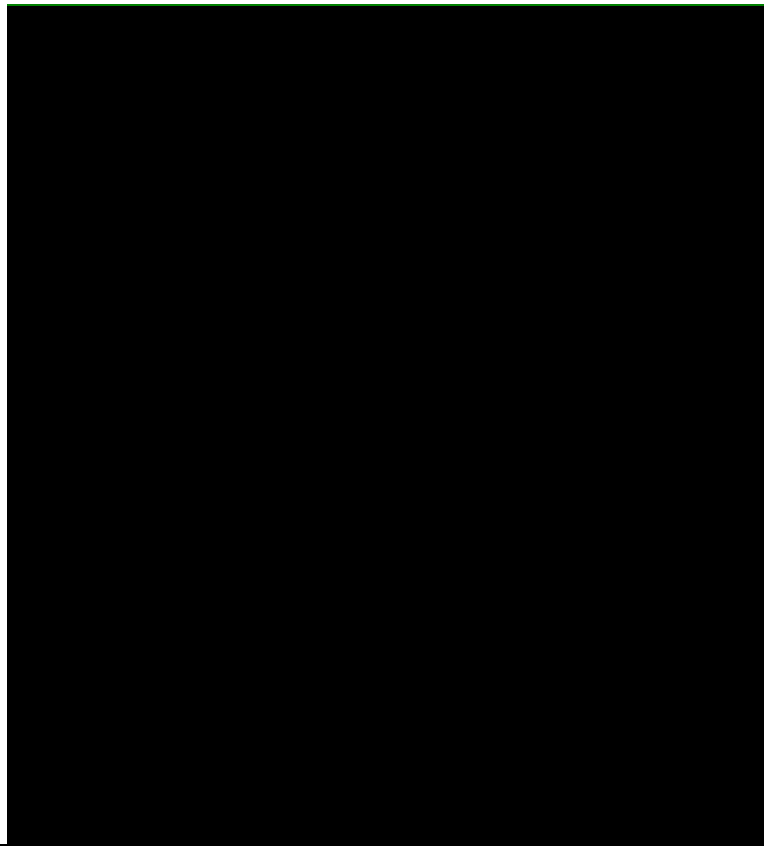
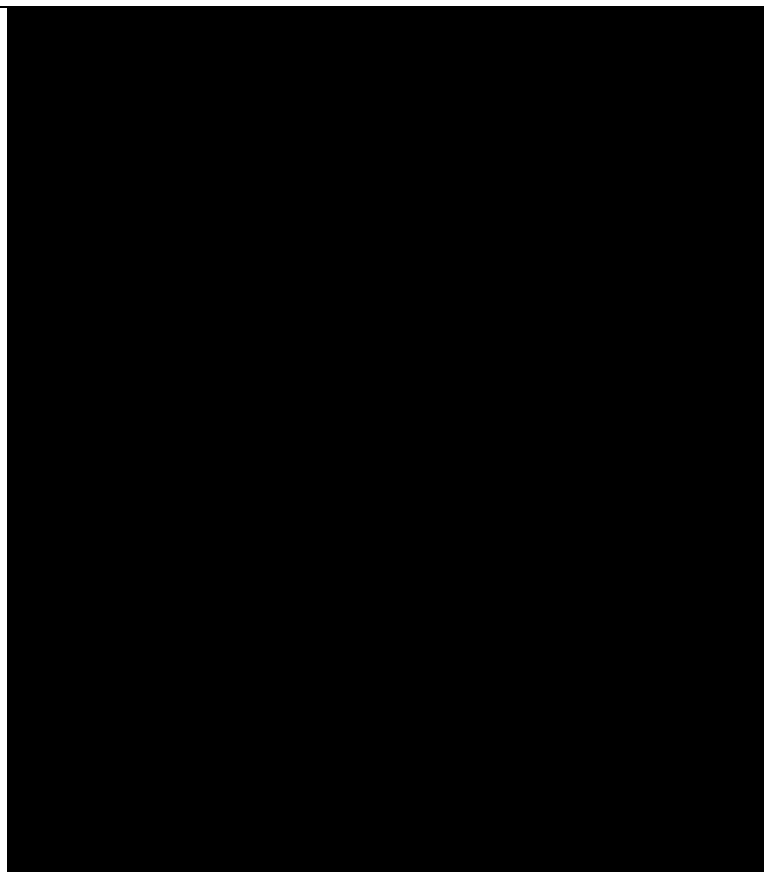


Report on Apiary in NSW

Upper North East Region

A project undertaken as part of the NSW Comprehensive Regional Assessments

September 1999



REPORT ON APIARY IN NSW

UPPER NORTH EAST REGION

Hassall & Associates

A project undertaken for
the Joint Commonwealth NSW Regional Forest Agreement Steering Committee
as part of the
NSW Comprehensive Regional Assessments

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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.

1. CONTENTS

i. EXECUTIVE 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 Upper North East RFA Region (Upper North East 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 Upper North East apiary industry is located in a major beekeeping and honey producing area. It has areas that are valuable honey producing and overwintering resources. The Upper North East apiary industry is characterised by its mobility, its eucalypt and understorey dependency and the variability of production. The industry produces 29% of the NSW production of honey from an estimated 4,000 sites carrying up to 300,000 hives. Approximately 29% of the industry is located on State Forest sites inside the RFA region boundaries.

Upper North East apiary is managed on a family basis, apiarists rely on leaned 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 Upper North East honey is not dissimilar to honey produced in other coastal regions. The Upper North East Region, on average, supplies approximately 4,300 tonnes of honey with a wholesale value of $7.1 million. Wax and other product sales add another $360,000.

The Upper North East Region's value to the NSW apiary industry lies not only in the value of products generated, but also in its value for pollination, overwintering bees and spring build up in queen bee breeding enterprises. Opportunities for the Upper North East apiary industry to relocate to alternative areas are limited.

Apiarists share the Upper North East 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 Upper North East Region is important as a pollination, queen breeding and "overwintering" resource. It is one of the major producers of honey and other apiary products in Australia.

3. APIARY IN THE UPPER NORTH EAST RFA REGION

3.1 A Profile of Apiculture in the Upper North East Region

Definition of the Upper North East Region

The Upper North East Region constitutes all or part of eight State Forests districts, they are:

- The whole of the Casino, Grafton, Urbenville and Glen Innes Districts;
- A large part of all but the southern portion of Dorrigo District; and
- Small parts in the east of Inverell District and the north of Walcha and Urunga Districts.

Location of the Apiary Industry within the Upper North East Region

The Upper North East Region covers an area south from the Queensland border, along the north coast as far south as Sawtell and then west encompassing Guyra and land south of Inverell. The western boundary runs west of Glen Innes and Tenterfield.

The land classes covered by the Upper North East Region are diverse in topography, climate and native vegetation. They provide different resources and uses for beekeepers. The two main land classes present in the region are coastal and tablelands.

Nature of the Upper North East Apiary Industry

The Upper North East Region is:

- a major honey producing area;
- a valuable spring build up and overwintering area, particularly the coast; and
- a valuable drought reserve.

The Upper North East Region apiary industry is:

- mobile;
- made up of local, intrastate and interstate beekeepers;
- eucalyptus dominant, in conjunction with a valuable understorey resource; and
- equally proportioned between registered and private property sites.

Information on production, pattern of usage and floral resources utilised in the Upper North East Region was gained from industry journals, NSW Agriculture and discussions with local beekeepers. The NSW Agriculture/State Forests beekeeping reports that are being complied across the state have not been finalised for the Upper North East Region and were therefore not available for this report.

Bee sites are found throughout the region. Honey production is seasonal and related to rain, flowering cycles, temperature and forest access (Stace, 1993). Production occurs across the region, but is concentrated in the forests. There are significant areas of State Forests, National Parks and private forest areas along the North Coast and these are valuable resources for the Upper North East apiculture industry.

The estate of the NSW National Parks and Wildlife Service (NPWS) covers about 6% of the Upper North East Region and consists of 14 National Parks (with a total area of 236,000 hectares) and 41 nature reserves (32,000 hectares). State Forests (covering 813,000 hectares) and timber reserves (1,500 hectares) encompass some 19% of the region, with Crown Land accounting for a further 14% of the region (RACAC, 1996). The North East forests of NSW are recognised as one of the major honey producing areas of Australia.

Beekeepers utilise the coastal areas of the region, including significant private property, for spring build up of bees and overwintering. This is where most incidental pollination occurs (Geoff Manning, 1998). The high average rainfall of the North Coast area makes it a valuable drought reserve area for both NSW and Queensland beekeepers.

A characteristic feature of the NSW apiary industry is the mobility of apiarists throughout the regions and environments of NSW, Victoria and Queensland. Migration is the strength and basis of the Australian beekeeping industry. Bee keepers must migrate their bees to where the floral resource is, in order for them to survive. The forests of the Upper North East Region are an all year resource; somewhere there will be a tree, shrub, or ground flora that will either produce honey, pollen or both. The vegetation will either be economic for honey production or a place for bees to build their strength (Stace, 1990).

When bees are not in the Upper North East Region, they could be anywhere in NSW or Queensland where there is an available floral resource. It is standard practice however, for beekeepers to maintain a network of sites within a 200-300 kilometres radius of their base, due to the costs involved. There has been a tendency in recent years in the south of the region to move out to canola or turnip weed, due to the loss of coastal spring resources (Geoff Manning, 1998). The actual sites utilised vary year to year, depending on flowering and rainfall patterns.

The forests within the region are eucalyptus dominated but also support a variety of understorey plants including heaths and banksias, that play an important role in the provision of bee breeding conditions. When asked to nominate the most important honey producing species utilised, eucalypts comprised 80% of the species listed.

Local beekeepers were also questioned on the ratio of private property sites to registered sites within the Upper North East Region and estimated that for every one registered site there would be one private property site utilised.

Floral Resources Utilised

Grey ironbark was nominated as the most important honey producing species utilised in the region's forests. Brush box, Grey box, Bloodwood, Spotted gum, Red ironbark and tea tree were all mentioned as important species. Other species identified as important honey and pollen producing species found on the North Coast and Northern Tablelands include: White mahogany, Red mahogany, Forest red gum, Turpentine, Scribbly gum, Grey gum, Needlebark, Flooded gum, Blackbutt and Banksia on the coast; and New England mesinate, New England Blackbutt, Narrow leaf ironbark, Caley's ironbark, Silver leaf ironbark, White Stringybark, White box, Yellow box, Apple and Brown box on the tablelands (Stace, 1990). Scientific names are provided as an attachment to this report.

The dominant species in each area varies slightly due to distribution of flora and local topography and climate. Overall Grey ironbark appears to be the most important beekeeping species. It is important to note that Grey ironbark occurs only in coastal NSW. Grey ironbark is the most valuable ironbark to beekeepers on the coast, producing the best quality coastal eucalypt honey. The honey is light in colour with good density and excellent flavour (Clemson 1985, quoted in NSW Agriculture/State Forests, 1997c).

Grey ironbarks are a summer flowering species and flower usually every two to three seasons. Clemson 1985, reports that buds are carried for between five and nine months. The yields for Grey ironbark reported by beekeepers range from 50 to 108 kilograms with the majority of beekeepers surveyed reporting a yield of between 54 and 80 kg per hive (NSW Agriculture/State Forests 1997c).

Grey ironbark is not reported to be a good pollen tree, it usually grows in association with White mahogany, where the White mahogany produces pollen which is attractive to honeybees and allows the colony to remain in reasonable condition on an otherwise pollen deficient honey flow, ie. Grey ironbark (NSW Agriculture/State Forests 1997a). White mahogany grows on coastal areas of NSW from Sydney north into Queensland. It is summer flowering and buds are carried for ten months (Clemson, 1985). Reported yields for White mahogany ranged from 14 to 54 kg (NSW Agriculture/State Forests 1997b).

Eucalypts in the Upper North East forests do not flower on an annual basis. On average their flowering cycle is once every 2 to 5 years. This means that the Upper North East Region, which is largely dependant 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. Sites are used at different times due to most forest sites containing a

combination of two to five eucalypt species. It would be an unusual year that there was no honey flow in the region (Geoff Manning, 1998).

Understorey species such as, Tea tree, banksia, turpentine and heaths were all mentioned as important species. 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).

Size of the Upper North East Region Industry

Information was obtained from State Forests, the National Parks and Wildlife Service (NPWS) and the Rural Lands Protection Boards (RLPBs), to ascertain the number of registered bee sites in the region.

Difficulties arise in determining the total number of bee sites within the Upper North East Region. This is because the number of sites fluctuates 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 5-6 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.

From the State Forests data it was possible to ascertain that there was a total of 1,164 sites in State Forests and 10 on Crown Land in the Upper North East Region in 1997. These sites are leased by 190 apiarists. Data provided by regional NPWS offices indicated that there were 180 bee sites controlled by 46 apiarists within National Parks and the total number of bee sites on RLPBs in the Upper North East Region was 646 held by 98 apiarists.

Advice from local beekeepers indicated that the ratio of private property sites to registered sites varies between areas within the region. Many private property sites are utilised to access State Forest resources, adjoining or close to the private property site. It is difficult to average this ratio due to the numbers involved and the diverse nature of the region however based on local knowledge and for the purposes of this study the overall ratio for the Upper North East Region is estimated to be one registered site to one private property site. Given that total registered sites was 2,000, the number of private property sites in the region is therefore estimated to be approximately 2,000, and these are leased by around 330 apiarists.

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, and 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). Discussions with local beekeepers placed the average closer to 75 for the Upper North East Region.

The total number of sites in the Upper North East Region is therefore approximately 4,000. In the Upper North East Region apiarists average 75 hives per site, total hive numbers are therefore estimated to be 300,000.

Socio-Economic Characteristics of Upper North East 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 Upper North East 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;
- Most production 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.

Demand for Apiculture Products from the Upper North East Region

The major products of the apiary industry are honey and beeswax. Other products from bees include queen bees and package bees, and minor products such as propolis and royal jelly.

Most of the honey produced in the Upper North East Region is sold to the Australian Honey Corporation (Capilano) in Brisbane. Local beekeepers estimate that between 90 and 95% of overall production would be sold to Capilano.

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 some honeys produced in the region, for example 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, i.e. it is not blended (Doug Somerville, NSW Agriculture). There are a small number of beekeepers that do not sell to Capilano and would either sell to Windsor Farms in Sydney, Aussie Honey in Warwick, Leabrook Farms in South Australia or sell their own product.

Beeswax is primarily sold to Capilano, who sell it overseas. There are some minor local buyers in the market including candle makers.

3.2 Values Generated by Apiculture in the Upper North East Region

Supply and Value of Production

The main products that the apiary industry generates values for are the following:

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

Value estimates for each product are provided below. Total value of production is estimated and split between State Forests and all other resources.

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

- Currently there are 300,000 hives in the Upper North East Region (see Section 3.1 Size of the Industry);
- The region's productive season is typically a total of 9 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 Upper North East 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 90,000 (300,000 hives by 90% divided by 3);
- To reflect the diversity and range of species involved, calculations of honey and wax production are based on the seven major honey importance species, (See Section 3.1 Nature of the Upper North East Apiary Industry); and
- The average wholesale price for these honeys is $1.65 kg (Lloyd Smith, Capilano Brisbane, 1996 figures).

Table 3.1 provides estimates of the total value of honey production in the Upper North East Region.

Table 3.1 Supply and Value of Honey Production Upper North East Region

Floral Resource (a)	**Number of Productive Hives (b)**	**Production per Hive (kg/hive) (c)**	**Total Production (kg)**	**Total Honey Value**
Grey ironbark	36,000	65	2,340,000	$3,861,000
Grey box	9,000	30	270,000	$445,500
Brush box	9,000	65	585,000	$965,250
Red gum	9,000	30	270,000	$445,500
Spotted gum	9,000	30	270,000	$445,500
Bloodwood	9,000	30	270,000	$445,500
Tea tree	9,000	30	270,000	$445,500
Total	**90,000**		**4,275,000**	**$7,053,750**

(a) Floral resources are for the top five resources nominated by beekeepers in the Upper North East Region.
(b) Hassall & Associates estimates based on NSW Agriculture and State Forest data.
(c) Source: Local Upper North East Region beekeepers

From Table 3.1 it can be seen that the total average annual value of honey in the Upper North East Region is approximately $7.1 million.

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 Upper North East Region averages 4,275,000 kg (see Table 3.1); and
- the price paid by wholesalers for wax is $5.00 kg (C. Koerstz, Sydney).

The total average value of wax production is therefore $363,375 (4,275,000 kg by 1.7% by $5/kg).

Queen Bee and Package Bee Sales: There are at least three to four significant queen bee producers that utilise the State Forests of the Upper North East Region. These beekeepers rely on queen bee production for a significant portion of their income. A reliance on commercial queen bee rearing for a significant part of their income influences the type of flora which is desirable for those beekeepers (NSW Agriculture/State Forests, 1997a). Like most beekeepers, they move their hives into and out of the Upper North East Region as conditions change and favourable flowerings occur (Doug Somerville, Apiary Officer, NSW Agriculture). It is not possible to determine the value of these sales.

There are no significant package bee producers in the Upper North East Region, however package bees have been sold from the region to exporters. Mostly in the southern part of the region due to the proximity to Sydney which is an exit point for exports (Geoff Manning, 1998).

Pollination: Pollination is a major activity for beekeepers within the Upper North East Region. Crops pollinated within the region include avocados, macadamia nuts, kiwi fruit, pumpkins, watermelons, strawberries and miscellaneous orchard fruit. Pollination in the Upper North East Region would be considered the second most important apiary enterprise behind honey production. The value of pollination has not been quantified, its estimation is outside the scope of this study.

Total Value: From Section 3.1, Size of the Industry, the ratio of State Forest and other registered sites to 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 (NPWS, RLPBs and private property). Table 3.2 contains this split.

Table 3.2 Value of Apiary Production Upper North East Region, State Forests and other resources

Product	**State Forest**	**Other Resources**	**Total**
Honey	$2,052,641	$5,001,109	$7,053,750
Wax	$105,742	$257,633	$363,375
Queen and packaged bees	not quantified	not quantified	not quantified
Pollination	not quantified	not quantified	not quantified
Total	**$2,158,383**	**$5,258,742**	**$7,417,125**

The total value of production is $7.4 million, some $2.2 million of which is generated in State Forests.

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 apiarists and for the spring build up required in particular by queen and package bee breeders. Overwintering allows some honey production and an increase in hive strength to prepare for the major spring/summer production period.

Drought Reserve Value

The Upper North East Region 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, its 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.

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 1,000 hive enterprise for financial year 1995/96. Relevant estimates for the 1,000 hive enterprise are presented below in Table 3.3 and extrapolations made for expenditure incurred in the Upper North East Region, based on nine months spent within the region in an average year.

Table 3.3 Input Expenditures per 1,000 Hive Enterprise and Expenditures Incurred in the Upper North East Region

Item	**Expenditure per 1,000 Hives ($ per annum) (a)**	**Average expenditure per 1,000 Hives incurred in Upper North East Region ($ per annum) (b)**
Hive maintenance	4,000	1,333
Queen replacement	5,600	,1867
Labour; Owner	45,000	11,250
Additional	25,000	6,250
Workers compensation	1,600	400
Truck running	26,750	5,350
" " depreciation (15%)	26,000	5,200
Utility running 14/Km	6,300	1,260
" " depreciation (15%)	4,500	900
Extracting Costs & Maintenance	4,500	750
Other plant	1,500	500

operation		
" " depreciation	1,500	500
Container losses	500	83
Living away & sundry expenses	4,500	0
Site rentals	6,000	4,500
Telephone	2,000	667
Postage & Stationary	200	67
Insurance	2,500	883
Land rates	350	117
Hive insurance	650	217
Assoc. Subs & Prof'l expenses	1,000	333
Total Production & Standing Costs	**169,950**	**42,377**

(a) Data sourced from Investing in Commercial Honey Production, The Fourth Mansfield Report, NSWAA 1996
(b) Original expenditure split provided by Greg Roberts, President NSW Apiarists Association and modified with the assistance of Upper North East beekeepers. Expenditure split includes adjustments for 1 in 3 year usage of the Upper North East Region and expenditures made outside the region.

From Table 3.3 it can be seen that total input expenditure in the Upper North East Region per 1,000 hives is $42,377. From the previous analysis of honey values it is known that, on average, there will be 100,000 hives in the Upper North East Region (300,000 hives, productive one year in three). Total input expenditures are therefore $4,237,700 (100.00 by $42,377).

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 (1,000 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 $5,000 pa and larger operations (1,000 hives) at $25,000 per annum.

The portion of labour costs incurred in the Upper North East Region is detailed in Table 3.3. From the table it can be estimated that owner labour contributes approximately $1,000,000 ($10,000 from Table 3.3 by 100.00) or 40.0 full time job equivalents. While hired labour contributes approximately $520,800 ($5,208 from Table 3.3 by 100.00) or 20.8 full time job equivalents.

The total value of the Upper North East Regions industry employment is therefore $1,520,800 or 60.8 full time job equivalents.

Value to the Regional Economy (incorporating multipliers)

Appropriate input-output multipliers were not available for this study.

Upper North East Region Values in Relation to the NSW Apiary Industry

To provide a comparative value for the Upper North East 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 Upper North East Region's importance for overwintering, pollination and queen bee breeding. 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 Upper North East Region should produce 4,275,000 kg this year, therefore accounting for 29% of NSW honey production. The Upper North East Region is a significant honey production area.

3.3 Dependency of Apiary on the Upper North East Region

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

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

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 (Doug Somerville, Apiary Officer, NSW Agriculture).

The valuable understorey resource available in the Upper North East Region is utilised by beekeepers living both inside and 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. There are many horticultural and agricultural crops in the area, however they are not available year round and they 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, banksia and heathlands.

The Upper North East 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 North and South Coast regions appears limited, due to lack of available sites (Doug Somerville, NSW Agriculture 1997). There are no simple alternatives that are viable.

Drought Reserve Capacity

The Upper North East Region is recognised as a significant drought reserve area. It has been utilised in the past and the coastal areas of the region offer some relief during dry periods inland if the coast has a favourable season. The Upper North Coast is utilised in this capacity, however the industry is under the same pressure as other NSW regions with a heavy reliance on forest flora and the lack of available sites. In times of severe drought some beekeepers may seek sites on the South Coast of NSW, which is also known for its drought reserve capacity however the travel costs for Upper North East based apiarists to reach the South Coast means that it does not truly offer a viable alternative.

Availability of Alternative Eucalypt Resources

The State Forest areas within the Upper North East 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, RLPB reserves, private forest and private property. These may have resources available or adjoin State Forests or National Parks, and thereby provide access to valuable floral resources for beekeepers.

The high reliance on eucalypts for honey production, which is the major product of the Upper North East apiary industry, does limit the use of non State Forest resources that may not have the required species present or available 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.

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 Upper North East 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 Upper North East Region eucalypts and understorey 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 3.1 Socio-Economic Characteristics of Upper North East 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.

Relocation to Alternative Areas

Opportunities for Upper North East 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 Upper North East Region 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.

3.4 Relationship of Upper North East Apiary Industry to Other Forest Uses and Users

Co-dependence/Conflict Between Beekeeping and Other Forest Users

Apiarists share the Upper North East 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 NPWS.

Upper North East Region forest uses and potential uses identified include:

- Timber production and wood chipping;
- Paper production;
- Mining;
- Grazing;
- Collecting seeds, firewood and rock gathering;
- Eco-tourism;
- Recreation (bushwalking/picnics/camping/horseriding/4WD/rallying/etc);
- Educational/scientific activities; and
- Conserving biodiversity & heritage values.

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 which have no value to apiarists, this is not a major issue in the Upper North East Region, however 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, many claim no interaction at all. Utilisation of grasses is independent of the harvest of floral resources.

Collecting seeds, firewood and rock gathering: 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 Upper North East Region is provided in Table 3.4. The table indicates scope for conflict with a number of recognised forest users.

Table 3.4 The Relationship of Apiary to Other Upper North East 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

3.5 Sensitivity to Change, Upper North East Apiary Industry

In order to assess the Upper North East 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 outside national parks and wilderness, financial viability, etc.); and
- Conclude on financial viability with and without the Upper North East Region.

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 compromise 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 expect 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. Good will, 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 the case in the Upper North East Region area where almost 29% 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.

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 affecting 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.

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 Upper North East Region that would have had an impact on the immediate viability of a significant number of apiarists. The Upper North East Region has importance as a honey production, overwintering, pollination and queen bee breeding area for the NSW apiary industry and will continue to be one of the major producers of honey and other apiary products in Australia.

REFERENCES

Australian Bureau of Statistics (1997). NSW Yearbook.

Clemson, A (1985). Honey and Pollen Flora. Department of Agriculture, NSW. Inkata Press.

Gibbs, D.M.H. and Muirhead, I.F. (1998). The Economic Value and Environmental Impact of the Australian Beekeeping Industry.

Jones, W.A. (1993) The role of supplementary feeding in managed pollination, Crop Pollination Association Inc. - 1st Annual Conference, Echuca, Victoria.

Moncur, Mitchell, Fripp and Kleinschmidt (1995). Commonwealth Forestry Review, 74(4).

National Parks and Wildlife Service Manual, Section 2.4 - Beekeeping.

NSWAA (1996). Investing in Commercial honey production - The 4th Mansfield Report.

Resource and Conservation Assessment Council, 1996. Economic studies of the Upper North East of New South Wales. Sydney.

Somerville, D. (1997a). Beekeeping in the Bulahdelah State Forests. NSW Agriculture and State Forests.

Somerville, D. and Barnes I. (1994). Batemans Bay Forestry District, Apiary Management Survey. NSW Agriculture and State Forests.

Somerville, D. and Bishop, S. (1997b). Beekeeping in the Kempsey State Forests. NSW Agriculture and State Forests.

Somerville, D.C. and Moncur, M.W. (1997). The Importance of Eucalypt Species for Honey Production in New South Wales, Australia. Paper for XXXVth International Apicultural Congress, Antwerp, Belgium. 1-6 September 1997.

Somerville, D. and Murray, J. (1997c). Beekeeping in the Taree State Forests. NSW Agriculture and State Forests.

Stace, P, 1990. The submission presented to the resources assessment commission on Australian Forests and Timber Resources, re beekeepers utilisation of North East N.S.W. Forests, The Australian Beekeeper, 92 **(4)**, 157-159.

Stace, P. 1993. The Grafton Forestry District's Apiary Industry: A situation statement for the Grafton forestry district's EIS study 1992, *The Australian Beekeeper*. 373-376.

State Forests of New South Wales (1997). Data lists of previous and current bee sites leased in State Forests.

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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
RLPBs	Rural Land Protection Boards
SF	State Forests of NSW

SCIENTIFIC NAMES OF FLORA SPECIES MENTIONED IN THIS REPORT

Common Name	**Scientific Name**
Apple	*Augophera spp*
Banksia	*Banksia spp*
Blackbutt	*Eucalyptus pilularis*
Bloodwood	*E. gummifera*
Brown box	*E. microcarpa*
Brush box	*Lophestemon confertus*
Claey's iron bark	*E. caleyi*
Flooded Gum	*E. grandis*
Forest red gum	*E. terticornis*
Grey box	*E. moluccana*
Grey Gum	*E. punctate*
Grey Ironbark	*E. paniculata*
Narrow leaf ironbark	*E. cebra*
Needlebark	*E. planchoniana*
New England blackbutt	*E audrewsai spp andrewsia*
New England mesinate	*E audrewsai sub spp campaulata*
Red mahogany	*E. resinifera*
Scribbly gum	*E. haematoma*
Silver leaf ironbark	*E. melenaphloi*
Spotted Gum	*E. maculata*
Tea tree	*Melaleuca quinquenervia*
Turpentine	*Syncarpia glomulifera*
White box	*E. albeins*
White Mahogany	*E. acmenoides*
White stringybark	*E. calignosxa*
Yellow box	*E. melliodora*