Total and areas > 600 ha per lustrum
Total
>600ha
Area (000's ha)
0
1
Northland
Thames
Waikato
B.O.P.
East Cape
Tongariro
Hawkes Bay
Wanganui
Waiarapa
Nelson Bays
Marlborough
West Coast
Otago
Southland
United Council