

# Small Hive Beetle *Aethina tumida* in New South Wales Apiaries 2002-6

Survey Results 2006

J. Rhodes

Livestock Officer - Bees,  
Intensive Industries Development,  
Tamworth

B. McCorkell

Biometrician,  
Research Operations,  
Tamworth

MAY 2007



Title: Small Hive Beetle *Aethina tumida* in New South Wales Apiaries 2002-6 Survey Results 2006

Author: J.Rhodes, Livestock Officer - Bees, Intensive Industries Development, Tamworth and B.McCorkell, Biometrician, Research Operations, Tamworth.

© State of New South Wales through NSW Department of Primary Industries 2006

This publication is copyright. You may download, display, print and reproduce this material in an unaltered form only (retaining this notice) for your personal use or for non-commercial use within your organisation. To copy, adapt, publish, distribute or commercialise any of this publication you will need to seek permission from the Manager Publishing, NSW Department of Primary Industries, Orange, NSW.

For updates to this publication, check <http://www.dpi.nsw.gov.au/>

Published by NSW Department of Primary Industries

First Published September 2007

ISBN XXXXXXXXXXXXX

#### Acknowledgements

Beekeepers who supplied information are acknowledged for their interest and time in responding to this survey.

The survey was organised through NSW DPI, Orange by Tim Burfitt and Bernie Dominiak and funded by NSW DPI. Survey form design was assisted by Bernie Dominiak, Doug Somerville and Nicholas Annand. Office staff at NSW DPI Tamworth arranged printing and postage of the survey forms. Chris Fokker, Tamworth office, compiled the information supplied by beekeepers. The contribution by these people which allowed the survey to be carried out successfully is acknowledged.

#### Disclaimer

The information contained in this publication is based on knowledge and understanding at the time of writing (January 2006). However, because of advances in knowledge, users are reminded of the need to ensure that information on which they rely is up to date and to check the currency of the information with the appropriate officer of New South Wales Department of Primary Industries or the user's independent advisor.

Job No: or TRIM reference:

---

## CONTENTS

<b>Introduction</b>	<b>1</b>
Survey method	1
Survey returns	1
<b>Summary</b>	<b>2</b>
essential issues derived from the survey -	3
<b>Results</b>	<b>4</b>
Question 1. Have you seen adult or larval stages of the SHB in your hives.	4
Question 2. Where is damage from SHB larvae occurring.	5
Question 3. Estimate the average number of adult SHB seen in your hives.	6
Question 4. What strengths of hives died out after being infested with SHB.	11
Question 5. Provide information on hives that you consider died out as a result of SHB.	13
Question 6. Provide information materials that you have destroyed.	14
Question 7. Estimate the increased costs of production for your business.	17
Question 8. Tick the management plan you have in place to manage SHB.	19
Question 10. Would you use a control agent in your hives.	24
Question 11. Other comments.	25
<b>Appendix 1</b>	<b>27</b>
Survey Forms 1 and 2 mailed to beekeepers.	27

## INTRODUCTION

The New South Wales Department of Primary Industries (NSW DPI) conducted a mail survey of beekeepers registered with NSW DPI in May 2006. The purpose being to record the spread of the Small Hive Beetle *Aethina tumida* (SHB) within NSW since its identification at Richmond, NSW, in 2002 and to provide information on changes in management practices and economic effects due to SHB on the NSW beekeeping industry during 2002-6.

## SURVEY METHOD

Beekeepers owning 50 or more hives and registered under the Apiaries Act 1985 with NSW DPI were mailed a questionnaire requesting information on the presence of SHB in their beekeeping enterprises and effects of SHB on management practices and changes in production costs. Beekeepers were not required to identify themselves. A number of interstate based beekeepers operating in NSW were included in the survey. A stamped, addressed return envelope was included with each questionnaire to encourage return of the forms. Forms were mailed in June 2006 with a request for their return by July 2006. Survey forms are shown in Appendix 1.

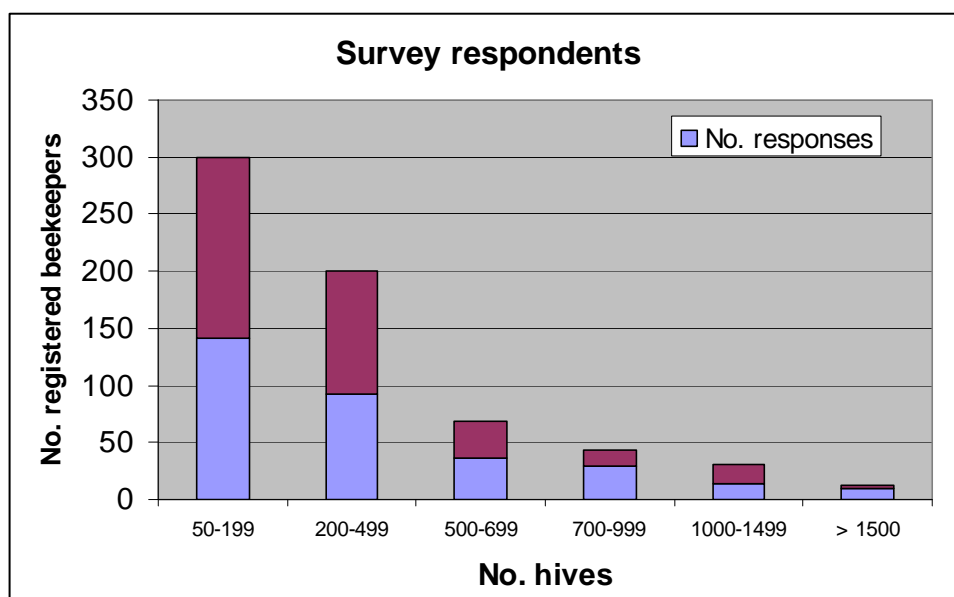
## SURVEY RETURNS

655 persons were surveyed, 324 persons responded (49.5%). This is a good response from a mail survey showing a high interest by NSW beekeepers.

Number of beekeepers contacted and number responding, according to the number of hives owned. The rate of response was largely independent of the number of hives owned by beekeepers.

Number of hives owned by beekeeper	Number of beekeepers registered and sent survey questionnaire	Number of beekeepers returning questionnaire (%)
50-199	300	142 (47.3)
200-499	200	92 (46.0)
500-699	68	37 (54.4)
700-999	44	29 (65.9)
1000-1499	31	14 (45.2)
More than 1500	12	10 (83.3)
<b>Total</b>	<b>655</b>	<b>324 (49.5)</b>

Many beekeepers did not provide an answer to every question or to all parts of each question. Many responses were in the form of a comment or an approximate number and were not included in the survey results. Only information relating to SHB occurrence in apiaries in NSW was included.



### The number of times beekeepers move their apiaries each year in NSW.

Number of hives owned by beekeepers	Number of beekeepers responding	Number of times apiaries moved each year	
		Average	Range
50-199	131	2.8	0-10
200-499	80	4.4	1-10
500-699	32	4.6	3-7
700-999	26	5.0	2-8
1000-1499	12	5.6	3-9
> 1500	10	5.9	4-8

Results show large numbers and regular movements of apiaries occurring each year which would assist the movement of bee pests and diseases within NSW.

## SUMMARY

Between November 2002 when initially identified in managed beehives at Richmond, NSW and June 2006, the SHB had been identified in all major beekeeping districts in NSW. SHB numbers in bee colonies increased each year since 2002 with the highest numbers of adult SHB reported in beehives and the highest amount of damage to bee colonies and hive materials from SHB larval stages occurring during the 2005-6 season.

Damage to bee colonies and hive materials was highest in coastal districts compared with districts west of the ranges. The dollar value of damage to bee colonies and hive materials in coastal districts varied considerably between beekeeping enterprises and between districts. No reasons for differences in the amounts of damage between coastal districts were identified. All strengths of bee colonies were affected by SHB damage with data suggesting that nucleus colonies were most vulnerable to damage.

SHB larval damage in bee colonies occurs mainly between November and March with an in-hive SHB adult control device required to be used inside beehives for a minimum of 5 months each year. SHB larval damage inside honey houses/sheds occurs mainly between December and March indicating that beekeeper management practices, possibly in association with the use of SHB control devices, are required to minimise damage in these situations.

#### **ESSENTIAL ISSUES DERIVED FROM THE SURVEY -**

- November, 2002. Initial identification of Small Hive Beetles from managed beehives in Australia at Richmond, NSW.
- 53% of beekeepers responding to this survey had observed SHB in their apiaries and/or honey house/shed. 312 beekeepers out of 655 surveyed provided a response to this question.
- SHB damage occurred in apiaries (69%), apiary and honey house (20%), and honey house (2%), not specified (9%).
- Districts most heavily affected by 2006, based on the number of responses from beekeepers, are the Mid North Coast, North Coast, South Coast, Northern Tablelands and North West Slopes and Plains.
- The number of adult SHB present in hives increased with time between 2002 and 2006. Highest increases in numbers of adult SHB in hives occurred during 2005-6.
- Distribution. For the 15 districts described in the survey form in NSW, SHB was present in 3 districts in 2002, 6 districts in 2003, 13 districts in 2004 and in all 15 districts by 2006. SHB was reported present in areas outside the described districts from 2003.
- Hive strengths affected. From the total number of hives reported which died out after being infested with SHB, nucleus hives were the most heavily affected (43.0%) followed by weak doubles (18.0%), strong doubles (15.2%), weak singles (9.3%), triple storied hives (7.5%) and strong single hives (7.0%).
- Hives dying out following SHB infestation between 2002 and 2006. 117 beekeepers reported 4631 hives dying out with an estimated value of \$390000, average loss per beekeeper was \$3300, range \$390-8517.
- Damage to honey/hive products/frames between 2002 and 2006. 109 beekeepers reported a total loss \$366600, average loss per beekeeper was \$3400, range \$10-10000.
- Estimated increased cost of production to manage SHB based on increased travel, purchase of chemicals and other management costs for the av. 52 beekeepers providing data for 2005-6 was \$174100 with an average cost per beekeeper of \$3800.
- Estimated increased hours of labour to manage SHB for the 61 beekeepers providing data for 2005-6 was 8526 hours with an average of 140 hours per beekeeper.
- An approximate total amount of increased costs for the 312 beekeepers responding to this survey to manage SHB for 2002-6 is \$M 0.93 plus 8526 hours of labour.
- Protection of stored beehive materials against SHB larval damage. Chemical fumigation is most commonly used (43%) followed by cold and freezer rooms (22%) with both having a high success rating.
- Damage in apiaries from SHB larvae is at its highest levels between November-March with December-February the most heavily affected months. In-hive SHB control traps/devices would need to be used inside hives between November and March, about 5 months each year.

- Damage in honey houses/sheds from SHB larvae is at its highest levels between November and March with December to March the most heavily affected months.
- Use of in-hive adult SHB control device using a pesticide as a control agent. 1 in 3 beekeepers would use such a device in their hives, 1 in 10 would not use the device, 56% of beekeepers surveyed did not answer this question.
- There is a requirement for an approved device to be made available to control adult SHB inside beehives.

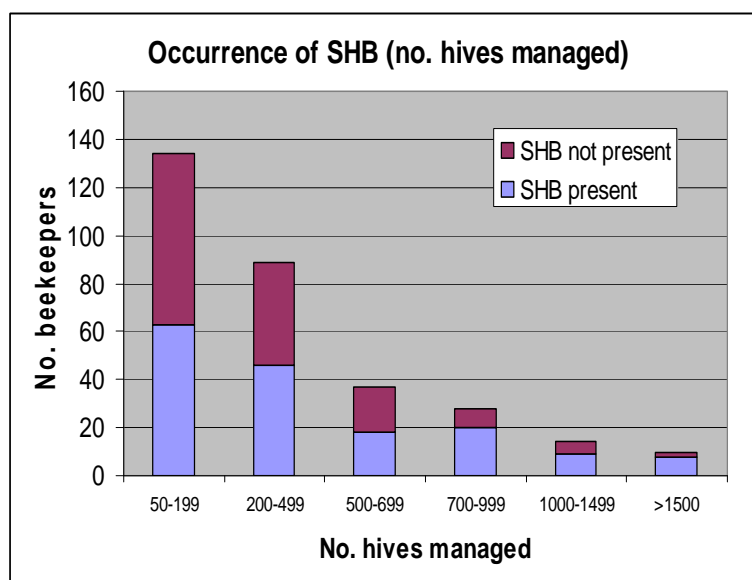
## RESULTS

### QUESTION 1. HAVE YOU SEEN ADULT OR LARVAL STAGES OF THE SHB IN YOUR HIVES, HONEY HOUSE OR OTHER PREMISES.

**Table 1.** Number of responses from beekeepers who had observed SHB present, or had not observed SHB present, between 2002-6, for beekeepers in all districts according to number of hives managed.

Number of hives managed	Beekeeper responses – number and percent			
	SHB present	%	SHB not present	%
50-199	63	47.0	71	53.0
200-499	46	51.7	43	43.8
500-699	18	48.6	19	51.4
700-999	20	71.4	8	28.6
1000-1499	9	64.3	5	35.7
More than 1500	8	80.0	2	20.0
<b>Total</b>	<b>164</b>	<b>52.6</b>	<b>148</b>	<b>47.4</b>

Comment – 52.6% of the 312 beekeepers responding to this question had observed SHB present. 343 out of 655 (52%) of beekeepers surveyed did not provide a response to this question.



**QUESTION 2. WHERE IS DAMAGE FROM SHB LARVAE OCCURRING – APIARY OR HONEY HOUSE/SHED.**

**Table 2.** Information on which part(s) of their business have been affected by SHB damage. 79 beekeepers provided information.

Year	Number of responses				Total
	Part of beekeeping operation where SHB damage occurring				
	Apiary	Apiary and honey house/shed	Honey house	SHB present – area not specified	
2002	1				1
2003	2	1			3
2004	9	5			14
2005	28	9	1	6	44
2006	41	9	1	5	56
<b>Total</b>	<b>81</b>	<b>24</b>	<b>2</b>	<b>11</b>	<b>118</b>
%	68.6	20.3	1.7	9.3	

Comment – Highest damage 68.6% is occurring in hives in the apiary, 20.3% of beekeepers had observed damage in both the apiary and in their honey house/shed, and 1.7% observed damage in the honey house only. Beekeeper response numbers increased for 2005-6 compared with 2002-4.



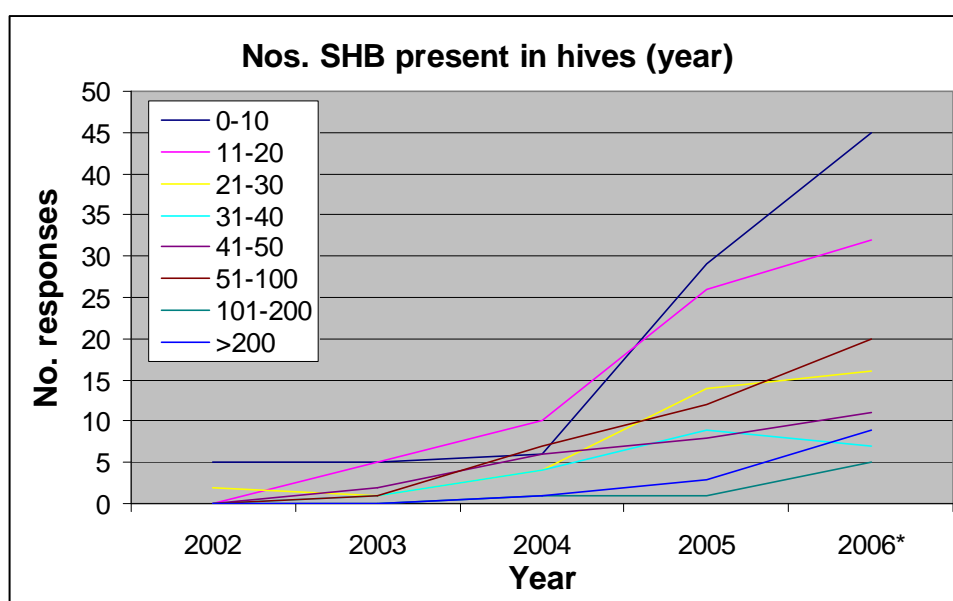
**QUESTION 3. ESTIMATE THE AVERAGE NUMBER OF ADULT SHB SEEN IN YOUR HIVES. PLACE THE DISTRICT NUMBERS WHERE THE BEETLES WERE SEEN (FROM FORM 1) IN THE APPROPRIATE BOX FOR EACH YEAR.**

**Table 3a.** Number of responses for the estimated numbers of SHB present in hives for the years shown for all districts in NSW.

Year	Number of responses for the estimated number of SHB present in hives								Total	% of total
	0-10	11-20	21-30	31-40	41-50	51-100	101-200	> 200		
2002	5	0	2	0	0	0	0	0	7	2.3
2003	5	5	1	1	2	1	0	0	15	4.9
2004	6	10	4	4	6	7	1	1	39	12.7
2005	29	26	14	9	8	12	1	3	102	33.1
2006*	45	32	16	7	11	20	5	9	145	47.1
<b>Total</b>	<b>90</b>	<b>73</b>	<b>37</b>	<b>21</b>	<b>27</b>	<b>40</b>	<b>7</b>	<b>13</b>	<b>308</b>	
% of total	29.2	23.7	12.0	6.8	8.8	13.0	2.3	4.2		

\* January- June 2006 (6 months )

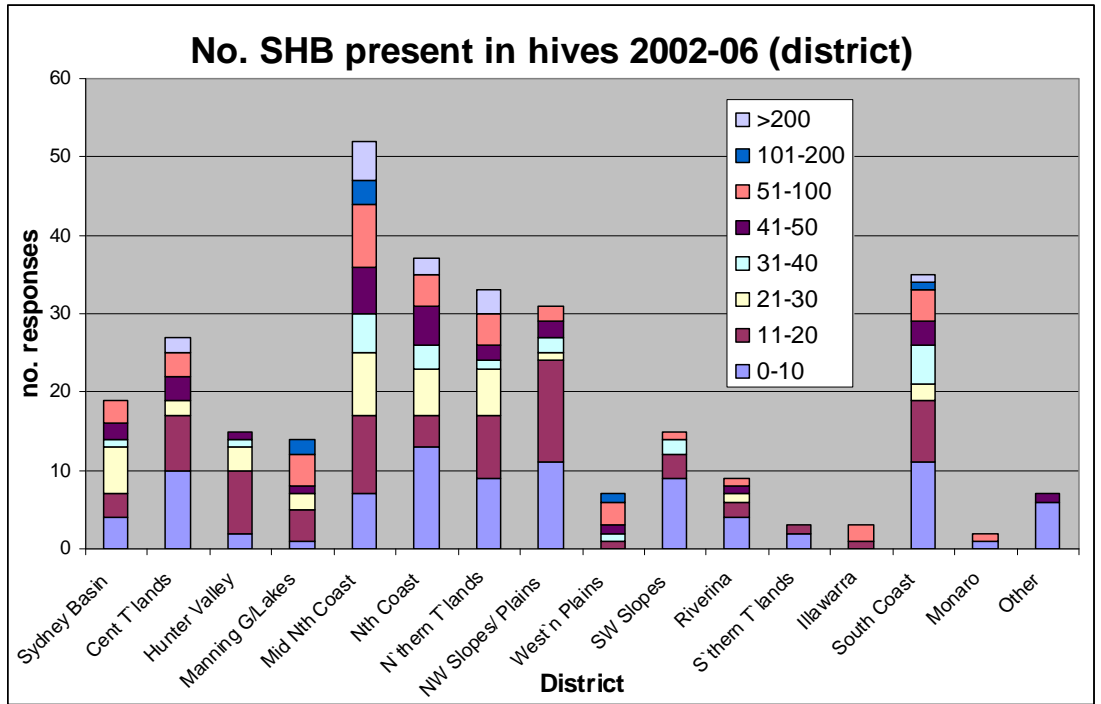
Comment – The results show an increase with time for the number of adult SHB observed in hives. There was a large increase in the number of adult SHB observed in hives for 2005 and 2006



**Table 3b.** Number of responses for the estimated number of SHB present in hives for each district for the years 2002-6.

District	Number of responses for the estimated number of SHB present per hive								Total	% of total
	0-10	11-20	21-30	31-40	41-50	51-100	101-200	>200		
Sydney Basin	4	3	6	1	2	3	0	0	19	6.1
Cent T'lands	10	7	2	0	3	3	0	2	27	8.7
Hunter Valley	2	8	3	1	1	0	0	0	15	4.9
Manning G/Lakes	1	4	2	0	1	4	2	0	14	4.5
Mid Nth Coast	7	10	8	5	6	8	3	5	52	16.8
Nth Coast	13	4	6	3	5	4	0	2	37	12.0
N'thern T'lands	9	8	6	1	2	4	0	3	33	10.7
NW Slopes/Plains	11	13	1	2	2	2	0	0	31	10.0
West'n Plains	0	1	0	1	1	3	1	0	7	2.3
SW Slopes	9	3	0	2	0	1	0	0	15	4.9
Riverina	4	2	1	0	1	1	0	0	9	2.9
S'thern T'lands	2	1	0	0	0	0	0	0	3	1.0
Illawarra	0	1	0	0	0	2	0	0	3	1.0
South Coast	11	8	2	5	3	4	1	1	35	11.3
Monaro	1	0	0	0	0	1	0	0	2	0.6
Other	6	0	0	0	1	0	0	0	7	2.3
<b>Total</b>	<b>90</b>	<b>73</b>	<b>37</b>	<b>21</b>	<b>28</b>	<b>40</b>	<b>7</b>	<b>13</b>	<b>309</b>	
% of total	29.1	23.6	12.0	6.8	9.1	12.9	2.3	4.2		

Comment – The estimated highest numbers of adult SHB present in hives were reported from the Mid North Coast, Northern Tablelands, Central Tablelands and the South Coast districts. The highest number of responses for the number of SHB observed in hives are from beekeepers who operate in the Mid North Coast, North Coast, South Coast, Northern Tablelands and the North West Slopes and Plains.

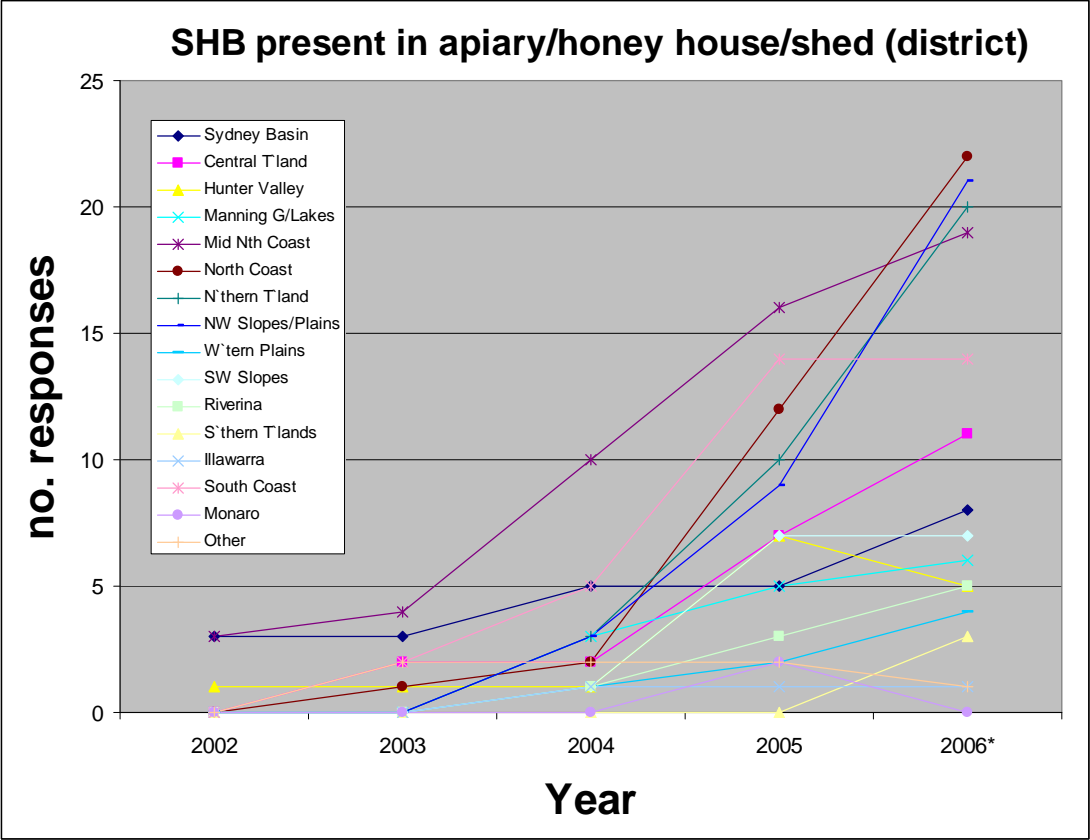


**Table 3c.** The number of responses where SHB was present in the beekeeper`s apiary and/or honey house/shed, for each district for each year shown.

District	Year					Total	% of total
	2002	2003	2004	2005	2006*		
Sydney Basin	3	3	5	5	8	24	7.7
Central T land	0	2	2	7	11	22	7.1
Hunter Valley	1	1	1	7	5	15	4.8
Manning G/Lakes	0	0	3	5	6	14	4.5
Mid Nth Coast	3	4	10	16	19	52	16.7
North Coast	0	1	2	12	22	37	11.9
N`thern T land	0	0	3	10	20	33	10.6
NW Slopes/ Plains	0	0	3	9	21	33	10.6
W`tern Plains	0	0	1	2	4	7	2.3
SW Slopes	0	0	1	7	7	15	4.8
Riverina	0	0	1	3	5	9	2.9
S`thern T lands	0	0	0	0	3	3	1.0
Illawarra	0	0	1	1	1	3	1.0
South Coast	0	2	5	14	14	35	11.3
Monaro	0	0	0	2	0	2	0.6
Other	0	2	2	2	1	7	2.3
<b>Total</b>	<b>7</b>	<b>15</b>	<b>40</b>	<b>102</b>	<b>147</b>	<b>311</b>	
% of total	2.3	4.8	12.9	32.8	47.3		

\* January-June 2006 (6 months)

Comment – The results suggest that populations of SHB are increasing with time with a large increase during 2005 and 2006 representing 80% of the total number of responses. The districts providing the highest numbers of responses from beekeepers were the Mid North Coast, North Coast, South Coast, Northern Tablelands and North West Slopes and Plains.



**QUESTION 4. WHAT STRENGTHS OF HIVES DIED OUT AFTER BEING INFESTED WITH SHB. PUT THE NUMBER OF HIVES THAT DIED OUT IN EACH BOX FOR EACH YEAR.**

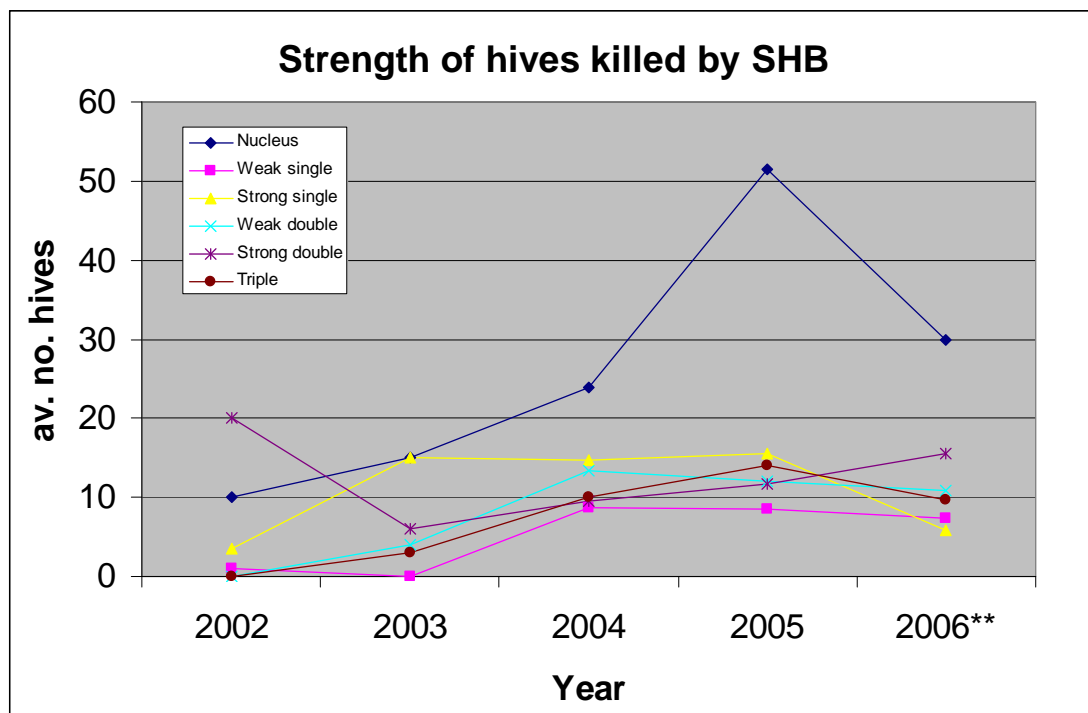
**Table 4.** Numbers of hives of different hive strengths which died out after being infested with SHB, for beekeepers managing all numbers of hives for all districts.

Year		Hive strength						Total
		Nucleus	Weak single	Strong single	Weak double	Strong double	Triple	
2002	<i>No. hives</i>	10	1	7	0	20	0	38
	Range	-	-	2-5	-	-	-	
	n*	1	1	2	0	1	0	5
	Av./response	10.0	1.0	3.5	0	20.0	0	7.6
2003	<i>No. hives</i>	30	0	15	8	24	6	83
	Range	15-15	-	-	4-4	3-12	1-5	
	n*	2	0	1	2	4	2	11
	Av./response	15.0	0	15.0	4.0	6.0	3.0	7.5
2004	<i>No. hives</i>	263	52	44	80	96	20	555
	Range	1-100	3-20	4-20	5-25	4-20	7-13	
	n*	11	6	3	6	10	2	38
	Av./response	23.9	8.7	14.7	13.3	9.6	10.0	14.6
2005	<i>No. hives</i>	978	207	186	387	245	127	2130
	Range	1-500	1-50	2-80	1-90	1-50	1-45	
	n*	19	24	12	32	21	9	117
	Av./response	51.5	8.6	15.5	12.1	11.7	14.1	18.2
2006**	<i>No. hives</i>	867	203	99	425	372	222	2188
	Range	1-400	1-30	1-20	1-60	1-85	1-40	
	n*	29	28	17	39	24	23	160
	Av./response	29.9	7.3	5.8	10.9	15.5	9.7	13.7
<b>Total</b>	<b>No. hives (%)</b>	<b>2148 (43.0)</b>	<b>463 (9.3)</b>	<b>351 (7.0)</b>	<b>900 (18.0)</b>	<b>757 (15.2)</b>	<b>375 (7.5)</b>	<b>4994</b>
	n*	62	59	35	77	60	36	
	Av./response	34.6	7.8	10.0	11.7	12.6	10.4	

\* n = number of beekeepers providing data

\*\* January – June 2006

Comment – Between 2002 and 2006, beekeepers reported 4994 hives died out after being infested with SHB. Nucleus hives were the most heavily affected (43.0%), followed by weak doubles (18.0%), strong doubles (15.2%), weak singles (9.3%), triples (7.5%) and strong singles (7.0%). This data may reflect the numbers of hives of the various hive strength categories present in NSW apiaries rather than provide an indication of the vulnerability of each hive strength to damage. However, nucleus hives were the most heavily affected by SHB infestation and all hive strengths were vulnerable. The number of beekeepers reporting hives which had died out and the number of hives which died out for all categories of hive strength, in general, increased between 2002 and 2006.



**QUESTION 5. PROVIDE INFORMATION ON HIVES THAT YOU CONSIDER DIED OUT AS A RESULT OF SHB INFESTATION. USE DISTRICT NUMBERS FROM FORM 1.**

**Table 5.** The number of hives that died out, the value beekeepers placed on those hives, and the number of beekeeper providing information for each district, for the years 2002-6.

District	No. of beekeepers providing information	Total number of hives which died out from SHB infestation	Estimated total value of hives which died out \$	Estimated average value per beekeeper \$
Sydney Basin	9	1346	57000	6333
Central T'land	6	279	10050	1675
Hunter Valley	6	136	8950	1492
Manning G/Lakes	12	387	34184	2849
Mid Nth Coast	28	1839	238470	8517
North Coast	23	183	10090	439
N'thern T'lands	7	31	2730	390
NW Slopes/ Plains	4	21	1760	440
Western Plains	1	40	8000	8000
SW Slopes	2	19	950	475
Riverina	1	15	2200	2200
S'thern T'lands	2	6	870	435
Illawarra	0	0	0	0
South Coast	12	293	11160	930
Monaro	0	0	0	0
Other	4	36	3400	850
<b>Total</b>	<b>117</b>	<b>4631</b>	<b>389814</b>	<b>3332</b>

Comment – Between 2002 and 2006, 117 beekeepers reported the number of hives which died out following SHB infestation was 4631 hives valued at \$388964 with an average loss per beekeeper of \$3332, range \$390-8517. Average value per hive was \$84.

High numbers of responses were received from the Mid North Coast (28) and from the North Coast (23) with a large variation between the estimated value of damage per beekeeper from SHB for each district. This demonstrates a large range of amounts of damage resulting from SHB infestation being experienced by different beekeeping enterprises.



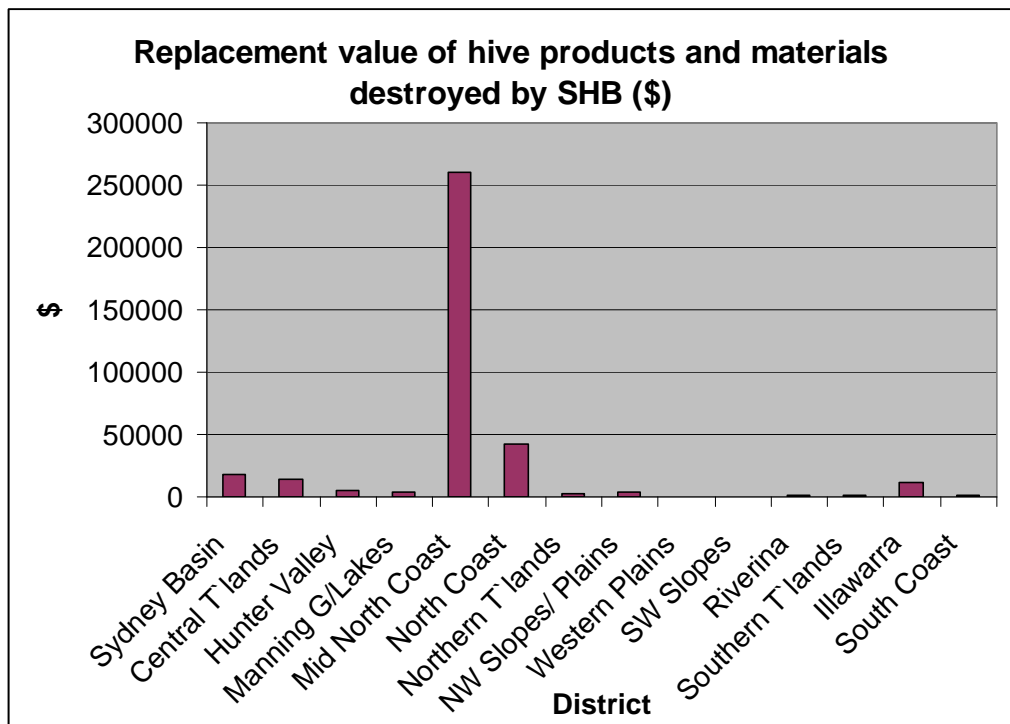
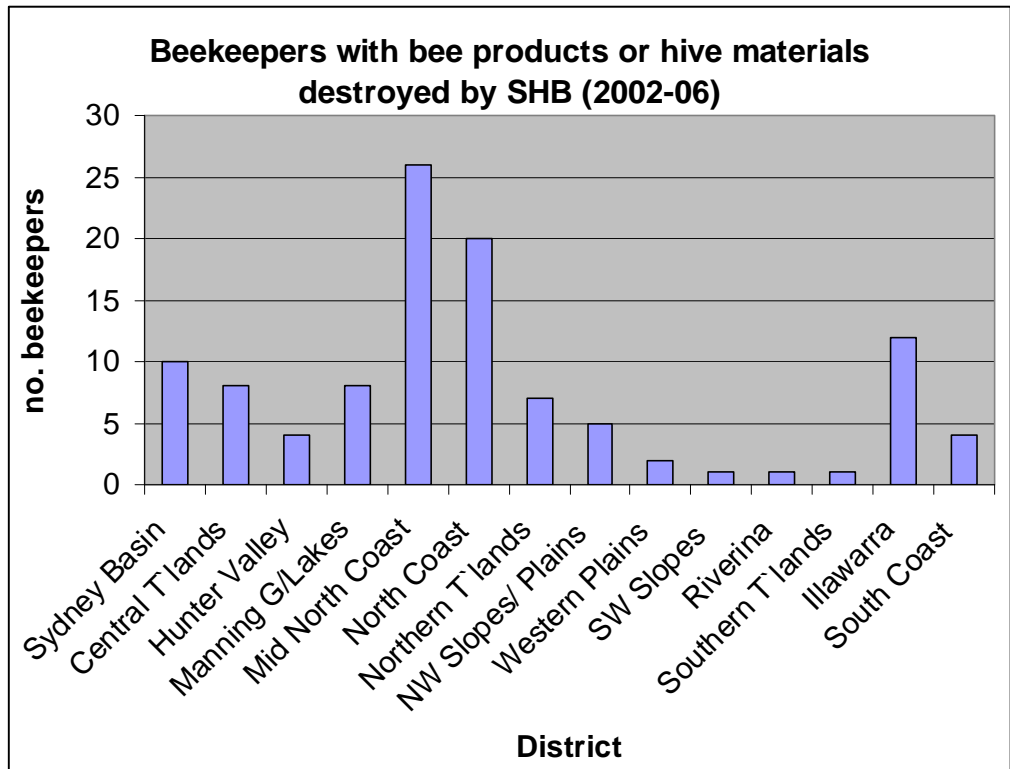
**QUESTION 6. PROVIDE INFORMATION ON HONEY (IN FRAMES OR EXTRACTED) AND HIVE MATERIALS (FRAMES, BOXES, ETC) THAT YOU HAVE DESTROYED AFTER BEING INFESTED WITH SHB. DETERMINE REPLACEMENT COSTS BASED ON HIVES/MATERIALS OF SIMILAR QUALITY AND VALUES. USE DISTRICT NUMBERS FROM FORM 1.**

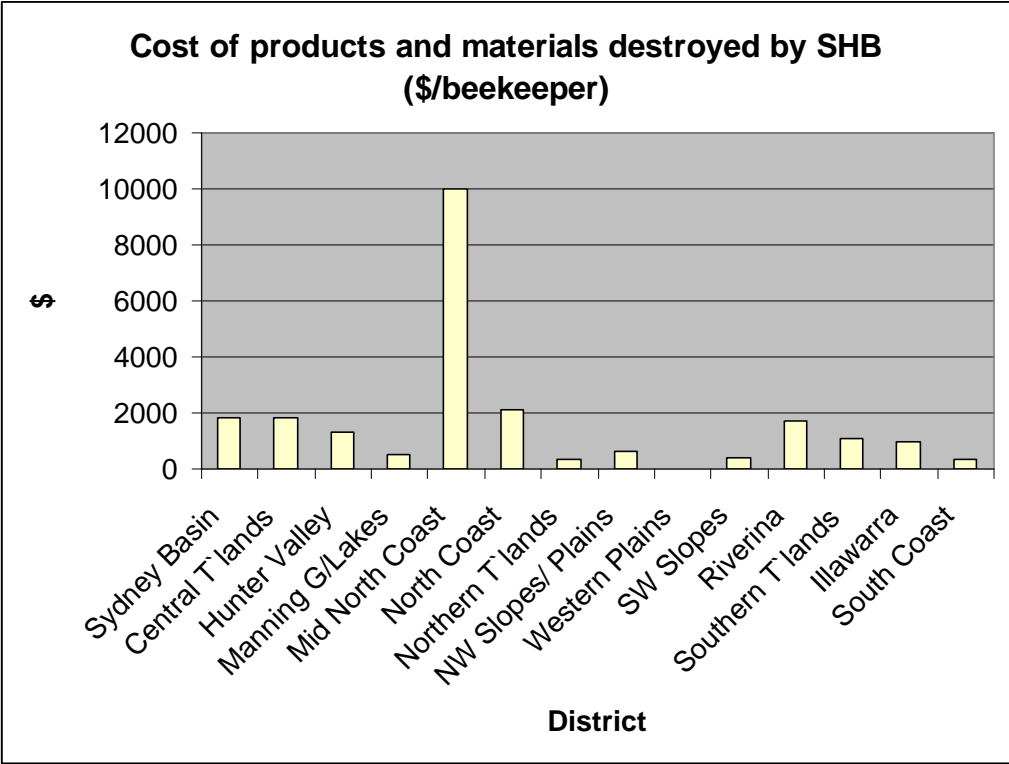
**Table 6.** The replacement value of bee products and hive materials destroyed resulting from SHB damage for each district, for 2002-6.

District	Number of beekeepers providing information	Replacement value of destroyed hive products and materials \$	Estimated average value per beekeeper \$
Sydney Basin	10	18536	1854
Central T <sup>l</sup> ands	8	14560	1820
Hunter Valley	4	5295	1324
Manning G/Lakes	8	4050	506
Mid North Coast	26	260017	10001
North Coast	20	42453	2123
Northern T <sup>l</sup> ands	7	2570	367
NW Slopes/ Plains	5	3215	643
Western Plains	2	20	10
SW Slopes	1	400	400
Riverina	1	1700	1700
Southern T <sup>l</sup> ands	1	1100	1100
Illawarra	12	11360	947
South Coast	4	1300	325
Monaro	0	0	0
Other	0	0	0
<b>Total</b>	<b>109</b>	<b>366576</b>	<b>3363</b>

Comment – 109 beekeepers reported a loss of \$366576 value of destroyed hive products and materials with an average cost to each beekeeper of \$3363, range \$10-10001.

A high number of beekeeper responses from the Mid North Coast (26) and the North Coast (20) suggesting the presence of SHB in large numbers of apiaries was not reflected in the average amount of damage to hive products and materials reported from each district, \$10001 and \$2123 respectively.





**QUESTION 7. ESTIMATE THE INCREASED COSTS OF PRODUCTION FOR YOUR BUSINESS TO MANAGE SHB FOR THE SEASON 2005-6.**

**Table 7a.** Costs of production above expected costs resulting from the effects of SHB for the 2005-6 season.

Estimated increased costs of production 2005-6								
District	Travel Cost		Chemical Cost		Labour (Hours)		Other management	
	n*	\$	n*	\$	n*	Hours	n*	\$
Sydney Basin	4	4290	6	2044	5	1482	3	1410
Central T`lands	0	0	1	10	3	24	1	1000
Hunter Valley	3	6050	0	0	1	50	2	7700
Manning G/Lakes	7	6425	4	460	6	285	4	4450
Mid Nth Coast	14	35000	13	5250	14	2348	8	38000
North Coast	16	16590	8	1090	13	1346	9	16020
N`thern T`lands	1	3000	4	1150	3	315	1	5000
NW Slopes/ Plains	0	0	1	100	1	300	0	0
Western Plains	0	0	0	0	0	0	0	0
SW Slopes	2	4000	3	800	1	16	2	2400
Riverina	1	180	2	445	3	56	1	120
S`thern T`lands	1	120	1	20	1	12	1	80
Illawarra	0	0	0	0	0	0	0	0
South Coast	8	8365	8	1085	9	2192	4	610
Monaro	0	0	0	0	0	0	0	0
Other	1	500	1	300	1	100	0	0
<b>Total</b>	<b>58</b>	<b>84520</b>	<b>52</b>	<b>12754</b>	<b>61</b>	<b>8526</b>	<b>36</b>	<b>76790</b>

\* n = number of beekeepers providing data

**Table 7b.** A summary of increased management costs for apiaries/honey house/sheds resulting from the effects of SHB, for all districts for the 2005-6 season.

Estimated increased costs of production					
	Travel \$	Chemicals \$	Labour# Hours	Other management \$	Total \$
<b>Total</b>	<b>84520</b>	<b>12754</b>	<b>8526</b>	<b>76790</b>	<b>174064</b>
n*	58	52	61	36	
Average / beekeeper	1457	245	140	2133	<b>3835</b>

\* n = the number of beekeepers providing data

Comment – Increased costs of production per beekeeper are estimated at \$3835 plus 140 hours increased labour costs for 2005-6.

**Table 7c.** An approximate total value of increased expenses for the number of beekeepers providing data for managing SHB for 2002-6.

Category		n**	Total value \$	Average cost/beekeeper \$
Number	Data source			
1	Hives destroyed* (Table 5)	117	389814	3332
2	Honey/hive products/materials* (Table 6)	109	366576	3363
3	Increased costs of production # (Table 7b)	av. 52	174064 plus 8526 hours	3835 plus 140 hours
<b>Total \$</b>			<b>930454</b>	<b>10530</b>
<b>Hours</b>			<b>8526</b>	<b>140</b>

\*\* n = number of beekeepers providing data

\* For years 2002-6

# For 2005-6 only

Comment – These data are based on information supplied by the number of beekeepers shown for each category. All beekeepers supplying information may not have experienced damage/increased costs from all 3 categories.

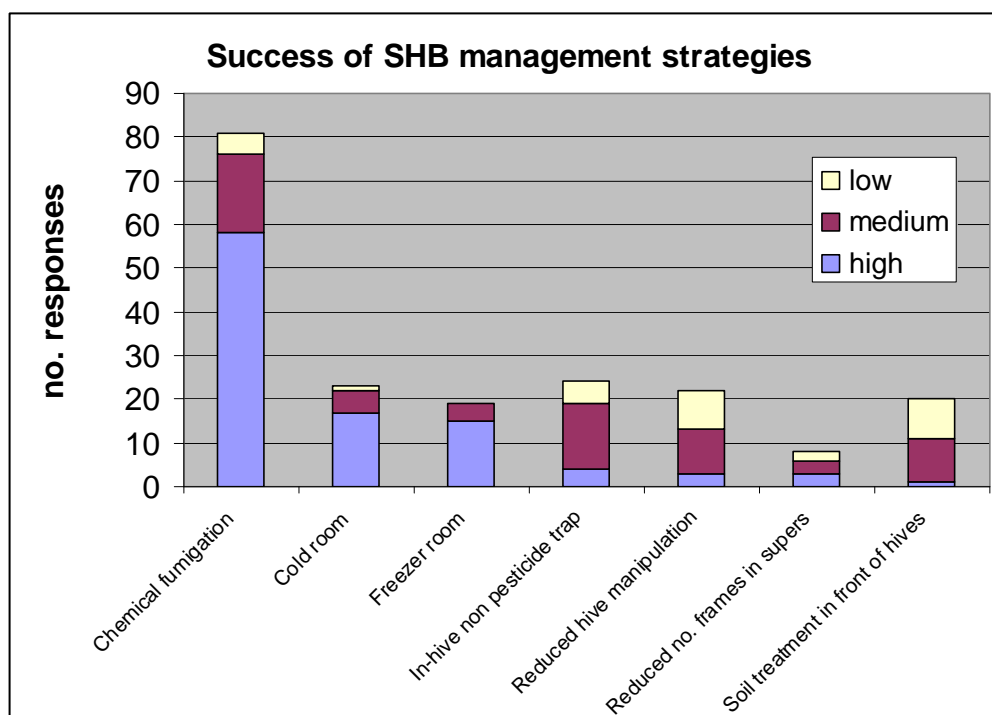
Categories 1 and 2 are total estimated damage costs for 2002-6, and category 3 increased costs are based on information supplied for 2005-6 only. A higher number of beekeeper responses were reported for the presence of SHB in apiaries/honey houses/sheds for 2005 and 2006 (80%) than for 2002 to 2004 (20%), Table 3c, suggesting a higher rate of damage and increased costs during 2005-6 than during 2002-4.

**QUESTION 8. TICK THE MANAGEMENT PLAN YOU HAVE IN PLACE TO MANAGE SHB IN YOUR APIARIES, HONEY HOUSE AND OTHER PREMISES.**

**Table 8.** The number of responses for control methods used and their success rating by the beekeeper.

Control method/strategy	Success rating			Number of beekeepers responding (%)
	high	medium	low	
Chemical fumigation of hive materials	58	18	5	81(43)
Cold room	17	5	1	23(12)
Freezer room	15	4	0	19(10)
In-hive non pesticide trap eg oil traps	4	15	5	24(13)
Reduced hive manipulation during humid weather	3	10	9	22(12)
Reduced numbers of frames in supers	3	3	2	8(4)
Soil treatment in front of hives	1	10	9	20(11)
<b>Total responses</b>	<b>101</b>	<b>65</b>	<b>24</b>	<b>190</b>

Comment – Chemical fumigation (of extracted hive materials) was the most used control practice (43%) and was given a high success rating. Cold rooms and freezer rooms (for extracted and non-extracted hive materials) were the second highest method used (22%) and were given a high success rate. In-hive control by oil trap, reduced hive manipulation (apiary management), and soil treatment in front of hives for SHB larvae control were used with a medium success rating.



**QUESTION 9. IN WHAT MONTH(S) ARE LARVAL STAGES OF SHB CAUSING DAMAGE IN THE (A) APIARY, OR (B) HONEY HOUSE/SHED.**

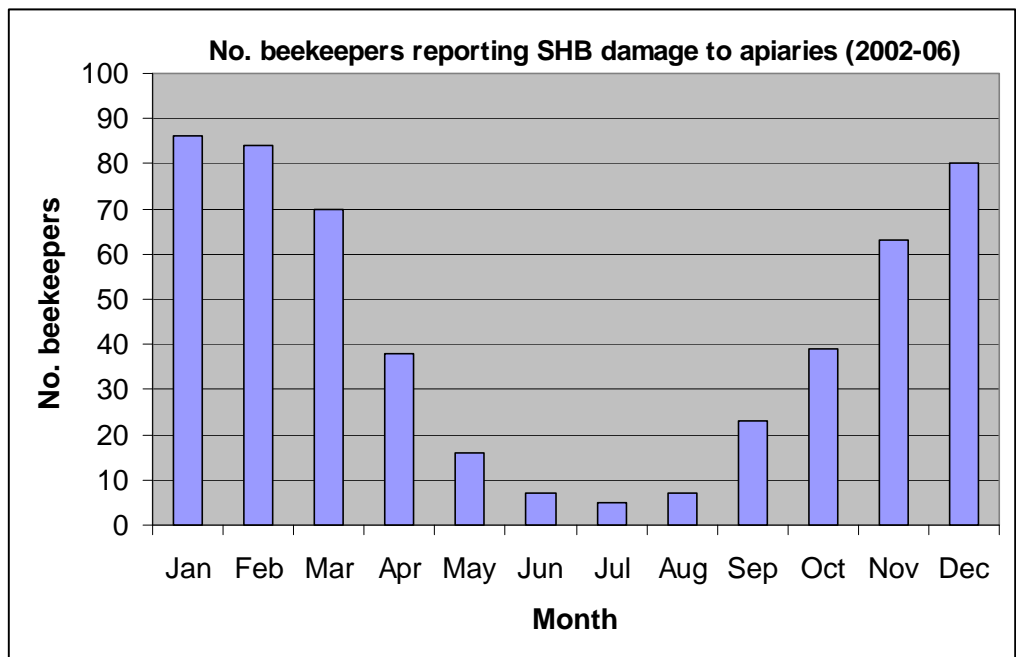
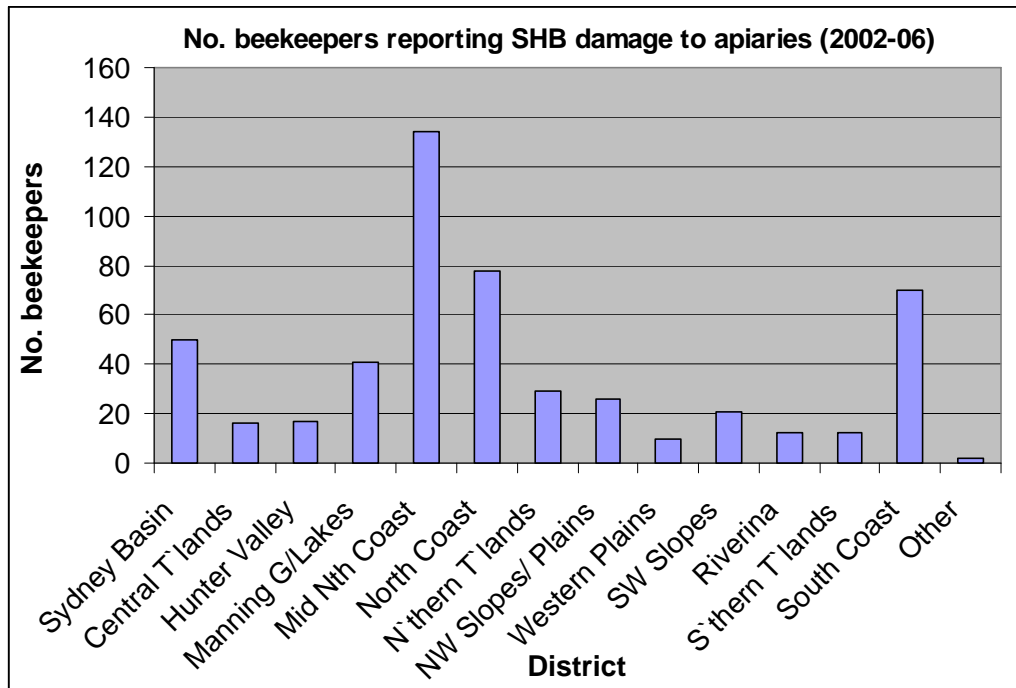
**Table 9a.** Apiaries - Number of beekeepers reporting damage in apiaries by SHB larvae for the months shown, by district, for 2002-6.

District	Month												Sub-total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Sydney Basin	8	9	8	6	2	0	0	0	3	3	5	6	50
Central T lands	2	3	3	0	0	0	0	0	2	1	2	3	16
Hunter Valley	1	2	2	2	1	0	0	0	1	3	3	2	17
Manning G/Lakes	8	7	6	2	1	1	0	1	1	3	5	6	41
Mid Nth Coast	25	22	18	11	4	2	2	2	4	7	14	23	134
North Coast	14	14	12	6	4	0	0	1	3	5	8	11	78
N'thern T lands	5	6	4	3	0	0	0	0	0	2	3	6	29
NW Slopes/ Plains	6	5	3	1	0	0	0	0	1	2	2	6	26
Western Plains	2	1	0	0	0	0	0	0	1	2	2	2	10
SW Slopes	3	3	3	2	0	0	0	0	1	2	4	3	21
Riverina	2	1	0	0	0	0	0	0	2	1	3	3	12
S'thern T lands	1	2	1	0	0	0	0	0	2	2	3	1	12
Illawarra	0	0	0	0	0	0	0	0	0	0	0	0	0
South Coast	9	8	9	5	4	4	3	3	2	6	9	8	70
Monaro	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	1	1	0	0	0	0	0	0	0	0	0	2
<b>Sub-total</b>	<b>86</b>	<b>84</b>	<b>70</b>	<b>38</b>	<b>16</b>	<b>7</b>	<b>5</b>	<b>7</b>	<b>23</b>	<b>39</b>	<b>63</b>	<b>80</b>	<b>518</b>
%	16.6	16.2	13.5	7.3	3.1	1.4	1.0	1.4	4.4	7.5	12.2	15.4	

Comment – (i) From the sub-totals for each district, the number of responses from beekeepers is higher for the coastal districts Mid North Coast, North Coast and the South Coast than districts west of the ranges, eg. Northern Tablelands.

(ii) From the sub-totals for each month, the number of responses is higher for the period November, December, January, February and March, with December, January and February being the highest response months.

This data supports high temperatures and high humid conditions being requirements suitable for SHB breeding. This data suggests that in-hive SHB control traps/devices would need to be used inside hives between November and March, about 5 months each year.



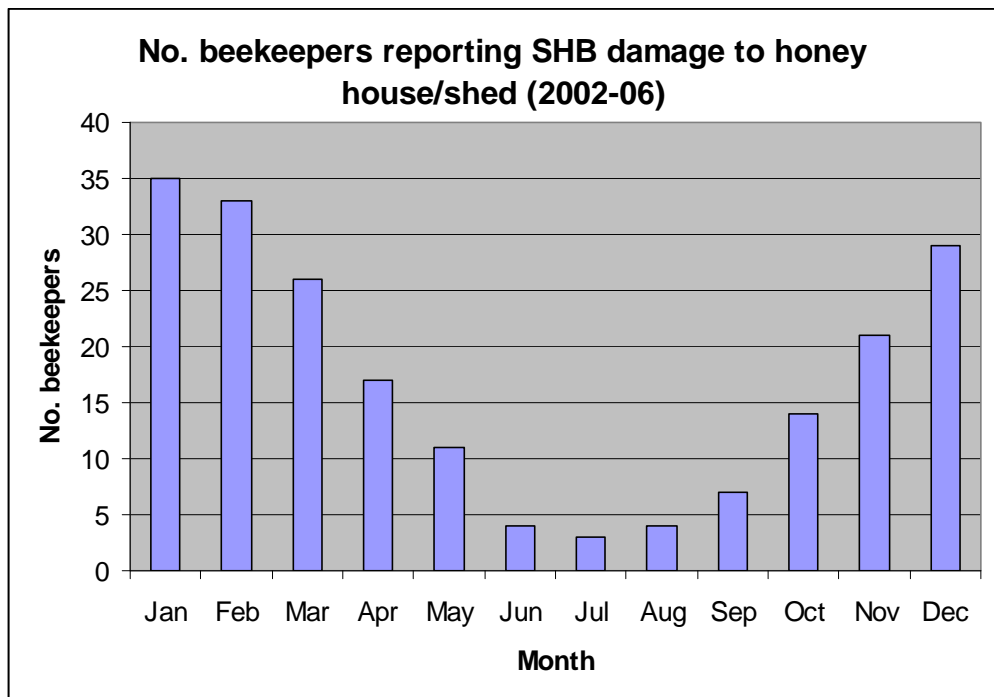
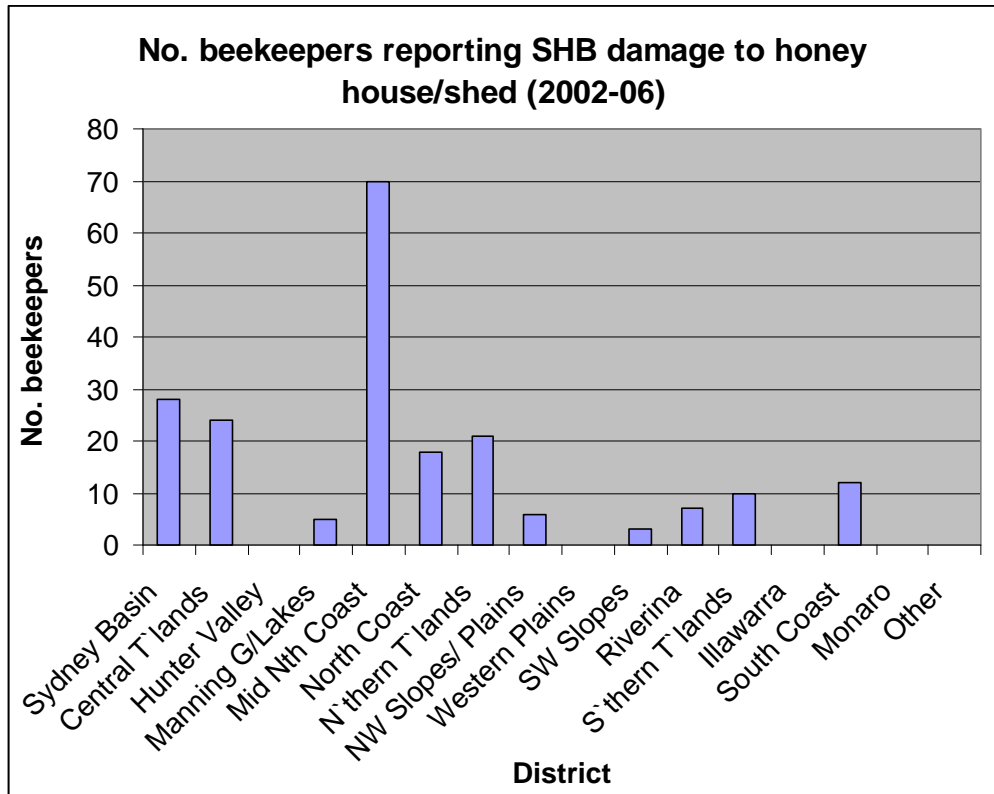


**Table 9b.** Honey house/shed – Number of beekeepers reporting damage in their honey house/shed by SHB larvae for the months shown, by district, for 2002-6.

District	Month												Sub-total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Sydney Basin	5	5	5	3	2	0	0	0	2	2	2	2	28
Central T'lands	4	4	4	1	1	0	0	0	1	2	3	4	24
Hunter Valley	0	0	0	0	0	0	0	0	0	0	0	0	0
Manning G/Lakes	2	1	0	0	0	0	0	0	0	0	1	1	5
Mid Nth Coast	9	9	8	6	5	3	3	3	3	4	8	9	70
North Coast	2	2	3	3	2	1	0	1	1	1	1	1	18
N'thern T'lands	4	4	3	2	0	0	0	0	0	2	2	4	21
NW Slopes /Plains	2	2	0	0	0	0	0	0	0	0	0	2	6
Western Plains	0	0	0	0	0	0	0	0	0	0	0	0	0
SW Slopes	1	1	1	0	0	0	0	0	0	0	0	0	3
Riverina	2	1	0	0	0	0	0	0	0	1	1	2	7
S'thern T'lands	2	2	1	1	0	0	0	0	0	1	1	2	10
Illawarra	0	0	0	0	0	0	0	0	0	0	0	0	0
South Coast	2	2	1	1	1	0	0	0	0	1	2	2	12
Monaro	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total	35	33	26	17	11	4	3	4	7	14	21	29	204
% of total	17.2	16.2	12.7	8.3	5.4	2.0	1.5	2.0	3.4	6.9	10.3	14.2	

Comment – (i) From the sub-total for districts, highest numbers of beekeeper responses were from coastal areas, Mid North Coast, Sydney Basin and North Coast, as well as from non-coastal districts, Central Tablelands and the Northern Tablelands. This data suggests that the temperature and humidity inside beekeeper`s sheds and honey houses may be more suitable for SHB survival and breeding than inside beehives in certain districts.

(ii) From the sub-totals for months, higher numbers of responses for damage were recorded for November to March.



**QUESTION 10. (A) IF AN IN-HIVE ADULT SHB CONTROL DEVICE USING A PESTICIDE AS A CONTROL AGENT BECAME AVAILABLE TO BEEKEEPERS, WOULD YOU USE THE DEVICE IN YOUR HIVES - ANSWER YES OR NO, AND (B) WHAT NUMBER OF YOUR HIVES WERE INFESTED WITH SHB DURING 2005-6.**

**Table 10.** The number of beekeepers who would use a pesticide based SHB control device inside their hives (Yes), the number who would not (No), and the number of hives infested with SHB during 2005-6 owned by those beekeepers are shown according to numbers of hives owned.

Number of hives owned	Number of beekeepers responding and number of SHB infested hives 2005-6			
	Yes		No	
	Number of beekeepers responding	Number of hives affected	Number of beekeepers responding	Number of hives affected
50-199	48	1914	9	210
200-499	25	4122	11	1164
500-699	13	5385	3	52
700-999	11	4355	7	1751
1000-1499	6	204	3	2270
>1500	4	680	2	2500
<b>Total</b>	<b>107</b>	<b>16 660</b>	<b>35</b>	<b>7 947</b>

Comment – Of the 324 beekeepers who completed and returned this survey questionnaire about 1 in 10, (35), said they would not use the device, about 1 in 3, (107), said they would use the device. More than half, (181), of the responding beekeepers did not answer the question.

## QUESTION 11. OTHER COMMENTS.

**Table 11.** Many comments were received which have been summarised according to a common theme.

### **Government involvement**

- The Exotic Animal Diseases Act 1991 penalises primary producers who obey the Act. Beekeepers having hives destroyed in an eradication attempt should be compensated for their losses from hives destroyed and associated loss of income.

### **Control methods**

- All hives kept strong, store supers in a cool room (fumigation every 10 days is unacceptable), after removing honey all extracted supers back on hives within 6 days, all extracting and honey storage equipment washed down after use.
- Cold and freezer rooms required to manage the problem.
- Pheromone bait trapping of SHB outside hives is required
- Frames with SHB larvae washed with water under pressure and placed in strong hive
- Hives with young queen bees show less damage than hives with old queen bees
- Extremes of hot and cold weather seem to eliminate SHB adults from inside hives
- Remove weak and dead-out hives from apiary quickly
- Oil traps seem to stop reproduction but some adults always present

### **Increased damage/costs from SHB**

- SHB impacts on all areas of beekeeping – supers, apiaries, honey house, queen bee production, comb honey production, package bee production, and export queen bees.
- Installation of a cool room to hold 3500 supers, estimated cost between \$55000 and \$65000 is a major increased expense
- Reduces ability of beekeeper to manage hives properly
- Estimated reduced honey produced on coast sites 2005-6 season was 65%
- I live on the coast but will not work bees on the coast without an effective control agent
- Have been making up nucleus hives to replace SHB dead-out hives for past 2 years on coast, cannot afford to continue doing this, a control agent needs to be developed quickly
- Our costs have increased due to having to extract honey soon after removed from hives
- Our concern is the possible increased spread of AFB with SHB roaming from apiary to apiary

**SHB observations**

- Adult SHB present inside hives all year round in small numbers
- SHB adult numbers decrease in hives moved west of the range. Queen rearing nucleus hives continue to break down in spring and summer west of the range
- Adult SHB numbers built up rapidly Nov-Dec 2005-6. Adult SHB over-wintering in hives

**Sources of infestation**

- In cages with purchased queen bees
- Hobbyist beekeepers

**Movement of SHB**

- By migratory beekeepers when moving apiaries

**SHB observed outside hives**

- In watermelon skins in December (not substantiated by laboratory identification)

# APPENDIX 1

## SURVEY FORMS 1 AND 2 MAILED TO BEEKEEPERS.

NSW Department of Primary Industries, Calala, NSW, 2340.

### Form 1 – Beekeeper Information

No. \_\_\_\_\_

Date \_\_\_\_\_

1. Number of hives managed during 2005-6. tick the appropriate box.

50-199	
200-499	
500-699	
700-999	
1000-1499	
More than 1500	

2. Tick the Districts where you have apiary sites. Name other areas in NSW where you have apiary sites by providing the name of the nearest major town. Use the district number to identify apiary site areas when answering questions in Form 2.

District Number	Tick	District Number	Tick
1		11	
Sydney Basin		Riverina	
2		12	
Central Tablelands		South`n Tablelands	
3		13	
Hunter Valley		Illawarra	
4		14	
Manning GR/Lakes		South Coast	
5		15	
Mid North Coast		Monaro	
6		16	
North Coast			
7		17	
North`n tablelands			
8		18	
NW Slopes/Plains			
9		19	
Western Plains			
10		20	
SW Slopes			

3. How many times, on average, would you move your apiaries each year \_\_\_\_\_

4. Your name and address are NOT required but you may provide them if you wish. All information provided is confidential.

Name \_\_\_\_\_ Address \_\_\_\_\_

**Form 2 – Small Hive Beetle Survey**

No. \_\_\_\_\_

1. Have you seen adult or larval stages of the SHB in your hives, honey house or other premises. Tick one box for each year.

	2002	2003	2004	2005	2006
Yes					
No					

If you have NOT seen SHB in your beekeeping business, stop here and RETURN the form in the envelope supplied. If you HAVE seen SHB, continue with the following questions.

2. Where is damage from SHB larvae occurring –

Honey house/shed	%
Bee yard	%

3. Estimate the average number of adult SHB seen in your hives. Place the District numbers where the beetles were seen (from Form 1) in the appropriate box for each year.

Number of SHB	District Number(s)				
	2002	2003	2004	2005	2006
0-10					
11-20					
21-30					
31-40					
41-50					
51-100					
101-200					
> 200					

4. What strengths of hives died out after being infested with SHB. Put the NUMBER of hives that died out in each box for each year.

	Nucleus	Weak single	Strong single	Weak double	Strong double	Triples
2002						
2003						
2004						
2005						
2006						

5. Provide information on hives that you consider died out as a result of SHB infestation. Use District numbers from Form 1.

District Number	Number of hives	Estimated \$ value



6. Provide information on honey (in frames and extracted) and hive materials (frames, boxes etc) that you have destroyed after being infested with SHB. Determine replacement costs based on hives/materials of similar quality and value. Use District numbers from Form 1.

District Number	Estimated \$ value

7. Estimate the INCREASED costs of production for your business to manage SHB for the season 2005-6.

District Number	Travel costs \$	Chemical costs \$	Labour costs hours	Other Management Costs* \$

\* Include running costs for cold rooms/freezers, and costs associated with management practices you now use but did not use prior to SHB

8. Tick the Management Plan you have in place to manage SHB in your apiaries, honey house and other premises (see key at bottom of Table).

	Tick if used	Success rating* (circle effect)		
Cold room		H	M	L
Freezer room		H	M	L
Chemical fumigation of hive materials		H	M	L
Soil treatment in front of hives		H	M	L
In-hive non-pesticide traps eg oil traps		H	M	L
Reduced hive manipulations during humid weather		H	M	L
Reduced number of frames in supers eg 8 frames in 10 frame super		H	M	L
Other (please specify) -		H	M	L
		H	M	L
		H	M	L
		H	M	L
		H	M	L
		H	M	L
		H	M	L

\* H = high, M = medium, L = low

9. In what month(s) are larval stages of the SHB causing damage.

District Number	Apiary	Honey house/shed

10. If an in-hive adult SHB control device using pesticide as the control agent became available to beekeepers, would you use the device in your hives (Circle)

**YES / NO**

What number of your hives were infested with SHB during 2005-6 \_\_\_\_\_

11. Other comments.

---

---

---

---

---

---

---

---