



Report on Apiary in NSW

Southern Region

A project undertaken as part of the NSW Comprehensive Regional

Assessments

October 1999



REPORT ON APIARY IN NSW

SOUTHERN REGION

Hassall & Associates

A project undertaken for
the Joint Commonwealth NSW Regional Forest Agreement Steering Committee
as part of the
NSW Comprehensive Regional Assessments
Project Number NA06/ES

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Commonwealth Government

ISBN 1 74029 109 3

This project has been jointly funded by the New South Wales and Commonwealth Governments and managed through the Resource and Conservation Division, Department of Urban Affairs and Planning, and the Forests Taskforce, Department of the Prime Minister and Cabinet

The project has been overseen and the methodology has been developed through the Economic and Social Technical Committee which includes representatives from the New South Wales and Commonwealth Governments and stakeholder groups.

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2. PROJECT SUMMARY

The purpose of this investigation was to evaluate the NSW apiary industry within the framework of the forest assessment process. This report, the output of the Southern RFA Region (Southern Region) investigation, includes the following information for the region:

- A profile of apiculture;
- Values generated by apiculture;
- An assessment of the dependency of apiculture on forests;
- The relationship of the apiary industry to other forest uses and users; and
- Conclusions on the sensitivity of the apiary industry to change.

The Southern apiary industry is located in a major beekeeping and honey producing area. It has areas that are valuable overwintering resources and areas in the mountains and on the coast that are useful drought reserves. The Southern apiary industry is characterised by its mobility, its eucalypt dependency, the variability of production and its dominance by apiarists who rely on beekeeping as their primary source of income. The industry produces almost 16% of the NSW production of honey from an estimated 2000 sites carrying up to 220 000 hives. Approximately 40% of the industry is located on State Forest sites inside the RFA region boundaries.

Southern apiary is managed on a family basis, apiarists rely on learned skills rather than formal education and make a modest income, relying on infrequent good years to replace capital and equipment.

There is a strong demand for apiarists product and Southern honey is not dissimilar to honey produced in other coastal regions. The Southern Region, on average, supplies approximately 2400 tonnes of honey with a wholesale value of \$3.9 million. Wax and other product sales add another \$200 000, a total of \$4.1 million. Value added is equivalent to \$1.3 million and labour income some \$1.1 million.

The Southern Region's value to the NSW apiary industry lies not only in the value of products generated, but also in its value for resting bees prior to their use in pollination, its capacity as a drought reserve and its relative importance at a time when alternative viable eucalypt and non eucalypt resources are in short supply. Opportunities for the Southern apiary industry to relocate to alternative areas are limited.

Apiarists share the Southern forests with a range of other commercial and non commercial users. Potential exists for conflict between apiarists and wood product producers and miners (loss of floral resources) and recreation visitors (bee stings, damage to hives). Co-dependence between apiarists and other forest users includes wood product producers and miners (provision of access roads, suitable bee sites) and scientific researchers (assistance with data collection). A number of other forest users and uses share a neutral relationship with apiarists.

The Southern Region is an important area for apiary as a drought reserve and "overwintering" resource. It is a highly significant producer of honey and other apiary products.

1. APIARY IN THE SOUTHERN RFA REGION

1.1 A PROFILE OF APICULTURE IN THE SOUTHERN REGION

1.1.1 Definition of the Southern Region

The Southern Region constitutes all or part of twelve State Forests of NSW (State Forests) management areas, they are:

- The whole of the Adaminaby, Badja, Bago-Maragle, Batemans Bay and Monaro South areas; and
- Part of the Bathurst, Holbrook, Moss Vale, Narooma, Nowra, Queanbeyan and Tumut areas.

1.1.2 Location of the Apiary Industry within the Southern Region

The Southern Region is large and diverse. It runs south from Oberon, along the South Coast from south of Shoalhaven Heads down to just north of Bermagui, where it meets the Eden RFA Region. It runs from the western boundary of the Eden Region and from the NSW-Victorian border, west to Holbrook and in the north west it encompasses Batlow, Tumut and Yass. It surrounds but does not include the Australian Capital Territory. It does encompass the entire Snowy River Shire, which includes Australia's highest peak Mount Kosciusko.

The land classes covered by the Southern Region are diverse in topography, climate and native vegetation. They therefore provide different resources and have different uses for beekeepers, based on vegetation available and flowering patterns. The three main land classes present in the region are coastal, mountains and tablelands.

1.1.3 Nature of the Southern Apiary Industry

The Southern Region is:

- a major beekeeping and honey producing area;
- a reliable and valuable overwintering area; and
- a useful drought reserve for southern NSW and interstate beekeepers.

The Southern Region apiary industry is:

- mobile;
- made up of local, other NSW and interstate beekeepers;
- eucalyptus based; and
- dominated by apiarists who rely on beekeeping as their primary source of income.

Honey production occurs in the mountains, on the tablelands and the coastal areas of the Southern Region. The south coast of NSW is particularly recognised as one of the major beekeeping and honey producing regions in NSW. The Southern Region encompasses most of the coastal area, the southern most part of the coast being covered by the Eden Region. The large areas of State Forest, National Parks and private forested areas all add to the value of the Southern Region to the apiculture industry.

Within the Southern Region's forests, there are many distinct vegetation communities, such as heath leaved banksia, which play an important role in the provision of excellent bee breeding conditions. Spotted gum, one of the most common eucalypts in the coastal part of the region, is also an important honey producing and overwintering resource.

When beekeepers on the south coast were surveyed, the importance of this area for resting bees was reinforced, with the north coast as the only specific alternative area mentioned for overwintering (CSIRO, 1978, confirmed by Doug Somerville, NSW Agriculture). Parts of the coastal and mountain areas of the Southern Region also provide an alternative in times of drought in traditional western and tableland beekeeping areas.

A characteristic feature of the NSW apiary industry is the mobility of apiarists throughout the regions and environments of NSW, Victoria and Queensland. The Southern Region is no exception with apiarists frequently crossing RFA region boundaries into and out of the region in response to the availability of nectar for honey and pollen.

When bees are not in the Southern Region, they could be anywhere in NSW or Victoria where there are floral resources available. It is standard practice however, for beekeepers to maintain a network of sites within a 200-300 kilometre radius of their base. The actual sites utilised vary year to year, depending on flowering and in particular, rain.

There are quite significant costs associated with beekeepers travelling extensive distances to source pollen and nectar. These costs prohibit the utilisation of resources that are excessive distances from base. For example the costs involved with travelling from the Southern Region to the north coast would prohibit the use of the north coast by Southern Region based beekeepers. The main problem associated with using sites on the north coast is the lack of available sites, due to strong competition for productive sites.

In NSW, eucalypts account for approximately 70% of honey production (Somerville and Moncur, 1997) and this is true of the Southern Region. On average 65% of beekeepers who use the region, rely on beekeeping as their primary source of income (NSW Agriculture and State Forests, 1990,1994 and 1995a).

NSW Agriculture in conjunction with State Forests, has completed five apiculture reports within the area covered by the Southern Region. The five areas are diverse topographically, climatically, ecologically and in terms of the flora they support. Without ignoring the unique contribution each area makes to apiculture within the Southern Region it is however necessary to consolidate the results of the reports to produce an overall profile of the region.

Beekeepers were surveyed and asked to nominate the most important floral species for honey production in their area. The five major species for each area are presented in table 1a below.

TABLE 1A MAJOR FLORAL SPECIES UTILISED BY BEEKEEPERS IN SOUTHERN REGION FORESTRY DISTRICTS

Batemans Bay (a)	Narooma (b)	Nowra (c)	Queanbeyan (d)	Tumut (e)
Spotted Gum	Yellow Stringybark	Heath Leaved Banksia	Brown Barrel	Snow Gum
Grey Ironbark	Spotted Gum	Red Bloodwood	Broad-leaved Messmate	Alpine Ash
Sydney Blue Gum	Woollybutt	Spotted Gum	Manna Gum	Manna Gum
Red Bloodwood	Grey Ironbark	Grey Ironbark	Narrow-leaved Peppermint	Narrow-leaved Peppermint
Yellow Stringybark	White Stringybark	Blackbutt	Snow Gum	Red Stringybark

Scientific names of all species mentioned are listed at the end of the report.

(a) Source: NSW Agriculture and State Forests, 1994

(b) Source: NSW Agriculture and State Forests, 1995a

(c) Source: NSW Agriculture and State Forests, 1990

(d) The report on apiary management potential for the Queanbeyan/Badja management area did not survey beekeepers, but does present information on species found in the forest that have a high usage value to beekeepers Source: NSW Agriculture and State Forests, 1995

(e) Tumut /Tumbarumba Source: NSW Agriculture, 1997

There is a significant demand for sites within State Forests that support the mentioned species. For example, when the survey was done in the Batemans Bay area in 1994, there were 396 sites leased which represented all of the available spotted gum sites. The majority of sites not leased represented either areas dominated by non-important honey or pollen species, areas with no suitable sites for the placement of bees or areas without access (NSW Agriculture and State Forests, 1994).

The range in climate and habitat that is observed within the Southern Region, reduces the ability to create a single list of important species for the region. However, when the individual surveys are combined the most mentioned species, where each accounted for at least 2% of production, were:

- spotted gum;
- grey ironbark;
- yellow stringybark;
- red bloodwood;
- woollybutt;
- white stringybark;
- blackbutt;
- sydney blue gum;
- red ironbark;
- heath leaved banksia;
- bangalay;
- sydney peppermint;
- egg & bacon;
- manna gum;

- alpine ash; and
- snow gum.

(NSW Agriculture and State Forests, 1990, 1994, 1995, 1995a and NSW Agriculture 1997)

As outlined above, the available and therefore most utilised species is dependant on the topography and climate of the area. The above provides a comprehensive list of species available in the whole region, however the availability of specific species is limited by their geographic distribution throughout the region. For example, of these species listed above, spotted gum, grey ironbark and yellow stringybark are the most reliable honey producing species so therefore are sought as a higher priority and sites with access to such species are in high demand, however spotted gum is solely a coastal species.

Red bloodwood, woollybutt, white stringybark and sydney blue gum are all considered secondary species and are sought as a lower priority, where some or all of the first three species are available. Heath leaved banksia and egg & bacon are important overwintering species, with heath leaved banksia found around Nowra but not south of Nowra and egg & bacon found right through the coastal area. Alpine ash and snow gum are important mountain species as is red stringybark traditionally, although this was not reflected by the NSW Agriculture survey responses. Red stringybark along with yellow box and thistles are important species on the tablelands, again due to the high reliance on coastal species these species were not represented in the NSW Agriculture survey results. The topography and vegetation of an area will dictate whether the use of that area by beekeepers. It may be used for honey production or overwintering and uses may change seasonally and year to year.

Based on the accumulation of the results for the Southern Region across all topographic regions, spotted gum is the major species of importance to beekeepers in the Southern Region. It is important to note that spotted gum occurs only in coastal forests and flowers every three to four years. It has a high level of importance for both honey and pollen. Buds are carried for 18 months and flowering usually occurs over an extended period, varying slightly with the season and locality, the further south spotted gum grows the later it flowers. In the Southern Region, spotted gum flowers between April and August (Clemson, 1985). Average yield is between 27 and 41 kg per hive in winter (CSIRO, 1978, confirmed by Doug Somerville, NSW Agriculture) and bees that have worked this floral resource are usually strong and healthy and particularly suitable for use in pollination.

The forest eucalypts which flower in the Southern Region in late autumn and winter include woollybutt, white stringybark, spotted gum, swamp mahogany, corky ironbark, mountain gum, red sally, black sally and manna gum. Wattle, tea tree, bottlebrush, myrtle, casuarinas and dillwynias are some of the understorey plants available. These species provide a worthwhile supply of pollen and a stimulating honey flow. Understorey species also provide excellent conditions for overwintering bees on the coast, and producing hives in the spring capable of immediately working another nectar floral source. Without utilisation of this understorey resource, a two month build up period would otherwise be necessary prior to useful production of honey (NSW Agriculture and State Forests, 1994).

Eucalypts in the south east forests do not flower on an annual basis. On average their flowering cycle is once every two to five years. This means that the Southern Region, which is dependent on eucalypts for its honey production, will go through periods of both high and low productivity. Flowering events tend to be synchronised and dependent on locally favourable seasonal conditions. Beekeepers spend from 30 to 100 days in the area on one species in on-honey years, (CSIRO, 1978, confirmed by Doug Somerville, NSW Agriculture) which is approximately one year in three. Beekeepers may return to the same area for a different species

at a different time, for example spotted gum and grey ironbark may grow together but will flower in different seasons and may flower in different years.

1.1.4 Size of the Southern Region Industry

Difficulties arise in determining the total number of bee sites within the Southern Region. This is because the number of sites fluctuates significantly between consecutive years. Having established the number of sites currently leased it is not possible to determine whether these bee sites will be used or just maintained as a long term permit and held for scarcity of site reasons. Some sites are used more than biannually, with many sites being used as infrequently as every five to six years. The nature of the industry dictates that predicting the exact number of sites being viable and used in any one year, is a difficult task. The most practical way to perform this task is to base the estimate of registered sites on current agency data and adjust this data with the assistance of local knowledge, to determine the number of private property sites.

The number of hives per site depends on the floral resource utilised by the beekeeper and its abundance. For honey production and overwintering the average stocking rate for commercial loads of bees across all floral types would come close to 110 hives per site. This is partly due to the fact that most trucks used by beekeepers carry between 100 and 120 hives. It is also due to the knowledge that with a stocking rate of 110 hives per site, it can be expected that the beekeeper will receive a reasonable crop of surplus honey and bee colonies in good condition at the end of the flowering period (NSW Agriculture and State Forests, 1994).

In order to establish the size of the apiary industry in the Southern Region, current State Forests and National Parks bee site records for calendar year 1996, were obtained and analysed.

From the State Forests data it was possible to ascertain that there is currently a total of 785 sites in State Forests within the Southern Region and 157 Crown Land sites. These sites are leased by 175 apiarists. Data provided by regional National Parks offices indicates that there are 88 bee sites controlled by 27 apiarists within National Parks in the Southern Region.

Advice from local beekeepers and from NSW Agriculture and State Forests surveys indicated that the ratio of private property sites to registered sites varies according to the topography of different areas within the region. On the coast there is a greater reliance on State Forest sites and the estimated ratio is three registered sites to one private property site. In the mountain areas the ratio is estimated at one to one and on the tablelands the ratio is estimated as one to three, where State Forest resources are utilised less and agricultural and horticultural crops have a greater usage (Greg Roberts, NSWAA and Doug Somerville, NSW Agriculture). It is difficult to average this ratio due to the numbers involved and the diverse nature of the region however for the purposes of this study the overall ratio for the Southern Region is estimated to be one registered site to one private property site. Given that the total of State Forest, Crown land and National Parks sites is approximately 1000, the number of private property sites in the region is therefore estimated to also be 1000, and these are leased by approximately 200 apiarists.

The total number of sites in the Southern Region is therefore approximately 2000. In the Southern Region apiarists average 110 hives per site (NSW Agriculture and State Forests, 1995a), total hive numbers are therefore 220 000.

1.1.5 Socio-Economic Characteristics of Southern Apiarists

Socio-economic data was compiled in discussions with beekeepers, regional foresters and various industry authorities and the following points with regard to socio-economic characteristics are made:

- Enterprises are managed on a family basis;
- There is a general absence of corporate structures at the production level;
- Historically a lack of certainty regarding industry resource access has played a role in discouraging both new investment and young apiarists;
- Availability of sites dominated by reliable species is very limited, limiting entry for new beekeepers and current beekeepers expansion;
- Income generated in the Southern Region although substantial, is variable and subject to seasonal conditions;
- Individually apiarists tend to make a modest income from their operations relying on windfall good years to replace capital and equipment;
- Apiarists rely on practical learned skills, rather than formal education;
- From current State Forest site permit data it can be estimated that the Southern Region has a significant number (18%) of amateur or part time apiarists who *gross* less than \$75 000 per annum (Hassall & Associates estimate); and
- Most production (82%) is generated by large full time producers who gross up to \$150 000 (Greg Roberts, NSWAA: 800 hives, 300 drums, 295 kg/drum, \$1.65 kg) with costs of \$92,000 (NSWAA, 1996 for 800 hives excluding operator salary), a net value of \$58 000. After operator salary of \$45 000 (NSWAA, 1996) a surplus of \$13 000 is generated.

Continued productivity improvement will be required along with floral resource access if the industry is to remain viable and attract new producers.

1.1.6 Demand for Apiculture Products from the Southern Region

Most of the honey produced in the Southern Region is sold in either Sydney or Melbourne. The major buyers are Capilano Honey and Windsor Farms. Between them, these two dominant honey processors control over 80% of the NSW honey market (Greg Roberts, President, NSW Apiarists Association). Beekeepers that use the region also supply to Goodes Honey in Victoria and Leabrook Farms in South Australia, and at least six beekeepers that use the region are packer-producers (Doug Somerville, NSW Agriculture).

Capilano Honey indicate that most of the honey produced in the region is graded by colour and blended with honey from other sources. There are however at least two floral types present in the region, yellow box on the tablelands and slopes and grey ironbark on the coast, that produce a lighter honey for which a premium is achieved and which is usually sold as a straight line honey, ie. it is not blended (Doug Somerville, NSW Agriculture).

1.2 VALUES GENERATED BY APICULTURE IN THE SOUTHERN REGION

1.2.1 Supply and Value of Production

The apiary industry generates values for the following:

- Honey;
- Wax;
- Queen bee and package bee sales; and
- Pollination fees.

Value estimates are provided below for each product. Total value of production is also split into State Forests, Crown land, National Parks and private property estimates.

Honey: To derive a total value of production figure for honey in the Southern Region the following assumptions were necessary:

- Currently there are 220 000 hives in the Southern Region (see Section 1.1 Size of the Industry);
- The region's productive season is typically a total of 6 months duration, this depends on the beekeepers residence and topographic areas utilised. When resources are not available in the region, hives are relocated to other regions where additional production is generated;
- The flowering pattern of eucalypts in the Southern Region ensures the area is productive, on average one year in three, dependant on rainfall and on average 90% of hives reach productive potential. Average annual production is therefore from 66 000 hives (220 000 by 90% divided by three);
- Beekeepers surveyed within the Southern Region nominated 67 species that they use for beekeeping. Of those, 49 were eucalypts and the top 29 species were mentioned by more than ten beekeepers;
- To reflect the diversity and range of species involved, calculations of honey and wax production are based on the top 16 species, that each account for at least two percent of total production (See Section 1.1 Nature of the Southern Apiary Industry); and
- The average wholesale price for these honeys is \$1.65 kg (Lloyd Smith, Capilano Brisbane, 1996 figures).

Table 1b provides estimates of the total value of honey production in the Southern Region.

TABLE 1B SUPPLY AND VALUE OF HONEY PRODUCTION SOUTHERN REGION

Floral Resource (a)	Years between flows	Number of Productive Hives	Production per Hive (kg/hive) (b)	Total Production (kg)	Total Honey Value (\$)
Spotted Gum	4	8 766	42	368 172	\$607 484
Grey Ironbark	2-5	7 605	60	456 300	\$752 895
Yellow Stringybark	3-5	6 316	40	252 640	\$416 856
Red Bloodwood	2-3	6 188	50	309 400	\$510 510
Woollybutt	4-5+	4 641	30	139 230	\$229 730
White Stringybark	3-4	4 512	15	67 680	\$111 672
Blackbutt	3-4	4 383	27	118 341	\$195 263
Sydney Blue Gum	2-5	3 996	27	107 892	\$178 022
Red Ironbark	2-3	3 094	28	86 632	\$142 943
Heath leaved Banksia	Every yr	2 707	27	73 089	\$120 597
Bangalay	2-3	2 578	40	103 120	\$170 148
Sydney Peppermint	2-3	2 578	27	69 606	\$114 850
Egg & Bacon	Every yr	2 320	15	34 800	\$57 420
Manna Gum	3	2 191	27	59 157	\$97 609
Alpine Ash	2	2 063	27	55 701	\$91 907
Snow Gum	2-3	2 063	45	92 835	\$153 178
Total		66 000		2 394 595	\$3 951 082

(a) Floral resources are for the top 16 resources named by surveyed beekeepers in the Southern Region.

(b) Source: NSW Agriculture and State Forests 1990,1994,1995,1995a and NSW Agriculture 1997.

There may be productive resources covering a complete 12 month period in some years. (Doug Somerville, pers comm , 1997)

From table 1b it can be seen that the total average annual value of honey in the Southern Region is approximately \$4.0 million. This value ignores the value of the region for overwintering bees.

Wax: The following assumptions are necessary for a derivation of wax values:

- Wax production per hive is equal to, on average, 1.7% of the hives honey production (NSW Agriculture);
- Honey production in the Southern Region averages 2 394 595 kg (see table 1b); and
- The price paid by wholesalers for wax is \$5.00 kg (C. Koerstz, Sydney).

The total average value of wax production is therefore \$203 541 (2 394 595 kg by 1.7% by \$5/kg).

Queen Bee and Package Bee Sales: There are at least three significant queen bee or package bee producers that source bees from beekeepers within the Southern Region. The largest package bee producer in the region is also recognised as the largest beekeeper in Australia and is responsible for 2/3 of Australia's package bee exports. This producer sources and buys bees from all over NSW and Victoria, while also managing his own hives, basing his summer production at Oberon/Black Springs, which is within the Southern Region. Like most beekeepers, he moves his hives into and out of the Southern Region as conditions change and favourable flowerings occur (Doug Somerville, Apiary Officer, NSW Agriculture). The value of these sales has been excluded from total value calculations.

Pollination: There is a significant pollination industry in the Southern Region, particularly in the production of apples in the Batlow area (Greg Roberts, NSW Apiarists Association), with smaller scattered areas of blueberries and strawberries and peaches/stonefruit production in the Araluen Valley also utilising pollination services. There is a reliance on bees from the Southern Region for the pollination of cherries and plums at Young and for canola and seed lucerne production in southern NSW (Doug Somerville, NSW Agriculture 1997). The value has not been quantified as its estimation is outside the scope of this study.

Total Value: From Section 1.1, Size of the Industry, the ratio of State Forest, Crown land, National Park and private property sites is estimated. If this division of sites is applied to allocation of production values then total value of production can be split into production from State Forests and other resources (Crown land, National Park and private property). Table 1c contains this split.

TABLE 1C VALUE OF APIARY PRODUCTION SOUTHERN REGION, STATE FORESTS AND OTHER RESOURCES

Product	State Forest	Other Resources	Total
Honey	\$1 550 800	\$2 400 282	\$3 951 082
Wax	\$79 890	\$123 651	\$203 541
Queen and packaged bees	not quantified	not quantified	
Pollination	not quantified	not quantified	
Total	\$1 630 690	\$2 523 933	\$4 154 623

The total value of production is \$4.1 million, some \$1.6 million of which is generated in State Forests.

1.2.2 Bee Resting Value

Resting of bees sometimes referred to as overwintering, has no direct quantifiable value to a region or the apiary industry. It does however, provide the basis of the pollination services operated by apiarists in other regions for many economically significant agricultural and horticultural crops. Bees are brought to the south coast from inland NSW to overwinter in conditions which allow some honey production and an increase in hive strength to prepare for the major spring/summer production period.

1.2.3 Drought Reserve Value

The south coast area provides a reserve in times of drought in traditional western areas and the tablelands. It is not a straightforward exercise to value this drought capacity. However, it's worth to the NSW apiary industry, and those who benefit from the industries activities (producers of agricultural and horticultural crops requiring pollination for example), should not be overlooked.

1.2.4 Input Expenditure

Input expenditure items are drawn from the Fourth Mansfield Report (NSWAA, 1996) which provides variable and fixed cost estimates for both a 600 hive and 1000 hive enterprise for financial year 1995/96. Relevant estimates for the 1000 hive enterprise are presented below in table 1d and extrapolations made for expenditure incurred in the Southern Region.

TABLE 1D INPUT EXPENDITURES PER 1000 HIVE ENTERPRISE AND EXPENDITURES INCURRED IN THE SOUTHERN REGION

Item	Expenditure per 1000 Hives (\$ per annum) (a)	Average expenditure per 1000 Hives incurred in Southern Region (\$ per annum) (b)
Hive maintenance	4000	1333
Queen replacement	5600	933
Labour; Owner	45 000	10 000
Additional	25 000	5208
Workers compensation	1,600	333
Truck running	26 750	5573
“ “ depreciation (15%)	26 000	5417
Utility running 14/Km	6300	1313
“ “ depreciation (15%)	4500	938
Extracting Costs & Maintenance	4500	750
Other plant operation	1500	333
“ “ depreciation	1500	333
Container losses	500	83
Living away & sundry expenses	4500	1000
Site rentals	6000	4000
Telephone	2000	444
Postage & Stationary	200	44
Insurance	2500	556
Land rates	350	78
Hive insurance	650	144
Assoc. Subs & Prof'l expenses	1000	222
Total Production & Standing Costs	169 950	39 040

(a) Data sourced from Investing in Commercial Honey Production, The Fourth Mansfield Report, NSWAA 1996

(b) Expenditure split provided by Greg Roberts, President NSW Apiarists Association. Expenditure split includes adjustments for 1 in 3 year usage of the Southern Region and expenditures made outside the region.

From table 1d it can be seen that total input expenditure in the Southern Region per 1000 hives is \$39 000. From the previous analysis of honey values it is known that, on average, there will be 73 330 hives in the Southern Region (220 000 hives, productive one year in three). Total input expenditures are therefore \$2 859 870 (73.33 by \$39 000).

1.2.5 Industry Employment

Labour requirements vary with the size of the enterprise. Smaller enterprises (up to 600 hives) require hired labour occasionally for honey extraction in the Spring through to Autumn, while larger operations (1000 hives or more) require a permanent employee in addition to the inputs of the owner operator (NSWAA, 1996).

The Fourth Mansfield Report (NSWAA, 1996) estimates labour costs for smaller enterprises (600 hives) at \$5000 per annum and larger operations (1000 hives) at \$25 000 per annum.

The portion of labour costs incurred in the Southern Region is detailed in table 1d. From the table it can be estimated that owner labour contributes approximately \$733 300 (\$10 000 from table 1d by 73.33) or 29.3 full time job equivalents. While hired labour contributes approximately \$381 903 (\$5208 from table 1c by 73.33) or 15.3 full time job equivalents.

The total value of the Southern Regions industry employment is therefore \$1 115 203 or 44.6 full time job equivalents.

1.2.6 Value to the Regional Economy (incorporating multipliers)

In table 1c the total value of the apiary industry to the region is estimated. The gross value of output is \$4 154 623 some \$1 294 753 of which is value added (the equivalent measure of Gross Domestic Product, GDP, that does not double count the cost of inputs and represents the returns to labour, capital, land and management). The gross output also includes payments of \$1 115 203 to 44.6 full time equivalent (FTE) employees. Through the application of multipliers it is shown in table 1e that the total impact (including the direct and indirect, or flow-on effects) to the rest of the regional economy represents \$7 320 446 in gross output which comprises \$2 164 827 in value added effects and payments of \$2 067 475 to 64.4 FTE employees (CARE, 1997).

TABLE 1E VALUE OF APIARY TO THE SOUTHERN REGIONAL ECONOMY

Value Item	Direct Impact	Type II Multiplier (a)	Flow-on Impact (b)	Total Impact
Gross Output (\$)	4 154 623	1.7620	3 165 823	7 320 446
Value Added (\$)	1 294 753	1.6720	870 074	2 164 827
Labour Income (\$)	1 115 203	1.8539	952 272	2 067 475
Employment (no.)	44.6	1.4448	19.8	64.4

(a) Multipliers are preliminary estimates based on the apiary sector in the NRAC report (1996) for the Upper North East Region of NSW for 1992-93. The Type II ratio is the ratio between the total multiplier and the initial effect. In this case, the consumption induced effects are included as well as the production induced effects. In the literature these are referred to as Type II multipliers (For further information and definitions please see ABS (1995) Information Paper, Introduction to Input-Output Multipliers).

(b) Flow-on Impact is a combination of the production induced effect and the consumption induced effect. (For further information and definitions please see ABS (1995) Information Paper, Introduction to Input-Output Multipliers).

These are indicative multipliers supplied by CARE.

1.2.7 Southern Region Values in Relation to the NSW Apiary Industry

To provide a comparative value for the Southern Region in relation to the whole NSW apiary industry is not a straightforward matter. Any quantitative measure chosen will exclude non quantified values such as the Southern Region's importance for resting bees, it's industry drought reserve capacity and pollination value. With this said, it is still important to provide some comparison of relative values between the region and the whole NSW apiary industry.

Based on ABS data, the average amount of honey produced annually in NSW over the last six years is 9 150 418 kilograms (kg). Advice from beekeepers and NSW Agriculture indicate that the ABS figure may be low due to the fact that these data are gathered only from beekeepers operating more than 320 hives, which excludes at least one-third of production. NSW production is estimated to be 14 635 000 kg (Gibbs and Muirhead, 1998). Based on current data the Southern Region should produce 2 394 595 kg this year, therefore accounting for 16% of NSW honey production. The Southern Region is a significant honey production area.

1.3 DEPENDENCY OF APIARY ON THE SOUTHERN REGION

The following needs to be considered when assessing the dependency of the NSW apiary industry on the Southern Region:

- Value for resting bees/pollen provision during crop dormancy;
- Drought reserve capacity;
- Availability of alternative eucalypt resources outside State Forests in the region;
- Availability of alternative non eucalypt resources (supplementary feeding); and
- Relocation to alternative areas.

1.3.1 Value for Resting Bees/Pollen Provision During Crop Dormancy

Honeybees require pollen and stimulating nectar for resting or overwintering purposes, particularly if the colonies have little or no stored honey. Pollen is the protein component of a bees diet which also supplies fats, minerals and vitamins to satisfy honeybee nutritional requirements. The bees are rested to ensure the supply of high numbers of strong bees for use during honey gathering and pollination of agricultural and horticultural crops in the Spring. The worker bee may live from six to twelve weeks plus, depending on the dietary intake of quality pollens and the degree of work output by (Doug Somerville, Apiary Officer, NSW Agriculture).

The valuable understorey resource available in the Southern Region is utilised by beekeepers living outside the region for resting or overwintering bees. The value lies in its diversity with bees having access to a range of pollens over a period of time. Agricultural crops (including the regional apple industry at Batlow) do not offer a nutritional substitute for developing honeybees, where bees are carried at high stocking rates to facilitate higher pollination rates (Doug Somerville, Apiary Officer, NSW Agriculture). Beekeepers are reliant on eucalypt forests and banksia heathlands.

The Southern Region is both large and abundant in resources valuable to the apiary industry. Any loss of resources for overwintering bees would have a significant effect on local, intrastate and interstate beekeepers. The ability to increase reliance on alternative south and north Coast regions appears limited, due to lack of available sites (Doug Somerville, NSW Agriculture 1997). There are no simple alternatives that are viable.

1.3.2 Drought Reserve Capacity

The Southern Region's importance during drought was highlighted in Section 1.2. Any loss of resources in the Southern Region will not impact on just local apiarists, given that apiarists from all of the state and interstate use the area as a drought reserve during dry years. Without the Southern Region, the best alternative drought reserves would be the north coast of NSW. However the north coast industry is under the same pressure as the Southern Region with a heavy reliance on forest flora and the lack of available sites, this combined with increased travel costs for Southern based apiarists, means that the north coast does not offer a viable alternative.

1.3.3 Availability of Alternative Eucalypt Resources

The State Forest areas within the Southern Region, contain primarily hardwood species that range in their pollen and nectar productive capabilities. Outside of the available State Forests sites, there are increasing areas of the region that have been dedicated as National Parks or have had their timber harvested removing useful floral resources.

Outside State Forests and National Parks, there are significant areas of Crown land, private forest and private property. These may have resources available or adjoin State Forests or National Parks, and thereby provide valuable floral resources for beekeepers. The high reliance on eucalypts and understorey species, does however, limit the use of non State Forest resources that may not have the required species present at the same level of maturity. The benefit of State Forests also lies in its management for timber production resulting in well maintained roads providing access for beekeepers and the presence of old log dumps which provide cleared areas for the placement of hives. These features occur rarely on Crown land or private property.

1.3.4 Availability of Alternative Non-Eucalyptus Resources (supplementary feeding)

A further alternative in the absence of access to eucalypt or crop resources, for apiarists who utilise the pollen productive capacities of the Southern Region, is to supplementary feed bees prior to and during pollination and breeding.

Supplementary feeding only becomes necessary in the absence of good quality pollen, fresh stimulatory nectar or honey stores being available for normal brood rearing and hive stimulation. Supplementary feeding can be used to condition hives six to eight weeks prior to moving to a honey crop, or supplementary feeding of carbohydrates and protein can be used to stimulate foraging and brood rearing or replace honey stores while pollinating a crop (Jones, 1993).

Supplementary feeding is most often used in managed pollination, where some crops that require open pollination do not produce pollen or nectar of sufficient quality and quantity to sustain colonies for the duration of their pollination contract (Jones, 1993). Beekeepers are usually paid for their pollination services, a notable exception is canola pollination, during which bees are stimulated and maintain strength.

The honeybee uses both carbohydrates to provide energy for colony activities and protein for development and growth. Carbohydrates can be supplemented either in dry form or as a syrup, either inside the hive or outside the hive in prepared feeders. Feeding protein supplements to encourage brood rearing is now becoming a wide spread practice in the beekeeping industry, made easier by collected pollen that has been irradiated to prevent disease transfer and the use of pollen extenders such as yeast (Jones, 1993).

Apiarists indicate that while supplementary feeding provides a marginal technical alternative to the use of Southern Region eucalypts for overwintering, the science of supplementary feeding is still largely lacking and that research thus far has indicated that only two generations of bees are possible under artificial protein feeding conditions. A naturally occurring pollen supply is far more beneficial and stimulating to a colony of honey bees than any artificial medium thus far developed (Doug Somerville, Apiary Officer, NSW Agriculture).

The economics of the practice also prevent its widespread adoption in NSW outside of supplementation during the pollination service. For example, glucose which can be used in supplementary feeding retails for approximately \$5.30 kg while honey, which under this scenario requires substantial glucose inputs, as well as normal harvesting, transporting and processing, retails for a similar amount, \$5.80 kg. Furthermore, the small differential between

gross income and total costs associated with honey production, (see Section 1.1 Socio-Economic Characteristics of Southern Apiarists) indicate that it is not within apiarists financial capacities to absorb the additional costs associated with supplementary feeding, and while some cost savings (site rental, transport) may be available from “staying home” and artificially feeding, the high cost of supplementary feed and its poorer nutritional value, have limited the uptake of the practice. Apiarists therefore rely on native forests.

1.3.5 Relocation to Alternative Areas

Opportunities for Southern Region apiarists to relocate to alternative areas are constrained. Viable non State Forest sites within the region are largely occupied during the periodic times of demand due to favourable flowerings. Non occupied sites are typically inaccessible or do not have suitable species present. Areas both within and outside the Southern Region that may contain valuable resources are being considered for national park or wilderness listing, while the biological control of patterson’s curse (salvation jane) is set to further erode the apiary capacity of agricultural land. Resources are also being lost to dieback and salinity which by affecting the health of eucalypts affects their flowering capacity. Issues such as urban sprawl and rural subdivisions may also ultimately impact on the ability of beekeepers to relocate to alternative areas.

1.4 RELATIONSHIP OF SOUTHERN APIARY INDUSTRY TO OTHER FOREST USES AND USERS

1.4.1 Co-dependence/Conflict Between Beekeeping and Other Forest Users

Apiarists share the Southern Region forests with a number of other commercial and non commercial users. There are both positive (co-dependence) and negative (conflict) interactions between apiarists and other users. These relationships are set out below. Data was collected for this analysis from apiarists, State Forests and the NSW National Parks and Wildlife Service (NPWS).

Southern Region forest uses and potential uses identified include:

- Timber production and wood chipping;
- Paper production from pine plantations;
- Mining;
- Grazing;
- Collecting seeds and firewood;
- Rock gathering;
- Bush walking, picnics;
- Camping;
- Horseriding;
- Off-road recreation (4WD, dirt bikes);
- Rally driving;
- Educational/scientific activities;
- Eco-tourism;

- Conserving biodiversity; and
- Protecting Aboriginal & other sites.

Timber production and wood chipping: Co-dependence includes use of roads to access bee sites, maintenance of roads and use of old log dumps as bee sites. State Forest activities include setting aside of some mature and semi mature trees within each area harvested, for seed trees, habitat trees and trees retained for growth (Don Nicholson, State Forests). Conflict results from the logging of trees for timber and chip production which removes mature trees that are important for apiary. Regrowth or plantation forests may not mature sufficiently to provide good pollen and nectar sources before re-logging. Plantation forests may also be dominated by species which have no value to honeybees. Hazard reduction burning by State Forests is also a source of conflict in this area due to the importance of understorey species and the effect of burning on honey and pollen yields.

Paper production: In some forestry regions there is potential for conflict. This is because paper production utilises softwood forests that have no value to apiarists, and the increase in plantings of softwood plantations is utilising potential hardwood areas. Paper production also utilises some eucalypt hardwood forests which means resources are then lost to apiarists.

Mining: Co-dependence includes use of roads to access sites, maintenance of roads and use of rehabilitated mines as bee sites. Conflict arises when miners clear trees that are resources for apiarists. This impact is relatively insignificant compared to timber, woodchip and paper production.

Grazing: Grazing of agricultural livestock in State Forests has minimal interaction with apiarists. Utilisation of grasses is independent of the harvest of floral resources.

Collecting seeds, firewood and rock: Minimal interactions, although there is some evidence that honeybees assist in the seed setting of eucalypt and acacia species (Moncur, Mitchell, Fripp & Kleinschmidt, 1995) and may result in the greater availability of seed for collecting.

Eco-tourism: Potential conflict due to the possibility of bee stings and disruption of ecosystems by honeybees.

Recreation (bushwalking/picnics/camping/horseriding/4WD/rallying/etc): Despite provision of dedicated bee site areas there still exists the potential for conflict with the public. This includes vandalism and damage that may be caused to hives by the public and the possible threat of bee stings.

Educational/scientific activities: Potential conflict due to the possibility of bee stings and disruption of ecosystems by honeybees.

Conserving biodiversity and heritage values: Data on impacts on species is inconclusive. There is minimal interaction with heritage sites.

A summary of apiary interactions with other forest users in the Southern Region is provided in table 1f. The table indicates scope for conflict with a number of recognised forest users.

TABLE 1F THE RELATIONSHIP OF APIARY TO OTHER SOUTHERN REGION USERS

Uses/Users	Co-dependence	Conflict	Comments
Timber production and wood chipping	✓	✓	substantial interaction
Paper production	*	✓	substantial interaction
Mining	✓	✓	some interaction
Grazing	*	*	minimal interactions
Collecting seeds firewood and rock	*	*	minimal interactions
Eco-tourism	*	✓	some interaction
Recreation	*	✓	localised interaction
Educational/scientific activities	*	✓	some interaction
Conserving biodiversity	*	*	minimal interactions
Protecting Aboriginal & other sites	*	*	minimal interactions

Key: ✓ denotes interaction, * minimal interaction

1.5 SENSITIVITY TO CHANGE, SOUTHERN APIARY INDUSTRY

In order to assess the Southern apiary industry's sensitivity to change the following needs to be addressed:

- NPWS policy and its impact on apiarists;
- Summarise the pressures for structural adjustment (loss of resources, financial viability, etc.); and
- Conclude on financial viability with and without the Southern Region.

1.5.1 NPWS Policy and its Impact on Apiarists

Old Policy

Up until early 1999, the NPWS policy on beekeeping stated that:

- There would be no new sites in areas reserved under the National Parks and Wildlife Act;
- All sites current as of 31 December 1989 would be retained for the term of the life of the licensee, or until surrendered;
- Licensed sites could not be exchanged or traded; and
- Any existing sites which seriously compromised the environmental values of the area would be relocated.

(National Parks and Wildlife Service Manual, Section 2.4, as at July 1998).

Under that policy, the declaration of new parks and wilderness areas would, while recognising existing beekeeping interests and allowing existing sites to continue, have prevented the issue of any new or additional apiary site licences for those areas. To allow an existing site to continue, the site must have been permanently booked at the time of change of tenure. If sites were used periodically but not booked permanently, access to those sites would have been lost. In addition to reducing the number of sites available, this would have served to diminish the flexibility with which apiarists operated.

Under the old policy it was reasonable to have expected a gradual reduction in the availability of bee sites in NSW as new lands were declared national parks or wilderness and apiarists retired from the industry without the option to exchange or trade sites. In addition to the loss of sites from which to generate production, the old policy made it difficult for apiarists to develop their business asset. Goodwill, which would normally be a major component of a business such as

apiary, was forfeited when a lease was surrendered. The capacity of the apiarists business to generate revenue and the value of the business was therefore depleted.

Loss of sites and subsequent loss of business value would have had a significant impact on apiary in NSW. This was thought to be particularly the case in the Southern Region area where almost 40% of the industry is reliant on State Forests which had the potential for inclusion in the reserve system with subsequent tenure change to national park or wilderness.

New Policy

In early 1999, the NPWS clarified its policy towards apiary activities in protected areas under its management. These policy changes were developed in consultation with the NSW Apiarists Association. The key points of this policy are:

- Apiarists will be allowed continued access to existing sites and sites may be transferred to family members, or when an apiary business is sold, to the person who has purchased the business. No new, additional apiary sites can be created in reserves managed by the NPWS, however beekeeping consents/permits current on all lands transferred to the NPWS will be recognised;
- The NPWS is developing a relocation protocol which will enable sites to be moved, following a process of consultation, where there are grounds that the activity is having a detrimental impact on the environment, or the NPWS has management imperatives such as conflicts with visitors, need to change access routes etc; and
- To protect wilderness values, sites within lands declared as wilderness will be relocated to alternative sites outside the declared wilderness. In such cases the NPWS will consult with apiarists to identify suitable alternative sites. Where suitable alternative sites are not available, sites situated in the core of a declared wilderness will be relocated to the edge of such areas.

(Extract from address at the Annual Apiarists' Conference, May 1999 by Director General, NPWS).

Under the new policy there will be no reduction in the availability of bee sites in NSW as new lands were declared national parks or wilderness. The capacity of the apiarists business to generate revenue and the value of the business is not impacted by the policy.

The NPWS policy will not result in loss of sites and therefore any subsequent loss of apiary business value in NSW. This finding has been confirmed with Greg Roberts, President of the NSW Apiarists Association.

1.5.2 Pressures for Structural Adjustment

There is a strong feeling in the industry that the viability of beekeepers will come under increasing pressure as the impact of the following effects becomes more intense:

- Timber production involving the clearing of viable apiculture resources, replanting and harvesting prior to maturity of the floral resource and replacement with species of no or limited value to apiarists;
- Salinity and die back in Riverina, tablelands and western eucalypts;
- Loss of floral resources due to urban encroachment and land clearing;
- Biological control of patterson's curse (salvation jane); and

- Economic pressures including increasing costs incurred in order to obtain useful floral resources.

The diversity of flora available, and the scope of resources they provide year round, is the basis of the apiculture industry in NSW. As the prospects of being able to utilise the range of resources diminishes, so to does the viability of the industry. The industry believes that these pressures may see a number of operators exit the industry within the next 10 to 15 years. Given that many operators are based in small regional areas there may be some impact on regions and communities.

1.5.3 Conclusions on Future Viability

The change in NPWS policy results in the removal of the threat of loss of access to significant apiary sites in the Southern Region that would have had an impact on the immediate viability of a significant number of apiarists. The Southern Region has importance as a over wintering and drought reserve resource for the NSW apiary industry and will continue to be a significant producer of honey and other apiary products.

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3. APPENDICES

3.1 PERSONS CONTACTED AS PART OF THIS STUDY

Contact	Organisation
Dawn Bell	RACD
Noel Bingley	Local Beekeeper
Nick Cameron	SFNSW - Batemans Bay
Des Cannon	Local Beekeeper
Linden Chalmers	CARE - Armidale
Dave Cromatee	SFNSW - Albury
Steve Dodds	SFNSW - Narooma
Charles Farrugia	SFNSW - Sydney
Gail Gosper	SFNSW - Narooma
Rebecca Grumley	NPWS - Narooma
Steve Hartley	RACD
Norm Hawkes	SFNSW - Sydney
Rod Hunt	NPWS - Queanbeyan
Cyril Keenan	SFNSW - Tumbarumba
Andrew Leys	NPWS - Sydney
David Monehan	NPWS - Kosciusko National Park
Sue Richards	DPIE
Greg Roberts	NSW Apiarists Association
Ian Smith	NPWS - Nowra
Doug Somerville	NSW Agriculture - Goulburn

3.2 ABBREVIATIONS USED IN THIS REPORT

BRS	Bureau of Resource Sciences
CRA	Comprehensive Regional Assessment
LTP	Long Term Permits for bee keeping in SF
NPWS	NSW National Parks and Wildlife Service
RACAC	Resource and Conservation Assessment Council
RFA	Regional Forestry Agreement
SF	State Forests of NSW

3.3 SCIENTIFIC NAMES OF FLORA SPECIES MENTIONED IN THIS REPORT

Common Name	Scientific Name
Spotted Gum	<i>Eucalyptus maculata</i>
Grey Ironbark	<i>E. paniculata</i>
Yellow Stringybark	<i>E. muelleriana</i>
Red Bloodwood	<i>E. gummifera</i>
Woollybutt	<i>E. longifolia</i>
White Stringybark	<i>E. globoidea</i>
Blackbutt	<i>E. pilularis</i>
Sydney Blue Gum	<i>E. saligna</i>
Red Ironbark	<i>E. fibrosa</i>
Heath Leaved Banksia	<i>Banksia ericifolia</i>
Bangalay	<i>E. botryoides</i>
Sydney Peppermint	<i>E. piperita</i>
Egg & Bacon	<i>Dillwynia juniperina</i>
Manna Gum	<i>E. viminalis</i>
Alpine Ash	<i>E. delegatensis</i>
Snow Gum	<i>E. pauciflora</i>
Narrow-leaved Peppermint	<i>E. radiata</i>
Red stringybark	<i>E. macrorhyncha</i>
Broad-leaved Messmate	<i>E. obliqua</i>
Brown Barrel	<i>E. fastigata</i>
Yellow Box	<i>E. melliodora</i>