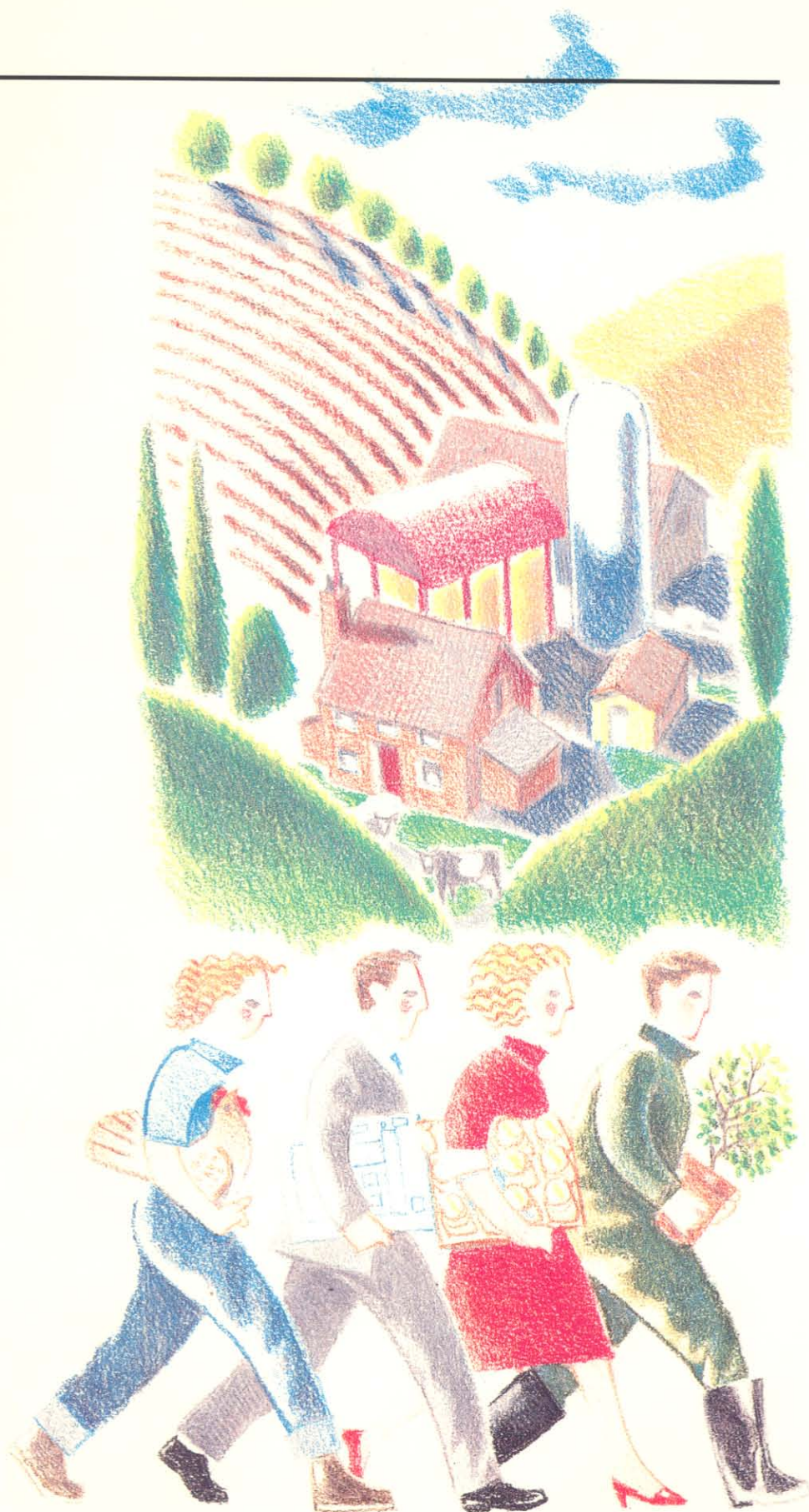


WORK IN THE COUNTRYSIDE

THE CONTRIBUTION OF FORESTRY TO RURAL EMPLOYMENT



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**The National Economic Development Council's
Agriculture Ad-Hoc Sector Group**

THE CONTRIBUTION OF FORESTRY TO RURAL EMPLOYMENT

THE NEED FOR A SURVEY

- 1 About one tenth of the land area of Britain carries woodland cover, and yet the contribution this important land use makes to rural employment is little known and widely misunderstood. When rural policies were essentially stable, that may not have mattered unduly, but the uncertain outlook engendered by the growing problem of agricultural surpluses has highlighted the need for precise information. Forestry certainly has a great deal to offer as a stable long term land use, with broadly predictable employment patterns and an enormous domestic market for its product close at hand: the UK presently imports almost 90 per cent of timber and timber products consumed.
- 2 The Forestry Commission has sponsored the collection of information on private forestry for many years in the 'Economic Surveys of Private Forestry' carried out annually by Aberdeen and Oxford Universities. Employment figures derived from these surveys have been published annually since 1976 in 'Forestry Facts and Figures' alongside information on the Commission's own workforce. However, employment was never the primary focus of these surveys, and while the data was useful in illustrating trends, its accuracy in absolute terms could not be guaranteed.
- 3 Recognising that a more comprehensive picture was likely to be needed against which to judge the employment effects of the many studies of the rural land use outlook emerging (eg Agriculture EDC, 1987), the Commission joined with Timber Growers UK - the organisation representing private woodland owners - in 1986 to initiate a thorough survey of domestic forestry employment and to make an assessment of the employment associated with primary processing of domestic timber.
- 4 This paper presents the results of the survey, and considers the contribution to rural employment that might be expected from forestry over the next couple of decades. This involves a more complex assessment than

forecasting agricultural or, say, tourism employment potential, because assumptions have to be made not just about the effects of future planting programmes and productivity increases, but also about the profile of employment generated by forests over the rotation of 50 or more years. The employment survey data has provided a reliable base from which to make such projections. In some cases, where interpolation or data not provided by the survey is required, we have called on the Forestry Commission's own experience and direct involvement as a forestry employer.

THE PRESENT SITUATION

Survey Results

5 The employment survey, based on data gathered in 1986 and 1987, identified about 40,000 jobs dependent on the domestic forestry industry. Table 1 shows how these are distributed between the various sectors of the industry.

TABLE 1: FORESTRY EMPLOYMENT: MAN YEAR

	England	Wales	Scotland	GB
Forestry Commission	2900	1700	3500	8100
Private Estates	9050	1600	3300	13950
Forest Management Companies	550	150	1800	2500
Harvesting Companies	4050	1450	250	5750
Industries Processing Domestically Produced Timber	5700	1100	2350	9150
TOTAL	22250	6000	11200	39450

Note:

1 Forestry Commission figures are as at 31 March 1987. These include employees, both industrial and non-industrial, together with all self-employed contractors and their employees for the time that they were working in Forestry Commission forests.

- 2 Figures for private estates and forest management companies were obtained from the survey in 1986 and are mainly based on 1985 figures. They include industrial and non-industrial employees and self-employed contractors and their employees engaged by the estates and companies.
- 3 Harvesting companies' figures include self-employed contractors and their employees when employed on the harvesting and extraction of timber purchased by them, before felling, from private estates and companies. Because of the preponderance of very small firms and self-employed individuals, the cover of this sector achieved by the survey was incomplete. Man-years of employment from this same sector when engaged on the extraction of timber purchased from the Forestry Commission are not subject to the same difficulties and are included at 1 above.
- 4 Figures for domestic wood processing were supplied by the industry in 1987. UK processing of imported timber is excluded.
- 6 The survey did not cover Northern Ireland. The annual report of DANI Forestry Service for 1987 shows that 520 were employed in the public forestry sector in the province. There is relatively little private sector activity there.
- 7 The overall figure given here is an under-estimate in the sense that the survey did not reach some categories supplying the domestic industry (eg private sector forest nurseries, machinery suppliers and manufacturers, etc) or processing its product (eg secondary processing of domestic timber into furniture etc), as well as the shortfall identified at note 3 above. A full survey to identify all dependent employment would have been extremely complex, and was beyond the resources available, but a more comprehensive approach for a limited area - Stirling Local Authority District - has recently been carried out (Firn Crichton Roberts, 1987) and indicates that in addition to 384 jobs directly dependent on forestry, an additional 200 are generated in the supply of materials and services, and downstream processing of locally grown timber - in other words more than half as many again as those directly attributable to forestry.

Employment Profiles

8 The pattern of employment over the 50+ year rotation of a forest crop is illustrated for a typical example (a conifer crop in South Scotland) at Figure 1. As can be seen, there is a small peak in the early years, then little activity until thinning commences, with the bulk of the employment concentrated in the second half of the rotation and associated with harvesting activity.

9 With the British forest estate in its present predominantly juvenile state of development, the ratio of harvesting to other forest workers is about 2:1. With a "normal" forest estate (ie one with a balanced age structure, constant annual cut, regular replanting of felled areas, and no new planting) the expected ratio would be nearer 5:1. Figure 2 illustrates the present imbalance in age structure. As the forest estate matures the proportion of harvesting workers will increase, with consequential increases in haulage and processing. Table 2 shows the predicted sequence based on the 1987 Timber Production Forecast (Forestry Commission, 1987). (This is a 5 yearly rolling prediction of gross domestic softwood production over the next 20 years, prepared by the Forestry Commission and Timber Growers UK Ltd.

TABLE 2: POTENTIAL EMPLOYMENT GROWTH AS THE NATIONAL FOREST ESTATE MATURES INCORPORATING A RANGE OF PRODUCTIVITY ASSUMPTIONS

	Annual Productivity Improvement	Actual 1987	1989	Predicted 1994	1999	2004
Harvesting	0	11811	13359	15799	18200	21336
Haulage		1439	1649	1985	2261	2652
Processing		9150	10380	11917	14086	16377
Harvesting	2	11911	13359	14281	14871	15758
Haulage		1439	1649	1794	2261	2652
Processing		9150	10380	10772	11509	12096
Harvesting	4	11811	13359	12882	12100	11566
Haulage		1439	1649	1985	2661	2652
Processing		9150	10380	9717	9365	8878

10 Predictions for the total employment generated by forestry - assuming that the rate of new planting will reach the level envisaged under Government policy (33,000 hectares per annum) by 1990, and that harvesting will increase as projected in the Production Forecast - are shown in Annex 1.

Location of Employment

11 The effects of forestry employment are most significant in remote rural areas. This is illustrated by the Figures for Sutherland District shown in Table 3. As expected, the overall number employed is small, but there is more than one job in forestry for every 2.5 in agriculture, compared to a national average of one in forestry to 18 in agriculture.

TABLE 3: EMPLOYMENT IN SUTHERLAND DISTRICT

		No	%
Overall ¹	Employees	2,007	61
	Self-employed	<u>1,300</u>	<u>39</u>
	Total	<u>3,307</u>	<u>100</u>
	(Unemployed	331	10)
Agriculture ²		523	15.8
Forestry ³		216	6.5

Source:

1 Abstracted from OPCS census 1981 and DE employment census 1985. Male population of working age. People.

2 DAFS June census - 1983. Part-time counted as half. Casual counted as quarter.

3 FC and Fountain Forestry - 1985. Man-years.

12 Over the country as a whole 30 per cent of all forest workers live within 5 miles of the forests in which they work, and 80 per cent within 20 miles. In England the equivalent Figures are 60 per cent within 5 miles and 92 per cent within 20. The majority of English forests are more than 5 miles and the majority of Scottish and Welsh forests considerably more than 20 miles from large centres of population, thus quantifying the conclusion that most forestry employees live in rural areas.

13 Parts of the domestic timber processing sector are less obviously rural. Papermills particularly, and to a lesser extent particleboard mills, between them the main consumers of small diameter logs, tend to be large, and to draw on substantial wood supply catchments to feed high throughput plants sited so as to optimise haulage, scale and marketing economies. Industrial development grants may encourage establishment of such plants in urban development areas, but the existence of a large workforce and the necessary services is also important. However, of 34 major plants, only 11 are in towns of population greater than 35,000 and 4 in towns of over 50,000.

14 The large plants represent only a small fraction of total employment generated in processing domestically produced timber. Most employment is in sawmills. The smaller median size for sawmilling operations, combined with a natural tendency towards location near sources of supply, results in most of the 425 sawmills which draw on domestic supplies being located in rural areas.

Types of Forest Estate

15 In England, particularly in the south, private traditional estates predominate as employers. Thus, 69 per cent of all labour in the Forestry Commission's East England Conservancy is employed by private estates, 16 per cent by the Forestry Commission, 12 per cent by timber merchants and only 3 per cent by forest management companies.

16 Moving north the pattern changes. In the North Scotland Conservancy 50 per cent of the labour is with the Forestry Commission, with 29 per cent on private estates, 19 per cent with forest management companies and only 3 per cent with timber merchants.

17 These Figures reflect the dominance in the North of the Forestry Commission estate, and of both Forestry Commission and private sector new planting over the last few decades, so that the average age of the forest estate is lower and harvesting activity is more limited.

Direct Labour and Contractors

18 For harvesting operations there is a roughly equal split between the use of direct labour and contractors, while other forest operations are carried out predominantly by direct labour (Table 4). The major forest management companies do not follow this pattern, relying much more heavily on contract labour, although - as can be seen from the data - they do not dominate even in the private sector.

Table 4 Contribution of Direct Labour and Contractors

	Direct %	Contract %
Forestry Commission		
Harvesting	44	56
Other Forest Operations	93	7
Private Sector (Total)		
Harvesting	46	54
Other Forest Operations	78	22
Forest Management Companies (included in Private Sector above)		
Harvesting	4	96
Other Forest Operations	32	68

19 There is greater reliance on directly employed labour in England, with a 2:1 ratio between direct labour and contractors, compared to a roughly 1:1 ratio in Wales and Scotland. This is partly a reflection of the preponderance of private estates in the south, since they use 70 per cent direct labour compared to 65 per cent in the Commission and about 20 per cent for the rest (ie management companies and others). It is also

apparent that a much higher proportion of the workforce on private estates is engaged in forest maintenance operations than is the case in any other category. This is reinforced in the south by the fact that average estate size is much smaller than elsewhere, and it is probable that these estate woods are maintained more meticulously than the remoter, and more timber production orientated, forests of the north and west. There is also, of course, a higher proportion of broadleaved woodlands in the south, the more intensive management of which would add to that effect.

20 Overall the use of contractors has increased over the years. In 1977 about 20 per cent of the Commission's labour force was made up of contractors. By 1982 the proportion had risen to 28 per cent and in 1987 it was 35 per cent. In the private sector 47 per cent of forest employment is in the hands of contractors. Although Figures are not available for earlier years, a similar trend to that in the Commission is known to have occurred.

Wages

21 The basic wage for an unskilled worker in the Forestry Commission is tied to the statutory minimum agricultural wage and stands at £99/week since the last review in July 1987. With piecework and bonus the average weekly earnings of a forest craftsman are £146, which is about the same as average earnings in agriculture. Harvesting workers are the highest paid category, with chain saw operators earning an average £159, and the few highly specialised harvesting machine operators reaching as much as £280. These rates compare with the national average for male manual workers in manufacturing industry of £185/week. This is bound to influence to some extent the quality and supply of labour attracted into the industry, and there have been local shortages of harvesting workers in some areas.

22 Wages in the private sector are less well documented. Though they are thought to be less on average than Forestry Commission rates, there is frequently an element of payment in kind, often including rent free housing, particularly on private estates.

23 Many privately-owned forests form part of mixed economy estates, with workers dividing their time between forestry and other - not always easily distinguishable - estate duties, including agriculture and game-keeping. Forestry contractors frequently operate as small groups of self-employed individuals who hire out their labour on a more or less permanent basis to one or more estates in the same locality.

Supervision and Management

24 The proportion of administrative and supervisory staff included in the Figures given in Table 1 averages out at about one job in the office for every 5 in the forest. Of the office jobs about two thirds are managerial and supervisory, a third clerical.

Amenity and Recreation

25 Insofar as this category could be identified by the survey, about 4 per cent of the total forest workforce is engaged in activities connected with amenity, conservation and recreation. The survey did not seek to distinguish particular activities under this general heading, but other evidence suggests that in the private sector there is more emphasis on shooting, stalking and game management as an associated activity, whereas in Forestry Commission forests more provision is made for public access and a wide range of recreational activities. However, there is by no means a complete separation of interest and both sectors certainly engage in both types of activity. There are no discernible regional differences in the percentage of the workforce engaged on amenity, conservation and recreational functions.

Farm Woodland Employment

26 The survey did not attempt to separate out employment generated by woodland on farms, although this is no doubt reflected in the overall Figures to some extent. Existing farm woodlands are typically under-managed, and many are not managed or worked at all, so that there must be scope for significant additional employment as a result of

initiatives such as Project Silvanus (in Cornwall, Devon and parts of Somerset), and Coed Cymru (in Wales) which seek to bring these small woods back into active management and production. However, as with new planting under the proposed Farm Woodland Scheme and set-aside arrangements, whatever extensification may be introduced, the effect will probably be more significant in terms of diversifying the existing range of activities on farms. The result is likely to be some retention of agricultural labour which might otherwise have been shed, rather than the creation of new forestry jobs.

THE OUTLOOK OVER THE NEXT 20 YEARS

Assessment

27 The employment survey data quoted earlier, supported by other Forestry Commission data, provide a baseline on which a model of projected development of forestry employment over the next couple of decades can be built. The major assumptions of the model are:

(a) that the pattern of employment growth implicit in increased harvesting activity, as plantations already established move into the production phase, will be as shown in Figure 1 and Figure 2;

(b) that by 1990 new planting activity will rise from the present rate of about 25,000 ha per annum to the target level of 33,000 ha per annum recently set by Government, and will remain steady at that rate for the balance of the next 2 decades. In circumstances where forecasts of the area likely to be surplus to agricultural requirements over a similar period run into millions of hectares, this is consistent with likely land availability and is not excessive by comparison to earlier planting rates (eg over 40,000 ha per annum was achieved during the mid 1970s). Harvesting activity on these newly planted areas will not arise during the period under review. It is assumed that, as is effectively the case at present, no conversion of woodland to agriculture will take place;

(c) that the proposed Farm Woodland Scheme will not add materially to the forestry workforce (although it may be helpful in allowing retention of existing farm labour).

28 Figures 3(a) to 3(c) show manpower projections for the Forestry Commission, the private sector, and the domestic processing industry broken down between England, Wales and Scotland and with no productivity improvement assumed (see Annex 1 for detailed assumptions).

29 Figures 4(a) to 4(d) project total employment in the industry broken down between Forestry Commission, private sector (both including timber haulage and administration) and domestic processing, with different levels of improvement.

Discussion

30 The starting point for the picture of employment growth illustrated in Figure 4(a) is the 1986/87 Forestry Commission/TGUK employment survey. While the assumptions on which the trend is based cannot be guaranteed to predict the way in which the industry will develop, they are well founded in relation to the current outlook. The growth of total employment in the industry from about 40,000 jobs now to almost 70,000 in 2004 is a reasonable baseline prediction. However, productivity improvements as shown in Figures 4(b) to 4(d) need to be considered before final conclusions are drawn.

31 This is a complex question affected principally by the relative cost effectiveness of mechanised working, the availability of willing labour, and of capital for investment in machinery. Historic trends for Forestry Commission working suggest that overall annual labour productivity improvements of 3 per cent over the period 1950 to 1980 and at least 2 per cent on harvesting and 1 per cent per annum in other activities have been achieved over the period since 1980.

32 However, there are several reasons for caution in projecting historic Figures forward. First, the period in question has been one of 'belt

tightening' in the public sector generally, and the Forestry Commission has been no exception. No doubt this is reflected in the improved productivity Figures, but the scope for further gains must be limited accordingly.

33 Secondly, in the past 3 years, the industry has been moving from a period of depressed timber prices - especially in the small roundwood sector - to one of higher returns as new processing capacity recently brought on stream competes for available supplies. The level of thinning activity, particularly labour intensive early thinning, has been correspondingly depressed and is only now beginning to regain momentum as small roundwood prices rise to make thinning financially attractive. This means that recent productivity trends to some extent reflect an increase in average log size harvested (large logs being less labour intensive to handle per unit volume), rather than genuinely increased efficiency in the deployment of labour.

34 Thirdly, recent years have seen a surge in mechanisation of timber extraction through the widespread introduction of forwarders (off road tractor/trailer units equipped with a hydraulic crane to load timber onto a bunk). This trend has been particularly marked within the Forestry Commission, but it seems likely that a number of factors which militate against complete mechanisation of harvesting operations in forestry may limit the scope for further mechanisation of extraction. These include the range and diversity of sites; their remote and scattered location; terrain constraints; and the fact that the British forest industry may sometimes be smaller than would be necessary to justify development of specialist equipment for local conditions.

35 In addition, experience on established estates in England suggests that labour involved in forest maintenance will be higher than is assumed in the Forestry Commission's theoretical models.

36 It seems unlikely that there is significant scope for further mechanising forest management operations, but it is more difficult to judge whether harvesting itself offers the prospect of similar gains to those achieved with extraction. Under present and immediately foreseeable

conditions it seems likely that manual chain saw felling and snedding (de-branching) will remain the most cost-effective option in many situations. It should be noted, however, that in the private sector especially there has been a rapid introduction of individually very costly harvesting machines, with correspondingly impressive output capacity. Whilst these may have a role in major forests with large harvesting programmes and suitable terrain, it is doubtful whether they will displace the small harvesting contractors currently responsible for a high proportion of the national programme elsewhere.

37 On the basis of current productivity Figures the most likely scenario is that in which 3 per cent productivity improvement is achieved for the harvesting and processing sectors and 1 per cent by the remainder of the domestic forestry industry (Figure 4d).

Forestry Employment in Perspective

38 The potential growth in forestry employment implicit in a continued expansion of the area under trees, and a steady build-up in harvesting activity suggests that, in contrast to agriculture, which has long dominated rural employment despite providing work for fewer individuals year-by-year, the relative contribution of forestry will increase. Whatever the result of the current trend towards encouraging more planting on better quality land, increased harvesting work in woods already established in remoter areas in the uplands means that a significant part of this growth will arise in these remote areas, where unemployment is already high and poor soils, harsh climate and remoteness combine to constrain severely the scope for alternatives. In these same areas the outlook for agricultural employment is, perhaps, comparatively gloomy.

TABLE 5: EMPLOYMENT GENERATED IN FORESTRY AND AGRICULTURE: SCOTLAND

The numbers of local jobs provided at present per 1,00 hectares by the principal land based activities in Scotland are as follows:

Dairy farming	28.4
Lowland crop and stock farming	19.5
Upland mixed farming	7.5
Forestry	8.7
Hill sheep farming	1.3

Source: Forestry Commission, Department of Agriculture and fisheries for Scotland (updated from Mackay, 1984).

In addition, there are supporting jobs in the primary processing of agriculture and forestry products, in haulage, and in the local community infrastructure, which are not readily quantifiable in this context.

39 It is evident from table 5 that forestry already provides more work per unit area than extensive hill farming. There must also be some value in the diversification inherent in a mixed rural economy. A recent report published by the Highlands and Islands Development Board (McCreath, 1988) shows that while total employment within an agricultural community in the West of Scotland (part of the Cowal peninsular) has fallen over the 35 years to 1985, the introduction of forestry as a land use over 40 per cent of the survey area has resulted in an economy supporting 140 per cent of the jobs which agriculture on its own would have provided.

40 It is often said that forestry labour is too mobile and transitory to bring worthwhile benefits to individual communities, but this view overlooks the real issue which is the total contribution to rural economies. Increased labour mobility is a phenomenon associated with many industries over the past 20 years or so, and reflects the availability of cheaper and easier transport. Forest workers must live somewhere, and the survey data quoted earlier (para 12) suggest that most are operating within

a reasonably confined area. Many employees, wherever they live and however far they travel to work, now aspire to a standard of living which cannot easily be met in remote agricultural or forestry dwellings. Typically, in the uplands at least where most forests are concentrated, these isolated individual houses or small settlements lack mains water and drainage; not a few still lack mains electricity; they suffer from poor access; shops, schools and public transport are inadequate, distant or both; and the housing stock is likely to be elderly and inadequate. The trend towards forest labour based in the larger villages and market towns must in part be a response to these factors. This deployment marries an acceptable standard of living for the workforce to the need to spread operations over a sufficient area of forest under the same management to ensure continuity of work. In this sense, forestry may be better placed in the uplands to provide a satisfactory standard of living than stock rearing, because the latter cannot easily dispense with the need for continuous 'on-site' supervision of livestock.

CONCLUSION

41 The picture is one of an industry which provides now rather more than 10 per cent of the current employment generated by agriculture in rural areas. The difficulty of forecasting the effect of productivity increases makes prediction of future overall numbers employed uncertain, but special factors at work in forestry - the new planting programme and an increase in harvesting activity - are likely to ensure that the industry's contribution to overall rural employment is maintained or increased. At the same time there are grounds for thinking that the structure and type of employment provided is in keeping with retention of a well housed and serviced workforce in small rural centres, especially in remote areas where other opportunities are scarce. It is perhaps here that the contribution of forestry is most important.

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FORESTRY MANPOWER PREDICTIONS

Productivity improvement (percent per annum)	Actual		Predictions		
	1987	1989	1994	1999	2004
None	Forestry Commission				
	ENG	2900	2978	3011	3244
	WALES	1700	1651	1922	2375
	SCOT	3500	3697	3758	4712
	GB	8100	8326	8691	10332
	Private Sector				
	ENG	13650	14008	15228	16266
	WALES	3200	3600	4535	5041
	SCOT	5350	6177	7729	8864
	GB	22200	23785	27492	30171
	Processing				
	ENG	5700	5124	5608	6116
	WALES	1100	1658	2039	2503
	SCOT	2350	3599	4271	5466
	GB	9150	10380	11917	14086
	Total (GB)	39450	42491	48100	54588
2% on all operations	Forestry Commission				
	ENG	2900	2978	2722	2651
	WALES	17--	1651	1738	1941
	SCOT	3500	3697	3397	3850
	GB	8100	8326	7856	8442
	Private Sector				
	ENG	13650	14008	13765	13290
	WALES	3200	3600	4099	4119
	SCOT	5350	6177	6986	7243
	GB	22200	23785	24850	24652
	Processing				
	ENG	5700	5124	5069	4997
	WALES	1100	1658	1843	2045
	SCOT	2350	3599	3861	4466
	GB	9150	10380	10772	11509
	Total (GB)	39450	42491	43479	44603
					45841

FORESTRY MANPOWER PREDICTIONS

Productivity improvement (percent per annum)	Actual		Predictions			
		1987	1989	1994	1999	2004
<hr/>						
	Forestry Commission					
2% on harvesting and processing only	ENG	2900	2978	2837	2881	2815
	WALES	1700	1651	1780	2035	2176
	SCOT	3500	3697	3537	4143	4803
	GB	8100 8326	8154	9059	9794	
	Private Sector					
	ENG	13650	14008	14312	14367	14267
	WALES	3200	3600	4226	4366	5093
	SCOT	5350	6177	7368	8038	8700
	GB	22200	23785	25905	26771	28060
	Processing					
	ENG	5700	5124	5069	4997	4827
	WALES	1100	1658	1843	2045	2231
	SCOT	2350	3599	3861	4466	5037
	GB	9150	10380	10772	11509	12096
	Total (GB)	39450	42491	44832	47339	49950
<hr/>						
	Forestry Commission					
3% on harvesting and processing 1% on rest	ENG	2900	2978	2743	2696	2549
	WALES	1700	1651	1720-0	1902	1968
	SCOT	3500	3697	3435	3922	4442
	GB	8100	8326	7898	8520	8959
	Private Sector					
	ENG	13650	14008	13846	13458	12956
	WALES	3200	3600	4108	4138	4721
	SCOT	5350	6177	7099	7476	7821
	GB	22200	23785	25054	25072	25498
	Processing					
	ENG	5700	5124	4816	4510	4139
	WALES	1100	1658	1751	1846	1913
	SCOT	2350	3599	3668	4031	4319
	GB	9150	10380	10234	10387	10371
	Total (GB)	39450	42491	43186	43978	44828
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Annex 1 (cont)

Assumptions:

Estimates are based on manpower presently engaged in establishment, maintenance, production, other forest operations (ie roading, environmental activities) and management (overheads). Forestry Commission factors are taken from internal records as at 31 March 1987; private sector from the 1986 Employment Survey and primary processing from information provided by the industry in 1987.

The proportions of the forest estate held by the Forestry Commission and the private sector are assumed to remain in the same ownership category.

From 1990, new planting is assumed to be 33,000 ha/annum; 28,000 private sector and 5,000 Commission. No allowance is made for future Farm Woodlands planting, on the assumption that this will mainly utilise existing farm labour.

Restocking reflects the production programme. All areas clear felled are assumed to be replanted within one year.

Softwood production estimates are based on 1987 Production Forecast for Forestry Commission and private sector separately. An additional somewhat arbitrary allowance of one million cubic metres per annum is made for hardwood production.

Estimates for primary processing are based on the Production Forecast, taking separate account of sawlogs and small roundwood processing. The national breakdown assumes that wood grown in each country will be processed there. Although this is not necessarily true in practice, it is a reasonable approximation.

Haulage is included in private sector and Forestry Commission estimates.

Figure 1

PROFILE OF LABOUR OVER ROTATION

Conifer crop - thinned from year 25

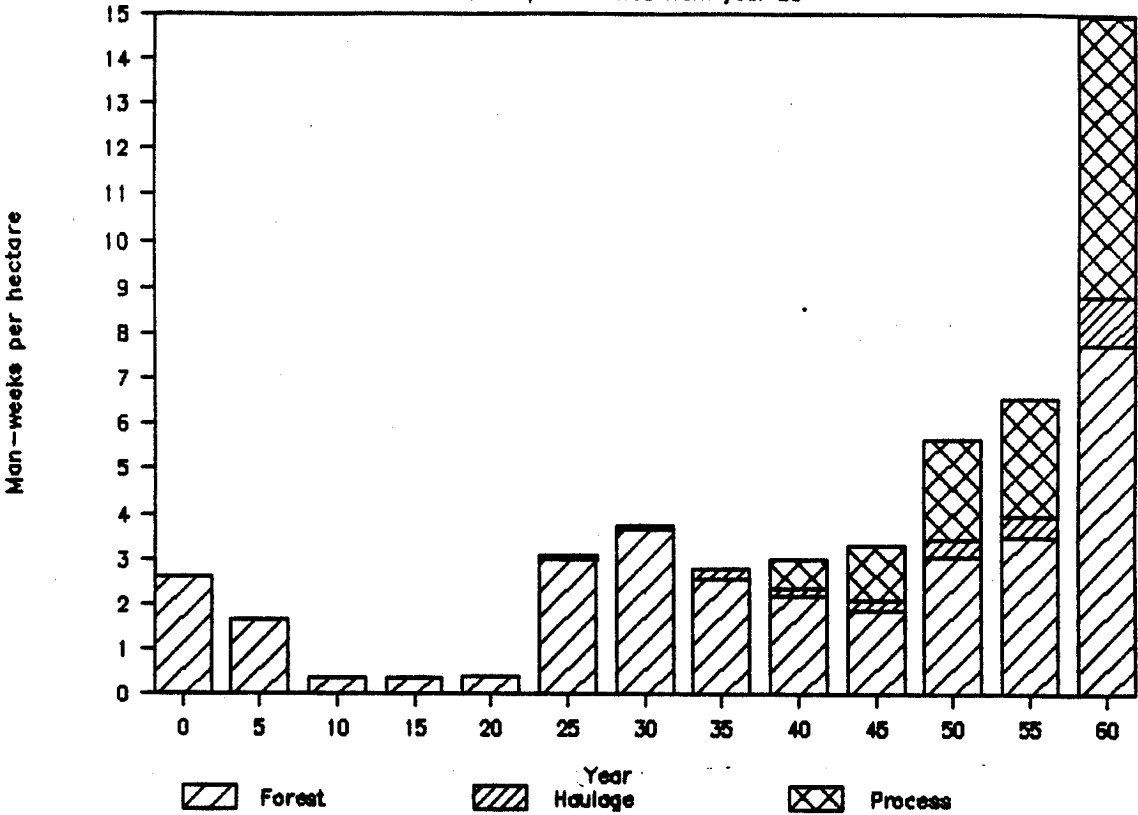


Figure 2

AGE STRUCTURE OF FORESTS IN BRITAIN

Updated from Census of Woodlands 1980

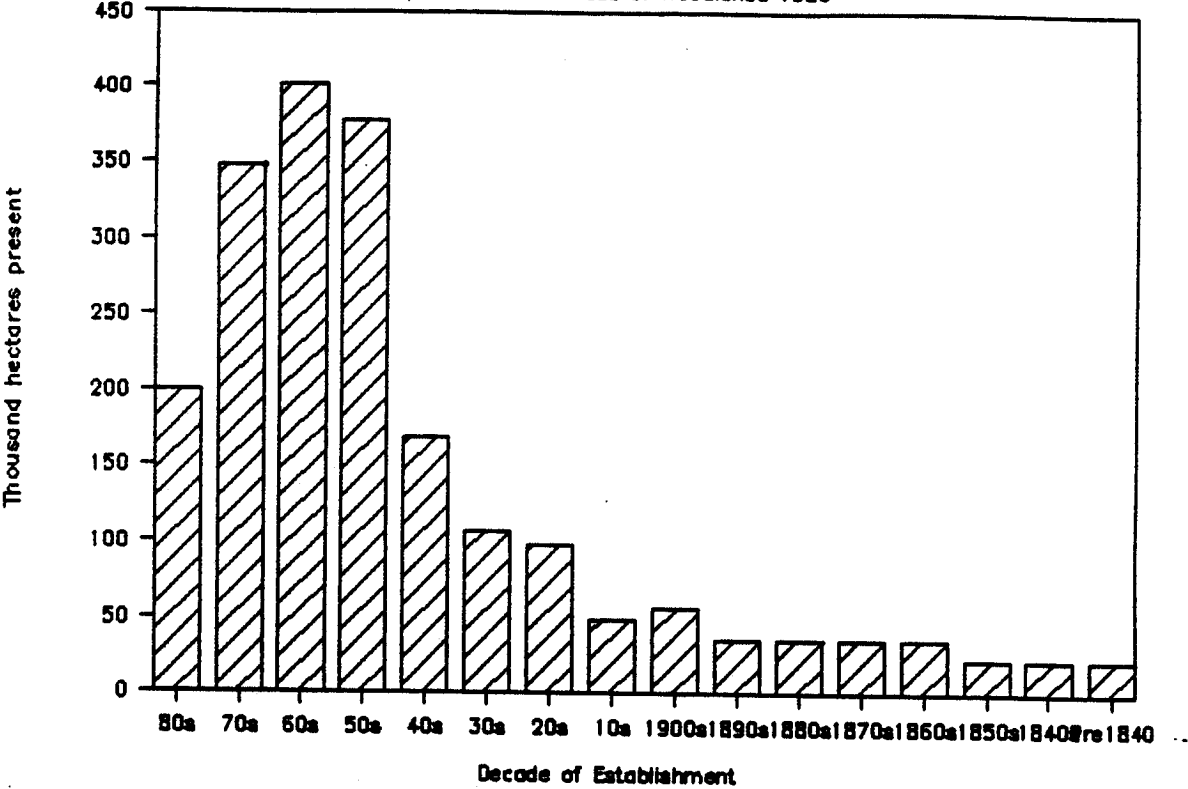


Figure 3a

FORESTRY COMMISSION

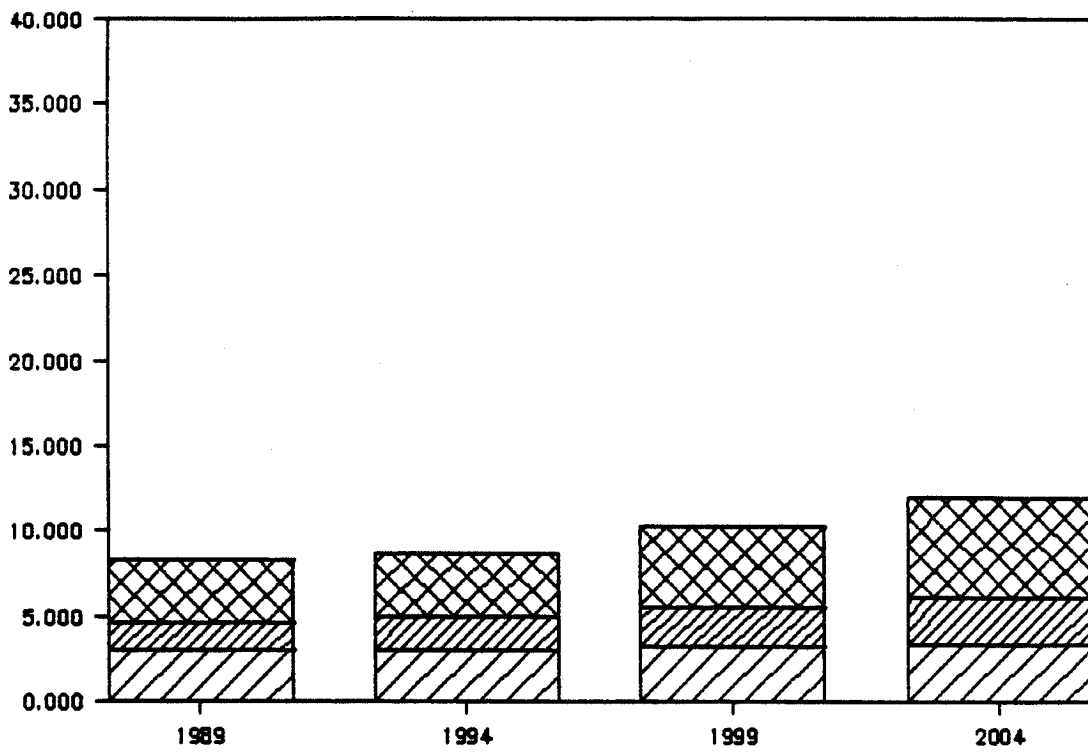


Figure 3b

PRIVATE SECTOR

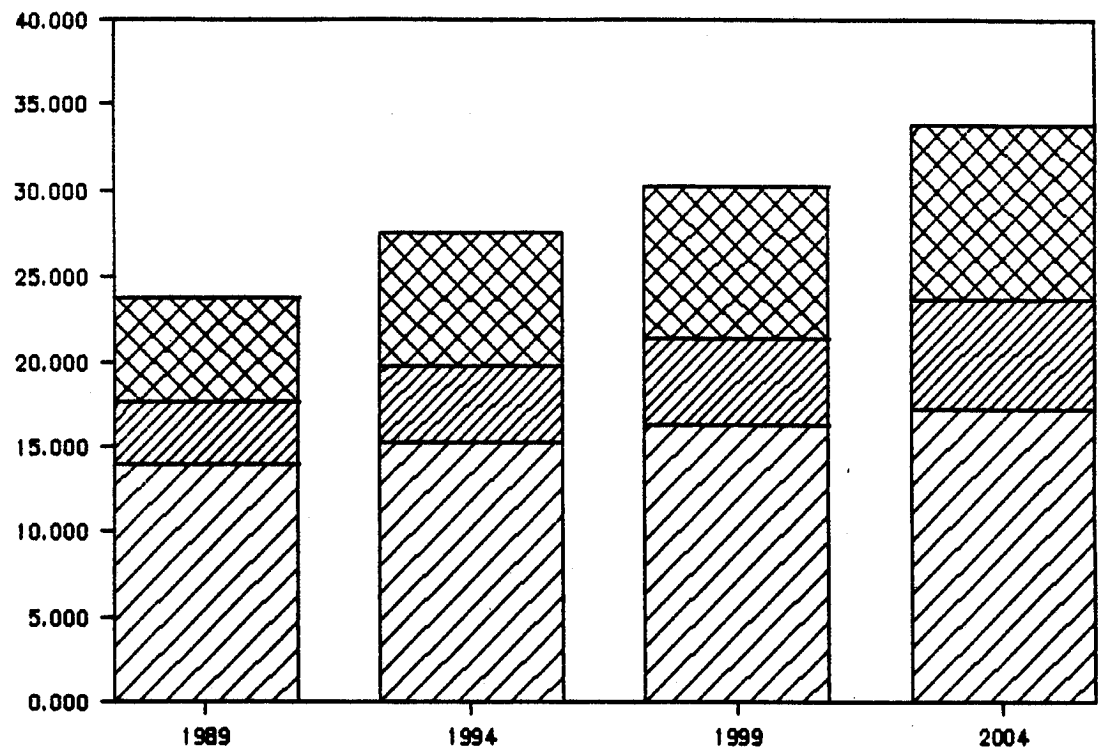


Figure 3c

PROCESSING

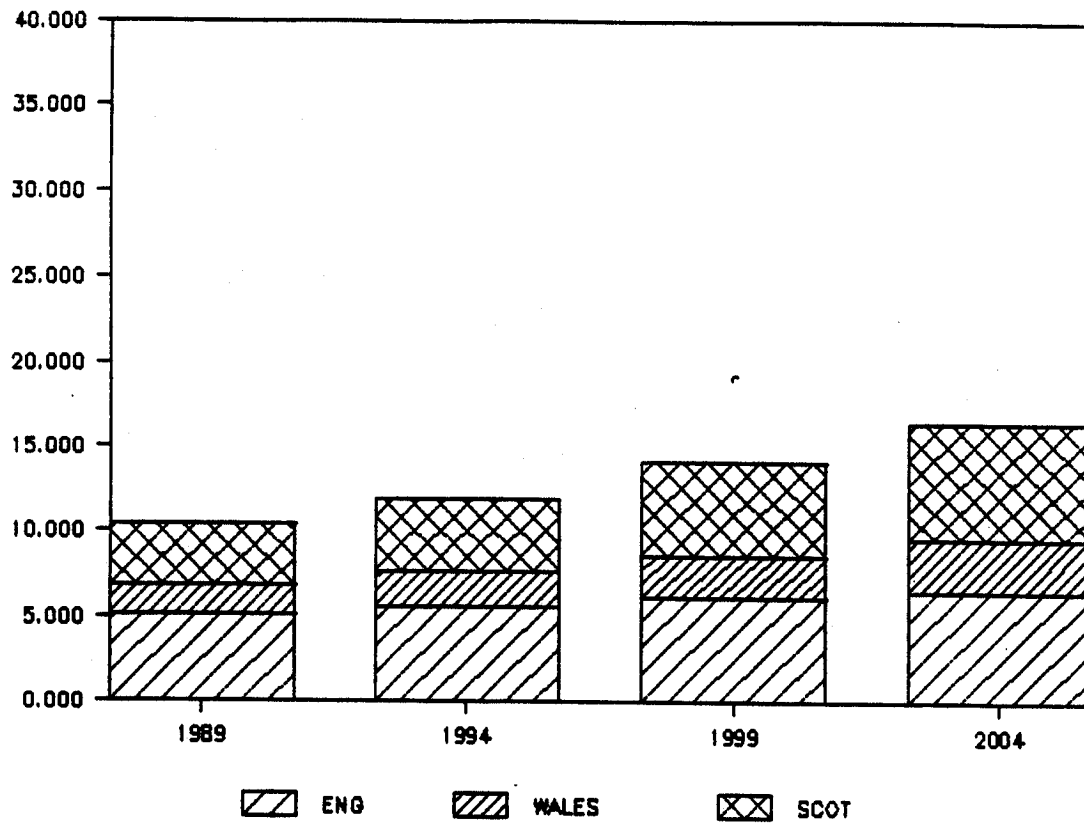


Figure 4a

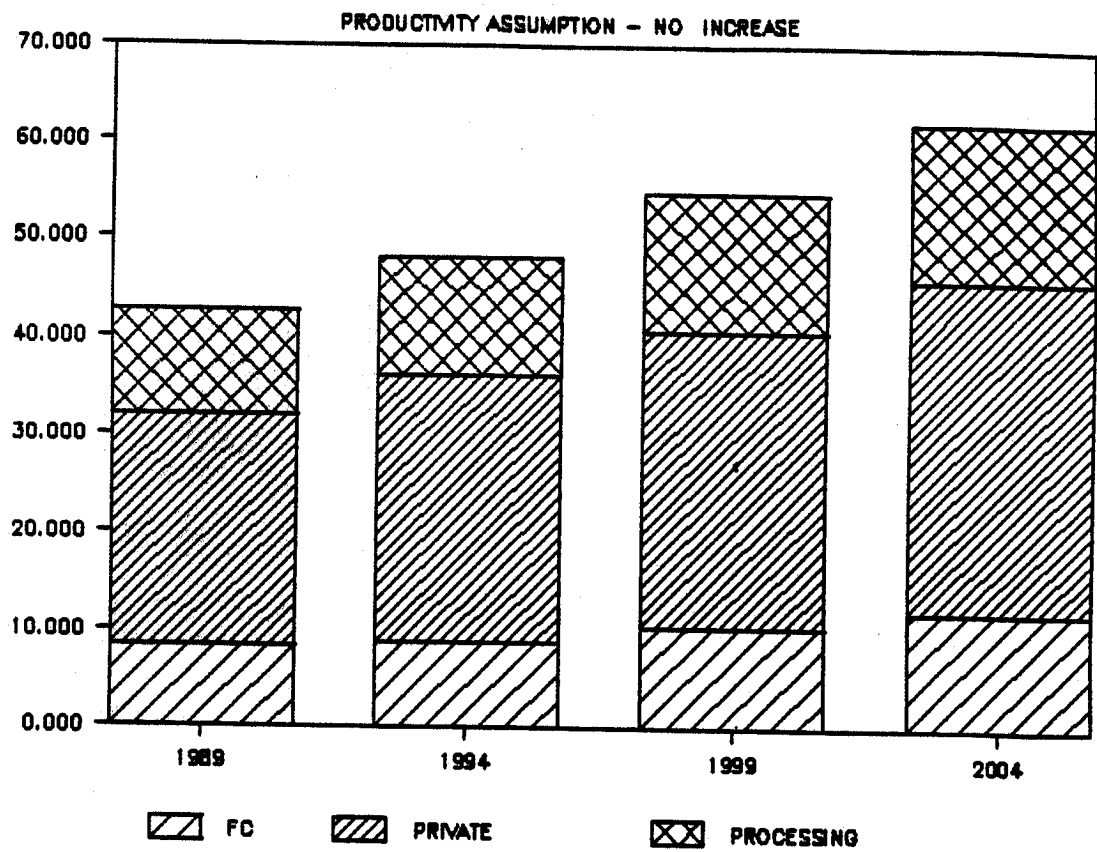


Figure 4b

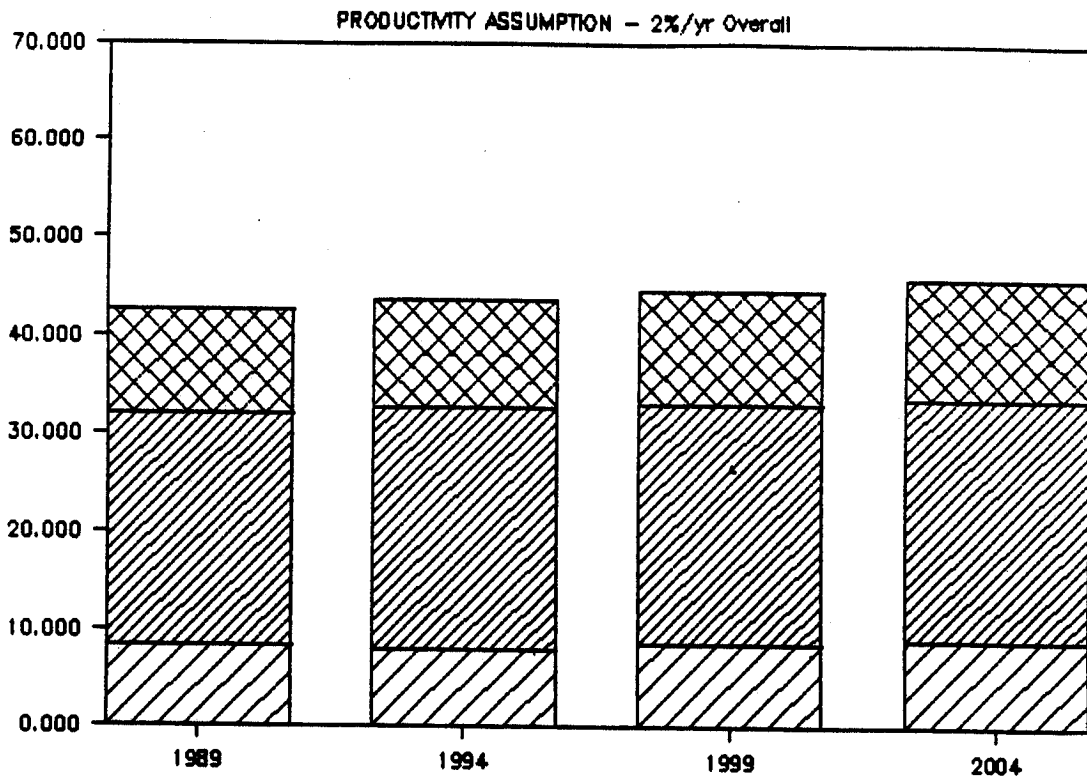


Figure 4c

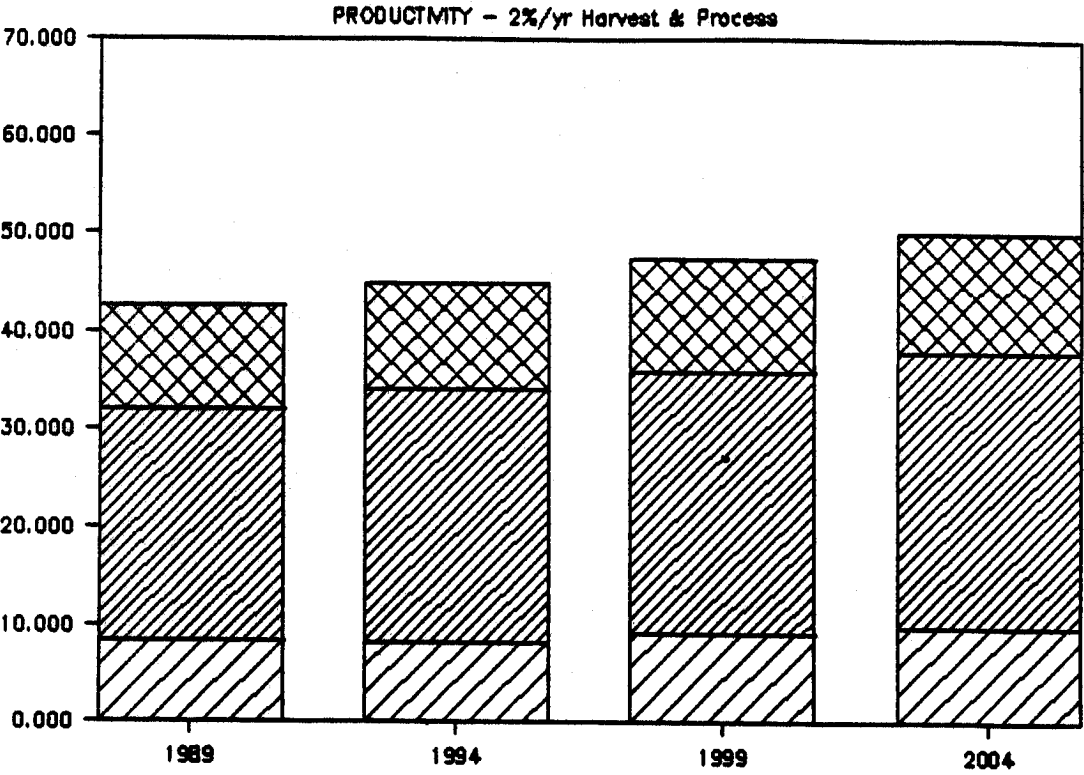


Figure 4d

PRODUCTIVITY ASSUMPTION

3% Harvest and Process: 1% Rest

