

## **5 Weeds of southern Australian pastures**

This chapter reports on the general results found through the postal survey. The objectives of chapter 5 were to: 1) provide an understanding of the geographic, production and demographic characteristics of the respondents in the postal survey; 2) identify producer perceptions of the most important pastures weed species; and 3) identify the most prevalent weed species in each of four functional weed groups (annual and perennial, grasses and broadleaf species) for further examination in chapter 6.

## **5.1 CHARACTERISTICS OF RESPONDENTS**

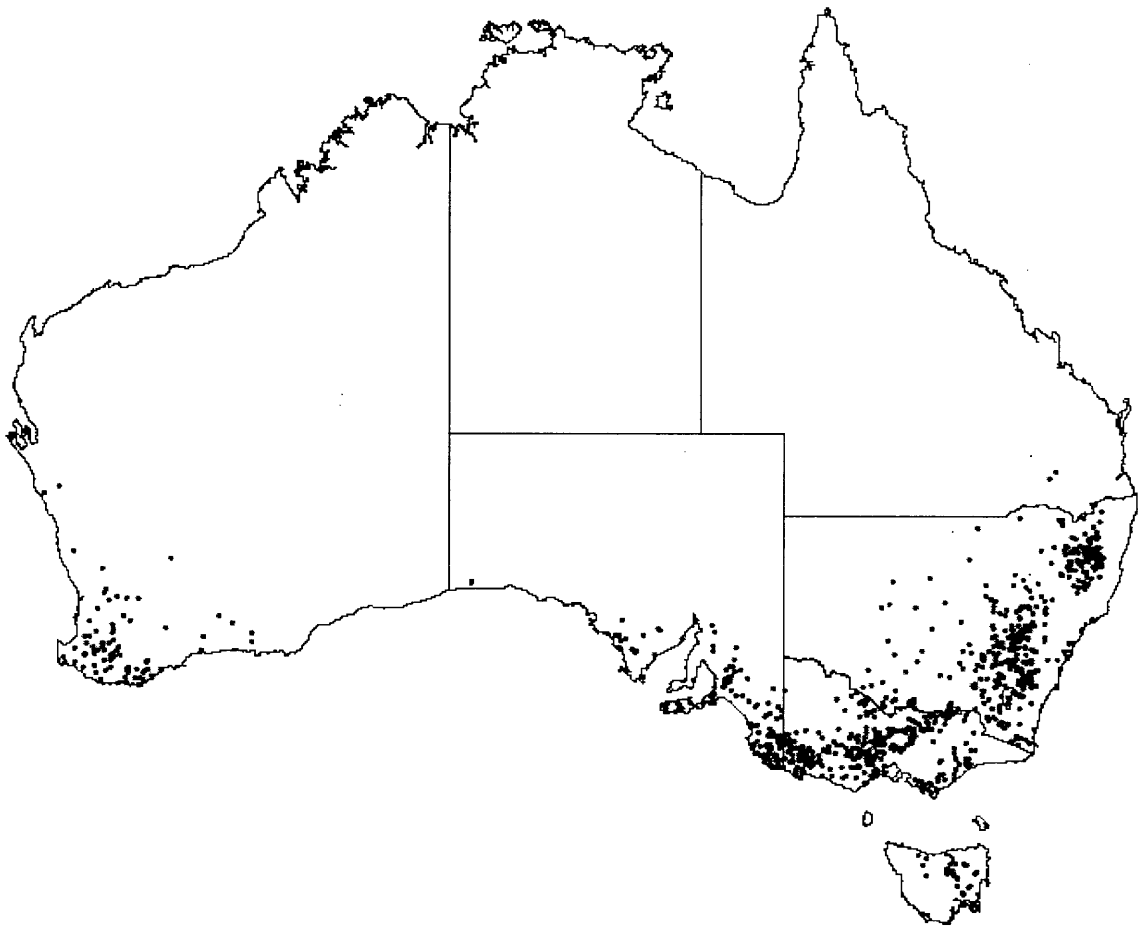
### **RESPONSE RATE**

The response rate to the survey was 13.4%. A total of 934 useable surveys were returned. The response rate did not include any adjustment for questionnaires that were returned to sender or sent to recipients who were not agricultural producers. The “returned to sender letters” were addressed to the commercial data base provider so no accurate numbers for these were obtained. Pilot studies using telephone books as sources for names and addresses had led us to believe that a response rate of around 20% was likely for the survey. The lower than expected response rate is most likely explained by the quality of the data base of producers used which was less than satisfactory. Despite this lower than anticipated response rate an extensive sample of the population of graziers in Southern Australia was obtained from which some remarkable observations have been made and important issues identified.

### **DISTRIBUTION OF RESPONDENTS**

Respondents were predominantly distributed across the eastern inland (non coastal) areas of New South Wales, throughout Victoria (excluding the north western districts), south eastern South Australia, south western Western Australia and Northern Tasmania as shown in Figure 5.1. These areas were identified as prominent sheep meat and particularly prime lamb

production areas and were targeted in the distribution of the survey mail out. Respondents were drawn from 35 IBRA regions of Australia (Table 5.1). The greatest proportion of respondents was found in the southern pasture zone and the next greatest the western pasture zone. The northern, central and Western Australian pasture zones held the balance of respondents (Table 5.1).



**Figure 5.1 Distribution of respondents to postal survey.**

**Table 5.1 The pasture zones, IBRA bioregions and number of respondents found in each.**

Pasture zone	IBRA bioregion	Number of respondents	%
Central	Australian Alps	3	0.3
	South East Corner	12	1.3
	South Eastern Highlands	127	13.6
	Total	142	15.2
Northern	Nandewar	13	1.4
	New England Tablelands	86	9.2
	NSW North Coast	2	0.2
	Sydney Basin	3	0.3
	Total	104	11.1
Southern	Ben Lomond	3	0.3
	Flinders	2	0.2
	Kanmantoo	35	3.7
	Naracoorte Coastal Plain	84	9.0
	South Eastern Coastal Plain	13	1.4
	South Eastern Highlands	20	2.1
	Tasmanian Central Highlands	3	0.3
	Tasmanian Northern Slopes	3	0.3
	Tasmanian Northern Midlands	13	1.4
	Tasmanian South East	6	0.6
	Victorian Midlands	116	12.4
	Victorian Volcanic Plain	56	6.0
	Total	354	37.9
Western	Brigalow Belt South	19	2.0
	Cobar Peneplain	8	0.9
	Darling Riverine Plains	4	0.4
	Eyre York Block	20	2.1
	Flinders Lofty Block	13	1.4
	Murray Darling Depression	28	3.0
	NSW south Western Slopes	86	9.2
	Riverina	63	6.7
	Total	241	25.8
Western Australia	Avon Wheatbelt	15	1.6
	Coolgardie	1	0.1
	Esperance Plains	18	1.9
	Geraldton Sandplains	3	0.3
	Jarrah Forest	39	4.2
	Mallee	5	0.5
	Swan Coastal Plain	2	0.2
	Warren	7	0.7
	Total	90	9.6
Unknown		3	0.3
<b>TOTAL</b>		<b>934</b>	<b>100.0</b>

## INDUSTRY CLASSIFICATION

The greatest proportion of respondents was found to fall into the ANZSIC category of sheep/beef cattle farming. Grain-sheep/beef cattle farming was the next most commonly reported industry category with sheep only and beef only farmers following (Table 5.2).

**Table 5.2 The number of respondents falling within each ANZSIC category.**

ANZSIC	Number of respondents	Proportion of respondents (%)
Beef cattle farming	90	9.6
Grain-sheep/beef cattle farming	292	31.3
Sheep beef cattle farming	361	38.7
Sheep farming	176	18.8
Unclassified	15	1.6
Grand Total	934	100.0

## PROPORTION OF THE POPULATION SURVEYED

The respondent numbers were compared with the population estimates made available by the Australian Bureau of Statistics (ABS) from the 2003-2004 Agricultural Survey (Australian Bureau of Statistics 2005a). The results suggest that a larger proportion of the sheep beef cattle farmers in NSW, SA and Victoria were surveyed than other states and enterprises (Table 5.3). There may be some discrepancy between the way the ABS categorises producers and that undertaken in this survey, so that these individual enterprise and state results need to be treated with some caution. However, the overall figures for all states are considered to be reasonably accurate. The results would suggest that the survey covered 1.3% of producers involved in beef, grain-sheep/beef, sheep/beef and sheep farming in Australia. Removing the large number of respondents that were not surveyed from Queensland increases this to 1.6% and a greater percentage would be achieved if other areas not targeted for the survey (e.g. coastal NSW, dominated by beef production) were to be excluded. It is reasonable to estimate that the survey has gathered information from somewhere between 1 and 3% of southern Australian graziers.

**Table 5.3 Respondent numbers and population estimates.**

State	ANZSIC	Number surveyed	Population <sup>1</sup>	Proportion of population surveyed (%)
NSW	Beef cattle farming	45	11,626	0.4
	Grain-sheep/beef cattle farming	83	6,983	1.2
	Sheep beef cattle farming	165	5,084	3.2
	Sheep farming	65	3,719	1.7
	Unclassified	9	0	
	Total	367	27,412	1.3
QLD	Beef cattle farming	0	11,505	0.0
	Grain-sheep/beef cattle farming	0	1,409	0.0
	Sheep beef cattle farming	2	274	0.7
	Sheep farming	0	745	0.0
	Unclassified	0	0	
	Total	2	13,933	0.0
SA	Beef cattle farming	9	1,248	0.7
	Grain-sheep/beef cattle farming	58	2,271	2.6
	Sheep beef cattle farming	59	1,406	4.2
	Sheep farming	18	910	2.0
	Unclassified	1	0	
	Total	145	5,835	2.5
TAS	Beef cattle farming	1	1,154	0.1
	Grain-sheep/beef cattle farming	21	64	32.8
	Sheep beef cattle farming	7	583	1.2
	Sheep farming	1	318	0.3
	Unclassified	0	0	
	Total	30	2,119	1.4
VIC	Beef cattle farming	21	7,809	0.3
	Grain-sheep/beef cattle farming	90	2,796	3.2
	Sheep beef cattle farming	116	3,402	3.4
	Sheep farming	66	2,368	2.8
	Unclassified	4	0	
	Total	297	16,375	1.8
WA	Beef cattle farming	14	1,930	0.7
	Grain-sheep/beef cattle farming	39	2,783	1.4
	Sheep beef cattle farming	12	1,241	1.0

State	ANZSIC	Number surveyed	Population <sup>1</sup>	Proportion of population surveyed (%)
Unclassified	Sheep farming	25	460	5.4
	unclassified	0	0	
	Total	90	6,414	1.4
	Beef cattle farming	0	0	
	Grain-sheep/beef cattle farming	1	0	
	Sheep beef cattle farming	0	0	
	Sheep farming unclassified	1	0	
	Total	3	0	
	TOTAL	934	72,088	1.3

<sup>1</sup> Population estimates from ABS 2003-2004 Agricultural Survey (Australian Bureau of Statistics 2005a)

### PHYSICAL ATTRIBUTES OF RESPONDENT PROPERTIES

The property size distribution of respondents was compared with the population estimates available in the Australian Bureau of Statistics 2003-2004 Agricultural Survey (Australian Bureau of Statistics 2005a). The most commonly reported property size of respondents within the ANZSIC category of beef cattle farming category was 100-499 hectares. The comparison with the distribution of the population is made difficult due to the low numbers. Despite this, the distributions do appear reasonably similar. Respondents from the grain-sheep/beef cattle farming category showed a reasonable similarity in their property size distribution to the population figures (Table 5.4). The majority of grain-sheep/beef cattle farmers had properties between 100 and 2,499 hectares. The sheep/beef cattle farmers showed some departure from the property size distributions. It appears that a greater proportion of respondents with mid – range property sizes (between 100 and 2,499 hectares) were surveyed. A large proportion of very small properties (less than 49 hectares) were also surveyed. Overall, the respondents reporting sheep farming appear to have smaller properties than the population.

Of all respondents it is clear that the greatest proportion are on properties between 100 and 2,499 hectares. Despite some minor differences in the distribution of respondents amongst the ANZSIC categories it is reasonable to assume that the majority of respondents are from genuine agricultural operations and represent the majority of properties involved in these industries in Australia.

**Table 5.4 Survey respondent numbers across ANZSIC categories and property size.**

ANZSIC	Property size (Ha)	Respondent numbers	Population numbers <sup>1</sup>	Proportion of population surveyed (%)
Beef cattle farming	0-49	8	4694	0.2
	50-99	7	5484	0.1
	100-499	49	13496	0.4
	500-999	15	3789	0.4
	1,000-2,499	6	3144	0.2
	2,500-24,999	5	3639	0.1
	25,000-99,999	0	700	0.0
	100,000-199,999	0	173	0.0
	200,000-499,999	0	282	0.0
	>500,000	0	98	0.0
	Total	90	35499	0.3
Grain-sheep/beef cattle farming	0-49	6	237	2.5
	50-99	7	312	2.2
	100-499	84	3961	2.1
	500-999	65	3973	1.6
	1,000-2,499	82	5081	1.6
	2,500-24,999	44	2654	1.7
	25,000-99,999	1	81	1.2
	100,000-199,999	0	7	0.0
	200,000-499,999	0	2	0.0
	>500,000	0	0	
	Unclassified	3	0	
	Total	292	16308	1.8
Sheep beef cattle farming	0-49	11	145	7.6
	50-99	12	542	2.2
	100-499	126	2815	4.5
	500-999	101	1879	5.4
	1,000-2,499	82	1672	4.9
	2,500-24,999	27	1196	2.3
	25,000-99,999	0	237	0.0
	100,000-199,999	1	32	3.1
	200,000-499,999	0	19	0.0



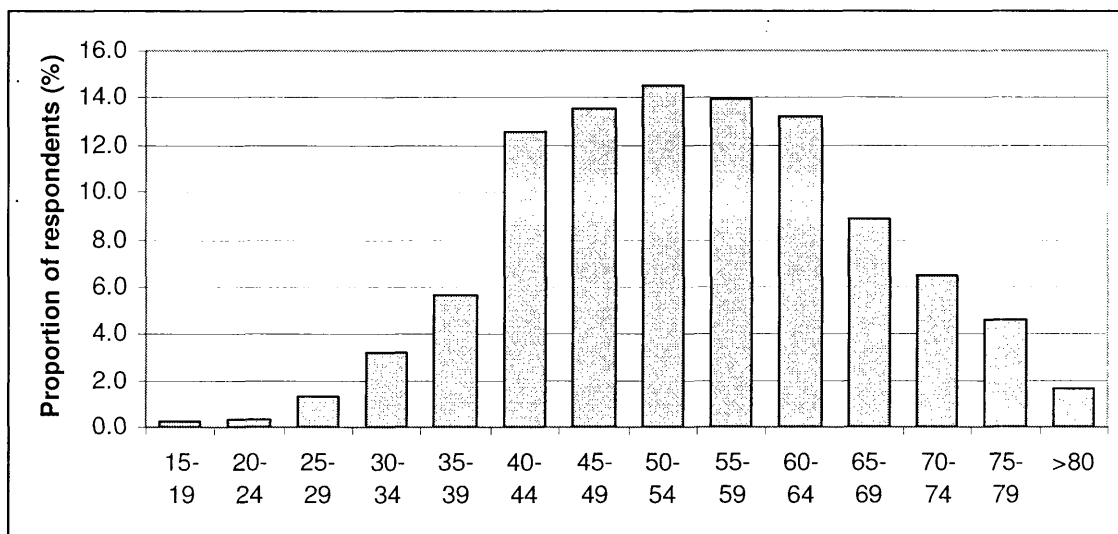
ANZSIC	Property size (Ha)	Respondent numbers	Population numbers <sup>1</sup>	Proportion of population surveyed (%)
	>500,000	0	4	0.0
	Unclassified	1	0	
	Total	361	8541	4.2
Sheep farming	0-49	19	757	2.5
	50-99	12	599	2.0
	100-499	83	5021	1.7
	500-999	35	2292	1.5
	1,000-2,499	21	1652	1.3
	2,500-24,999	6	1220	0.5
	25,000-99,999	0	344	0.0
	100,000-199,999	0	77	0.0
	200,000-499,999	0	51	0.0
	>500,000	0	5	0.0
	Unclassified	0	0	
	Total	176	12018	1.5
Unclassified	0-49	6	0	
	50-99	3	0	
	100-499	2	0	
	500-999	1	0	
	1,000-2,499	0	0	
	2,500-24,999	1	0	
	25,000-99,999	0	0	
	100,000-199,999	0	0	
	200,000-499,999	0	0	
	>500,000	0	0	
	Unclassified	2	0	
	Total	15	0	
All respondents	0-49	50	5833	0.9
	50-99	41	6937	0.6
	100-499	344	25293	1.4
	500-999	217	11933	1.8
	1,000-2,499	191	11549	1.7
	2,500-24,999	83	8709	1.0
	25,000-99,999	1	1362	0.1
	100,000-199,999	1	289	0.3
	200,000-499,999	0	354	0.0
	>500,000	0	107	0.0
	Unclassified	6	0	
	TOTAL	934	72366	1.3

<sup>1</sup> Population estimates from ABS 2003-2004 Agricultural Survey (Australian Bureau of Statistics 2005a)

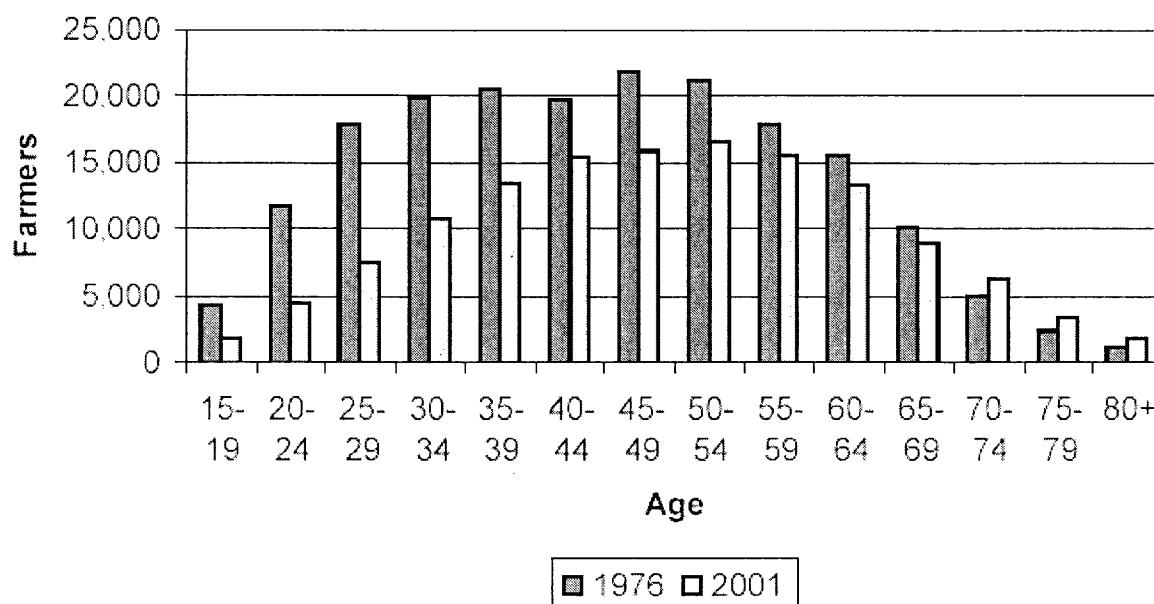
## SOCIAL CHARACTERISTICS OF RESPONDENTS

### AGE DISTRIBUTION OF RESPONDENTS

The age distribution of respondents is shown in Figure 5.2. Although formal comparison have not been made the respondents in this survey show a similar distribution to the Australian farmer population estimates for 2001 (Figure 5.3). The bulk of respondents are aged between 40 and 69 years. The median age of all Australian farmers was 50 in 2001 (Barr *et al.* 2005). The median age of the respondents to this survey was 54 suggesting that respondents may be slightly older than the general population or that the median age has continued to increase since 2001. The median age of farmers is also across all farm sectors whilst this study reports predominantly on the grazing industries.



**Figure 5.2** The age distribution of respondents to the survey



**Figure 5.3 Age distribution of Australian farmers from Barr *et al.* 2005**

#### ***YEARS OF MANAGEMENT OF PROPERTIES***

Survey respondents answered a question on their time spent as manager of the property on which they were reporting. The results shown in Table 5.5 indicate that 91.1% of respondents have been managing their property for more than 5 years. This is important as it suggests that most producers will have a relatively good understanding of their farms and are able to accurately report their perceptions of the seasonal effects and trends of weeds on their property for at least the last five years. When a summation of all the years of property management was undertaken it was found that a total of 21,388 years of experience was harvested in the survey.

**Table 5.5 Period of time that respondents have been managing properties on which they reported.**

Years managing property reported on	Number of respondents	Proportion of respondents (%)
<5	63	6.7
5-9	82	8.8
10-19	221	23.7
20-29	228	24.4
30-39	163	17.5
40-49	106	11.3
50-59	42	4.5
>60	8	0.9
Unknown	21	2.2
Total	934	100.0

## CONCLUSIONS

The general characteristics of the respondents reviewed suggests that a robust sample of the population of graziers from southern Australia was obtained. The sample includes producers from a range grazing of districts throughout southern Australia. Producers are included from all major grazing industries and the farm physical characteristics and demographic characteristics appear representative of the general population.

However, the fact these respondents have taken the time to complete and return the survey form does suggest that they are different in some respects to the general population. It is a well known fact that survey recipients with an interest in the subject of the questionnaire are more likely to respond (Dillman 1978). This suggests that the respondents to this survey are more likely to be interested in weed issues. In some research this may be of concern as the sample is not representative of the population. However, in this study it is less important. This project has focussed on determining the best management practices for weeds and the challenges that producers face in implementing them and it is likely that those producers with

a keen interest in weed issues are more likely to hold this desired information. Despite this possible benefit, it is important to note that these respondents may differ from the general grazing population.

## **5.2 WEEDS OF RESPONDENTS**

### **WEEDS OF ALL RESPONDENTS**

The most commonly reported weeds of all respondents are recorded in Table 5.6. This table shows that there were 107 weed species that were reported by more than 0.5% (5) respondents to the survey. The complete list of weed species reported by respondents includes an estimated 328 species. This is more than double the 119 species listed as relevant to Australian grazing lands in the Weed CRC and MLA report on weeds of significance to the grazing industries of Australia (Grice 2002). Whilst many of the weeds recorded in this survey were only reported by a few respondents, it is worth noting the large number of plants that graziers have suggested as undesirable species.

Broadleaf weeds made up more than half of the top twenty most frequently reported species. Sixteen of the top twenty weeds reported were dicotyledonous species, with the majority of these being annual broad leaf weeds. Only two of these top twenty weeds were annual grasses and only one is a perennial grass (Table 5.6).

Amongst the top five most commonly reported species, capeweed and Paterson's curse were the most commonly reported species. Whilst capeweed was reported by more respondents, Paterson's curse was reported as an increasing problem by over 40% of graziers. Barley grass was reported by just under 30% of respondents with the majority (56.7%) suggesting that this weed had been a stable problem. Saffron thistle was also reported by just under 30% of

respondents. Blackberry was reported by 26.1% of respondents, with only a small proportion of these (15.6%) considering it an increasing problem.

The Weed CRC and MLA report on weeds of significance to the grazing industries of Australia (WSGIA) (Grice 2002) reported on the results of a focus group meeting of 18 leading pasture weed researchers. This report provides a valuable point of comparison between what researchers consider to be the most important weeds to grazing industry and the producer perceptions obtained through this survey. Four of the top five most commonly reported weeds from this survey (capeweed, Paterson's curse, blackberry and saffron thistle) were included in the 48 weeds of greatest significance named in the WSGIA report. Barley grass, the one exception was identified as an annual grass in the WSGIA report with this functional group included in the top 48 species.

Within the top twenty most commonly reported weed species in this survey there were six species which were reported as an increasing problem by more than 25% of respondents reporting their occurrence (Table 5.6). These were Paterson's curse, vulpia, St John's wort, wild radish, saffron thistle and serrated tussock. These six weeds represent the most commonly increasing weed species amongst respondents. Paterson's curse, St John's wort, wild radish and serrated tussock are listed amongst the top 48 weeds of greatest significance in the WSGIA report. Like barley grass, vulpia is identified as an annual grass.

Within the top twenty weeds there were three species with more than 40% of respondents reporting them as a decreasing problem. These were blackberry, Bathurst burr and bracken fern. These three weeds represent the most commonly decreasing weeds species amongst respondents. However, their high level of reported occurrence corresponds with their listing as weeds of greatest significance in the WSGIA report. It may be that despite many

respondents suggesting them as a decreasing problem they have the potential to cause losses if left uncontrolled.

Of particular interest are the weed species which although not commonly occurring are an increasing problem for those respondents which have reported them. Three of the top four weeds to be reported as increasing problems are perennial grass species. Coolatai grass was considered to be an increasing problem by 71.4% of respondents reporting it; Chilean needle grass was regarded as an increasing problem by 70.0% of respondents with this weed; and *Sporobolus* spp. were recorded as increasing by 62.5% of respondents. All three of these perennial grass weeds are identified as amongst the top 48 weeds of greatest significance in the WSGIA report. Chilean needle grass was classified as a recently emerged weed with the potential to become highly significant for the grazing industry (Grice 2002).

The weed most commonly reported as increasing was Viper's bugloss (83.3%), a species closely related to Paterson's curse. Viper's bugloss was not reported amongst the 119 weeds of importance to the grazing industry identified in the WSGIA report despite being reported as a weed of pastures by graziers in the past (McGufficke 1996; Dellow *et al.* 2002).

Other increasing problems include mallows (56.3%), stemless thistle (53.8%), cassinia (50.0%), tea tree (55.6%), willows (50.0%), Afghan thistle (57.1%) and fireweed (50.0%). It is worth noting that three of these species- cassinia, tea tree and willows- are woody perennials. Mallows, stemless thistle, Afghan thistle and fireweed are amongst the 119 weeds of significance to the grazing industry, however none are specifically mentioned amongst the 48 weeds of greatest significance. Tea tree, cassinia and willows are not recorded amongst the 119 weeds of significance.

**Table 5.6 The most commonly reported weeds of all respondents (reported occurrence greater than 0.5%) n=934.**

Species	Common names	Occurrence (%)	Decreasing (%)	Stable (%)	Increasing (%)	Unknown (%)
<i>Arctotheca calendula</i>	Capeweed	40.8	20.7	52.8	21.8	0.0
<i>Echium plantagineum</i>	Paterson's curse	34.9	27.3	28.2	40.2	0.3
<i>Hordeum</i> spp.	Barley grass	28.9	15.9	56.7	21.5	0.0
<i>Carthamus lanatus</i>	Saffron thistle	28.4	23.8	44.9	27.9	0.0
<i>Rubus fruticosus</i>	Blackberry	26.1	45.5	36.5	15.6	0.0
<i>Onopordum</i> spp. <sup>1</sup>	Scotch thistle, Illyrian thistle, Onopordum Thistle, Cotton thistle, Blue thistle	25.8	23.7	48.1	22.4	0.0
<i>Xanthium spinosum</i>	Bathurst burr	24.4	40.8	40.4	11.4	0.0
<i>Vulpia</i> spp.	Silver grass, Rats tail fescue, Vulpia	23.1	21.8	44.0	31.0	0.0
Thistles (generic conglomeration)	Thistles	22.7	30.7	51.9	13.7	0.0
<i>Marrubium vulgare</i>	Horehound	18.0	38.1	39.9	15.5	0.0
<i>Silybum marianum</i> L.	Variegated thistle, Cabbage thistle	16.4	36.6	44.4	13.7	0.0
<i>Rumex</i> spp. (docks)	Dock, Curled dock	16.3	23.7	49.3	22.4	0.0
<i>Nassella trichotoma</i>	Serrated tussock, Tussock, Yass river tussock	14.6	30.1	41.2	27.9	0.0
<i>Hypericum perforatum</i>	St John's wort	13.2	28.5	37.4	30.1	0.0
<i>Cirsium vulgare</i> <sup>1</sup>	Black thistle, Spear thistle, Scotch thistle	12.8	20.8	56.7	19.2	0.0
<i>Raphanus raphanistrum</i>	Wild radish, charlock	11.3	17.9	44.3	34.9	0.0
<i>Erodium</i> spp.	Erodium, Crows foot, Storksbill, Corkscrew	10.3	17.7	61.5	16.7	0.0
<i>Pteridium esculentum</i>	Bracken fern	9.9	43.5	33.7	15.2	0.0
<i>Carduus pycnocephalus</i> and <i>tenuiflorus</i>	Slender thistle, Shore thistle	9.9	27.2	47.8	22.8	0.0
<i>Rumex acetosella</i>	Sorrel	9.9	39.1	41.3	16.3	0.0
<i>Rosa rubiginosa</i>	Sweet briar, Briar rose, Briars	9.5	53.9	36.0	6.7	0.0
<i>Citrullus</i> spp.	Paddy melons, Melon, Camel melon, Afghan melon	8.9	22.9	50.6	21.7	0.0
<i>Carduus nutans</i>	Nodding thistle	8.1	22.4	34.2	40.8	0.0



## 5 Weeds of southern Australian pastures

Species	Common names	Occurrence (%)	Decreasing (%)	Stable (%)	Increasing (%)	Unknown (%)
<i>Agrostis capillaris</i>	Bent grass, brown top bent grass	7.3	25.0	30.9	41.2	0.0
<i>Emex australis</i>	Cat head, three corner jack, spiny emex	7.2	7.5	43.3	47.8	0.0
<i>Lolium rigidum</i>	Annual ryegrass	6.9	20.3	43.8	32.8	0.0
<i>Juncus</i> spp.	Rushs, Pin rush, Toad rush	6.6	21.0	40.3	27.4	0.0
<i>Heliotropium</i> spp.	Heliotrope, Blue heliotrope	6.4	20.0	36.7	36.7	0.0
<i>Eragrostis curvula</i>	African lovegrass	6.3	22.0	35.6	42.4	0.0
<i>Holcus</i> spp.	Yorkshire fog, Fog grass	6.1	35.1	36.8	19.3	0.0
<i>Bromus</i> spp	Brome grass, Soft brome, Rip gut brome	5.9	25.5	38.2	30.9	0.0
<i>Ulex europaeus</i>	Gorse	5.9	43.6	34.5	18.2	0.0
<i>Cynodon dactylon</i>	Couch grass	5.7	17.0	37.7	39.6	0.0
<i>Asphodelus fistulosus</i>	Onion weed	5.7	37.7	35.8	18.9	0.0
<i>Avena</i> spp.	Wild oats	5.2	26.5	55.1	12.2	0.0
<i>Geranium</i> spp	Geranium	5.0	19.1	57.4	21.3	0.0
<i>Polygonum aviculare</i>	Wireweed, hogweed	4.8	20.0	57.8	17.8	0.0
<i>Brassica rapa</i>	Wild turnip	4.7	22.7	40.9	29.5	0.0
<i>Solanum elaeagnifolium</i>	Silverleaf nightshade, Deadly nightshade	4.4	22.0	43.9	34.1	0.0
<i>Tribulus terrestris</i>	Caltrop, Yellow vine	4.0	16.2	32.4	48.6	0.0
<i>Homeria</i> spp.	Cape tulip	3.7	37.1	34.3	20.0	0.0
<i>Chondrilla juncea</i>	Skeleton weed	3.7	31.4	45.7	17.1	0.0
<i>Stipa</i> spp.	Spear grass	3.4	28.1	56.3	12.5	0.0
<i>Romulea rosea</i>	Onion grass, Guildford grass	3.3	29.0	54.8	12.9	0.0
Tussock grass	Tussock grass	3.2	30.0	50.0	13.3	0.0
<i>Lycium ferocissimum</i>	African boxthorn, Boxthorn	2.8	50.0	23.1	26.9	0.0
<i>Urtica</i> spp.	Stinging nettle	2.8	26.9	42.3	23.1	0.0
<i>Centaurea calcitrapa</i>	Star thistle	2.7	36.0	24.0	32.0	0.0
<i>Chenopodium album</i>	Fat hen	2.4	31.8	54.5	13.6	0.0
<i>Taraxacum officinale</i>	Dandelion	2.2	4.8	61.9	33.3	0.0
<i>Juncus acutus</i>	Spiny rush	2.2	47.6	14.3	38.1	0.0
<i>Cassinia</i> spp.	Cassinia, Chinese scrub, Dog wood, Sifton bush, Biddy bush	2.1	20.0	30.0	50.0	0.0
<i>Nassella neesiana</i>	Chilean needle grass, Needle grass	2.1	20.0	0.0	70.0	5.0
<i>Alternanthera pungens</i>	Khaki weed	2.1	20.0	35.0	40.0	0.0
<i>Galinsoga parviflora</i>	Potato weed	2.1	10.0	60.0	30.0	0.0

## 5 Weeds of southern Australian pastures

Species	Common names	Occurrence (%)	Decreasing (%)	Stable (%)	Increasing (%)	Unknown (%)
<i>Sinapis arvensis</i>	Wild mustard, charlock	2.1	25.0	40.0	30.0	0.0
<i>Typha</i> spp.	Bulrush, Cumbungi	2.0	15.8	31.6	42.1	0.0
<i>Sclerolaena birchii</i>	Galvanised burr	1.8	11.8	29.4	47.1	0.0
<i>Senecio jacobaea</i>	Ragwort	1.8	52.9	17.6	29.4	0.0
<i>Malva parviflora</i>	Mallow, Marshmallow	1.7	12.5	31.3	56.3	0.0
<i>Soliva pterosperma</i>	Bindii	1.6	20.0	33.3	40.0	0.0
<i>Xanthium occidentale</i>	Noogoora burr	1.5	28.6	28.6	28.6	0.0
<i>Mentha pulegium</i>	Pennyroyal	1.5	21.4	35.7	42.9	0.0
<i>Oxalis</i> spp.	Oxalis, soursob	1.4	23.1	46.2	23.1	0.0
<i>Onopordum acaulon</i>	Stemless thistle	1.4	23.1	23.1	53.8	0.0
<i>Amsinckia</i> spp.	Amsinckia, Yellow burr weed	1.3	25.0	58.3	8.3	0.0
Family	Devils claw	1.3	25.0	50.0	16.7	0.0
Martyniaceae						
<i>Salvia reflexa</i>	Mint weed	1.3	25.0	50.0	25.0	0.0
<i>Capsella bursa-pastoris</i>	Shepherd's purse	1.3	0.0	58.3	41.7	0.0
<i>Centaurea solstitialis</i>	St Barnaby's thistle	1.3	25.0	58.3	16.7	0.0
Annual grasses (generic conglomeration)	Annual grasses	1.2	36.4	36.4	18.2	0.0
<i>Eucalyptus</i> spp.	Eucalyptus trees	1.2	18.2	36.4	36.4	0.0
<i>Pennisetum</i> spp. (foxtail grasses) <sup>2</sup>	Swamp foxtail, Foxtail grass, Fox tail fescue	1.2	9.1	27.3	54.5	0.0
<i>Cynara cardunculus</i>	Artichoke thistle	1.1	30.0	20.0	40.0	0.0
<i>Hypochoeris radicata</i>	Flatweed	1.1	20.0	60.0	20.0	0.0
<i>Opuntia aurantiaca</i>	Prickly pear	1.1	40.0	40.0	0.0	0.0
<i>Phragmites australis</i>	Reeds	1.1	30.0	10.0	40.0	0.0
<i>Verbascum thapsus</i>	Aaron's rod, Great mullein	1.0	22.2	33.3	44.4	0.0
<i>Bidens pilosa</i>	Farmers friend, sticky beak, Devil's pitch fork	1.0	0.0	55.6	44.4	0.0
<i>Poa</i> spp.	Poa tussock	1.0	11.1	66.7	22.2	0.0
<i>Leptospermum</i> spp.	Tea tree	1.0	11.1	33.3	55.6	0.0
<i>Cyperus rotundus</i>	Nut grass	0.9	0.0	37.5	37.5	0.0
<i>Sporobolus</i> spp.	Parramatta grass, Slender rat's tail grass	0.9	0.0	37.5	62.5	0.0
<i>Salix</i> spp.	Willow trees	0.9	12.5	25.0	50.0	0.0

## 5 Weeds of southern Australian pastures

Species	Common names	Occurrence (%)	Decreasing (%)	Stable (%)	Increasing (%)	Unknown (%)
<i>Poa annua</i>	Winter grass	0.9	0.0	62.5	12.5	0.0
<i>Aristida ramosa</i>	Wiregrass	0.9	25.0	62.5	12.5	0.0
<i>Solanum hoplopetalum</i>	Afghan thistle	0.7	14.3	28.6	57.1	0.0
<i>Bursari spinosa</i>	Blackthorn	0.7	57.1	14.3	28.6	0.0
<i>Cytisus scoparius</i>	Broom	0.7	28.6	57.1	14.3	0.0
<i>Hypparhenia hirta</i>	Coolatai grass	0.7	14.3	0.0	71.4	0.0
<i>Euphorbia terracina</i>	False caper	0.7	28.6	42.9	28.6	0.0
<i>Scolymus hispanicus</i>	Golden thistle	0.7	14.3	57.1	14.3	0.0
<i>Crataegus</i> spp.	Hawthorn	0.7	14.3	57.1	14.3	0.0
<i>Tagetes minuta</i>	Stinking Roger	0.7	28.6	57.1	14.3	0.0
<i>Solanum hermannii</i>	Apple of Sodom	0.6	16.7	50.0	33.3	0.0
<i>Ricinus communis</i>	Castor oil plant	0.6	16.7	66.7	0.0	0.0
<i>Pteridophytes</i> spp.	Fern	0.6	66.7	0.0	0.0	0.0
<i>Senecio madagascariensis</i>	Fireweed	0.6	0.0	33.3	50.0	16.7
<i>Cenchrus longispinus</i>	Innocent weed	0.6	16.7	50.0	33.3	0.0
<i>Diplotaxis tenuifloris</i>	Lincoln weed, Sand rocket	0.6	16.7	83.3	0.0	0.0
<i>Argemone ochroleuca</i>	Mexican poppy	0.6	16.7	50.0	16.7	0.0
<i>Phalaris</i> spp.	Phalaris	0.6	16.7	33.3	50.0	0.0
<i>Cenchrus</i> spp.	Spiny burr grass	0.6	33.3	16.7	50.0	0.0
<i>Dittrichia graveolens</i>	Stinkwort	0.6	50.0	50.0	0.0	0.0
<i>Datura</i> spp.	Thornapple	0.6	33.3	66.7	0.0	0.0
<i>Echium vulgare</i>	Viper's bugloss	0.6	0.0	16.7	83.3	0.0

<sup>1</sup> Results should be treated with caution due to confusion between the reporting of the common name “scotch thistle” to represent both *Onopordum* spp. and *Cirsium vulgare*. As a result *Onopordum* spp. is most likely over-reported whilst *Cirsium vulgare* is under-reported.

<sup>2</sup> Results should be treated with caution due to confusion of common names “swamp foxtail” and “foxtail grass”.

## **REGIONAL DIVERSITY IN WEEDS**

The pasture zones developed in chapter 3 (Geographical classification, page 52) were used to examine the regional differences in weed species. The most commonly reported weeds in each pasture zone are now discussed.

### ***NORTHERN PASTURE ZONE***

The weeds reported by respondents from the northern pasture zone are shown in Table 5.7. Blackberry was the most commonly reported, however the majority of respondents (56.5%) considered it a decreasing problem with few (4.3%) reporting it as increasing. Its high rate of reported occurrence in association with a low rate of producers reporting it increasing may suggest that whilst control attempts are successful this weed remains a potential threat. Similar results were found for Bathurst burr and sweet briar with a large number of respondents reporting them but few as an increasing problem. The grass weeds vulpia and African lovegrass are commonly reported as increasing problems. Additionally, Chilean needle grass and Coolatai grass were proving to be increasing problems for some producers. It would appear that whilst not common, the perennial grass weeds are a real threat to the grazing industry in the Northern pasture zone. The results from this survey agree largely with those of Sindel (1996) with the most troublesome weeds from the Tablelands of northern New South Wales reported in order as saffron thistle, blackberry, nodding thistle, Bathurst burr, spear thistle and horehound. The top four weeds are identical for both the Sindel (1996) survey and this questionnaire. The noticeable difference between the surveys is the absence of any reference to African love grass, serrated tussock and Chilean needle grass in the Sindel (1996) survey. These perennial grasses appear to have become more prominent in this area in the last ten years.

**Table 5.7 The most commonly reported weeds of respondents from the Northern pasture zone (reported occurrence >5%).**

Species	Common names	Occurrence (%) <sup>1</sup>	Decreasing (%) <sup>1</sup>	Stable (%) <sup>1</sup>	Increasing (%) <sup>1</sup>	Unknown (%) <sup>1</sup>
<i>Rubus fruticosus</i>	Blackberry	66.3	56.5	37.7	4.3	1.4
<i>Carthamus lanatus</i>	Saffron thistle	60.6	30.2	44.4	19.0	6.3
<i>Xanthium spinosum</i>	Bathurst burr	46.2	43.8	47.9	2.1	6.3
<i>Carduus nutans</i>	Nodding thistle	38.5	25.0	32.5	37.5	5.0
<i>Rosa rubiginosa</i>	Sweet briar, Briar rose, Briars	26.0	51.9	44.4	0.0	3.7
<i>Vulpia</i> spp.	Silver grass, Rats tail fescue, Vulpia	25.0	11.5	34.6	50.0	3.8
<i>Eragrostis curvula</i>	African lovegrass	24.0	12.0	36.0	52.0	0.0
<i>Hypericum perforatum</i>	St John's wort	24.0	20.0	52.0	28.0	0.0
<i>Cirsium vulgare</i>	Black thistle, Spear thistle, Scotch thistle	22.1	26.1	60.9	8.7	4.3
<i>Echium plantagineum</i>	Paterson's curse	21.2	36.4	22.7	36.4	4.5
<i>Onopordum</i> spp. <sup>1</sup>	Scotch thistle, Illyrian thistle, Onopordum thistle, Cotton thistle, Blue thistle	20.2	14.3	76.2	9.5	0.0
<i>Nassella trichotoma</i>	Serrated tussock, Tussock, Yass river tussock	17.3	5.6	61.1	33.3	0.0
<i>Marrubium vulgare</i>	Horehound	16.3	41.2	47.1	5.9	5.9
<i>Nassella neesiana</i>	Chilean needle grass, Needle grass	14.4	13.3	0.0	73.3	13.3
<i>Pteridium esculentum</i>	Bracken fern	13.5	28.6	35.7	35.7	0.0
Thistles (generic conglomeration)	Thistles	12.5	46.2	38.5	15.4	0.0
<i>Carduus pycnocephalus</i> and <i>tenuiflorus</i>	Slender thistle, Shore thistle	11.5	16.7	58.3	25.0	0.0
<i>Urtica</i> spp.	Stinging nettle	11.5	16.7	50.0	25.0	8.3
<i>Juncus</i> spp.	Rushs, Pin rush, Toad rush	10.6	9.1	45.5	45.5	0.0
<i>Pennisetum</i> spp. (fox tail grasses) <sup>2</sup>	Swamp foxtail, Fox tail grass, Fox tail fescue	10.6	9.1	27.3	54.5	9.1
<i>Stipa</i> spp.	Spear grass	8.7	0.0	55.6	33.3	11.1
<i>Hordeum</i> spp.	Barley grass	7.7	12.5	50.0	25.0	12.5
<i>Bidens pilosa</i>	Farmers friend, sticky beak, devil's pitch fork	7.7	0.0	50.0	50.0	0.0
<i>Hypparhenia hirta</i>	Coolatai grass	6.7	14.3	0.0	71.4	14.3
<i>Eucalyptus</i> spp.	Eucalyptus trees	6.7	14.3	57.1	28.6	0.0
<i>Centaurea calcitrapa</i>	Star thistle	6.7	71.4	0.0	0.0	28.6
<i>Verbascum thapsus</i>	Arrons rod, Great mullein	5.8	16.7	16.7	66.7	0.0
<i>Cynodon dactylon</i>	Couch grass	5.8	16.7	66.7	16.7	0.0
<i>Centaurea solstitialis</i>	St Barnaby's thistle	5.8	33.3	50.0	16.7	0.0

Species	Common names	Occurrence (%) <sup>1</sup>	Decreasing (%) <sup>1</sup>	Stable (%) <sup>1</sup>	Increasing (%) <sup>1</sup>	Unknown (%) <sup>2</sup>
<i>Silybum marianum</i>	Variegated thistle, Cabbage thistle	5.8	16.7	50.0	33.3	0.0

<sup>1</sup> Results should be treated with caution due to confusion between the reporting of the common name “scotch thistle” to represent both *Onopordum* spp. and *Cirsium vulgare*. As a result *Onopordum* spp. is most likely over-reported whilst *Cirsium vulgare* is under-reported.

<sup>2</sup> Results should be treated with caution due to confusion of common names “swamp foxtail” and “foxtail grass”.

### ***CENTRAL PASTURE ZONE***

The weeds reported by respondents in the central pasture zone are shown in Table 5.8. In contrast to all other regions, the most commonly reported weed amongst graziers from the central pasture zone (69.0%) was a perennial grass; serrated tussock. Serrated tussock was also reported as the weed of most concern in a survey of New South Wales Central Tableland farmers reported by Ayres and Kemp (1998). St John’s wort and nodding thistle were regarded as increasing problems by many respondents in the central pasture zone. Cassinia was reported as a weed by 8.5% of respondents with 41.7% of these indicating it was an increasing problem. Despite not being reported in the WSGIA report (Grice 2002), Ayres and Kemp (1998) recorded cassinia as the fourth most important weed of concern to graziers in the region.

**Table 5.8 The most commonly reported weeds of respondents from the central pasture zone (reported occurrence > 5%).**

<i>Species</i>	Common names	Occurrence (%) <sup>1</sup>	Decreasing (%) <sup>1</sup>	Stable (%) <sup>1</sup>	Increasing (%) <sup>1</sup>	Stable (%) <sup>1</sup>
<i>Nassella trichotoma</i>	Serrated tussock, Tussock, Yass river tussock	69.0	35.7	36.7	27.6	0.0
<i>Carthamus lanatus</i>	Saffron thistle	58.5	10.8	49.4	38.6	1.2
<i>Rubus fruticosus</i>	Blackberry	52.1	43.2	41.9	13.5	1.4
<i>Echium plantagineum</i>	Paterson's curse	52.1	27.0	31.1	37.8	4.1
<i>Onopordum</i> spp. <sup>1</sup>	Scotch thistle, Illyrian thistle, Onopordum thistle, Cotton thistle, Blue thistle	49.3	18.6	45.7	32.9	2.9
<i>Cirsium vulgare</i> <sup>1</sup>	Black thistle, Spear thistle, Scotch thistle	27.5	7.7	61.5	30.8	0.0
<i>Hypericum perforatum</i>	St John's wort	26.8	23.7	28.9	44.7	2.6
<i>Carduus nutans</i>	Nodding thistle	23.2	21.2	33.3	45.5	0.0
Thistles (generic conglomeration)	Thistles	23.2	30.3	48.5	21.2	0.0
<i>Silybum marianum</i>	Variegated thistle, Cabbage thistle	23.2	39.4	51.5	9.1	0.0
<i>Arctotheca calendula</i>	Capeweed	19.7	14.3	42.9	39.3	3.6
<i>Vulpia</i> spp.	Silver grass, Rats tail fescue, Vulpia	17.6	32.0	44.0	20.0	4.0
<i>Rosa rubiginosa</i>	Sweet briar, Briar rose, Briars	17.6	52.0	32.0	12.0	4.0
<i>Xanthium spinosum</i>	Bathurst burr	16.9	37.5	50.0	8.3	4.2
<i>Marrubium vulgare</i>	Horehound	16.9	29.2	54.2	12.5	4.2
<i>Eragrostis curvula</i>	African lovegrass	14.8	33.3	23.8	42.9	0.0
<i>Hordeum</i> spp.	Barley grass	14.1	15.0	45.0	20.0	20.0
<i>Pteridium esculentum</i>	Bracken fern	12.7	72.2	16.7	11.1	0.0
<i>Rumex acetosella</i>	Sorrel	9.2	30.8	23.1	38.5	7.7
<i>Cassinia</i> spp.	Cassinia, Chinese scrub, Dog wood, Sifton bush, Biddy bush	8.5	33.3	25.0	41.7	0.0
<i>Carduus pycnocephalus</i> and <i>tenuiflorus</i>	Slender thistle, Shore thistle	8.5	25.0	66.7	0.0	8.3
Tussock grass	Tussock grass	7.0	20.0	40.0	30.0	10.0
<i>Holcus</i> spp.	Yorkshire fog, Fog grass	5.6	25.0	62.5	12.5	0.0

<sup>1</sup> Results should be treated with caution due to confusion between the reporting of the common name “scotch thistle” to represent both *Onopordum* spp. and *Cirsium vulgare*. As a result *Onopordum* spp. is most likely over-reported whilst *Cirsium vulgare* is under-reported.

***SOUTHERN PASTURE ZONE***

Capeweed stands out as the most commonly reported species amongst respondents from the southern weed zone (Table 5.9). Capeweed is considered a widespread weed in Victorian pastoral systems and whilst listed as a weed of importance to the Victorian grazing industry, it is not considered to be a highly invasive species (McLaren *et al.* 2002b) which is reflected in the large proportion of respondents indicating that it was a stable problem. Paterson's curse, vulpia, brown top bent grass and wild radish on the other hand are most commonly reported as increasing problems amongst respondents from the southern pasture zone. According to McLaren *et al.* (2002b), each of Paterson's curse, vulpia and brown top bent grass is considered highly invasive in Victoria. In contrast, barley grass and wild radish are not listed as weeds of importance to the Victorian grazing industry (McLaren *et al.* 2002b). Wild radish is known to be a serious weed of Victorian cropping systems (Jones *et al.* 2000; Niknam *et al.* 2002) and so may cross over into grazing rotations particularly on those properties involved in grain-sheep/beef cattle farming. In contrast, barley grass is not reported as a serious weed in Victorian cropping systems by Niknam *et al.* (2002), nor is reported in surveys of cropping systems undertaken by Jones *et al.* (2000) in the Victorian high rainfall zone and South Australian – Victorian Bordertown Wimmera zone. So despite being thought of having little importance to both grazing and cropping industries many respondents to this survey reported the occurrence of barley grass, albeit predominantly as a stable problem.



**Table 5.9 The most commonly reported weeds of respondents from the southern pasture zone (reported occurrence > 5%).**

Species	Common names	Occurrence (%)	Decreasing (%)	Stable (%)	Increasing (%)	Stable (%)
<i>Arctotheca calendula</i>	Capeweed	60.7	19.1	53.5	22.3	5.1
<i>Hordeum</i> spp.	Barley grass	36.7	12.3	63.1	20.8	3.8
Thistles (generic conglomeration)	Thistles	34.2	28.9	51.2	14.0	5.8
<i>Echium plantagineum</i>	Paterson's curse	26.0	31.5	23.9	39.1	5.4
<i>Vulpia</i> spp.	Silver grass, Rats tail fescue, Vulpia	26.0	10.9	53.3	33.7	2.2
<i>Onopordum</i> spp. <sup>1</sup>	Scotch thistle, Illyrian thistle, Onopordum thistle, Cotton thistle, Blue thistle	24.6	25.3	49.4	14.9	10.3
<i>Rumex</i> spp. (docks)	Dock, Curled dock	24.0	21.2	52.9	22.4	3.5
<i>Silybum marianum</i>	Variegated thistle, Cabbage thistle	20.6	35.6	46.6	13.7	4.1
<i>Marrubium vulgare</i>	Horehound	18.6	42.4	34.8	18.2	4.5
<i>Carduus pycnocephalus</i> and <i>tenuiflorus</i>	Slender thistle, Shore thistle	18.1	26.6	45.3	26.6	1.6
<i>Agrostis capillaris</i>	Bent grass, brown top bent grass	15.3	29.6	29.6	37.0	3.7
<i>Rubus fruticosus</i>	Blackberry	14.7	40.4	32.7	23.1	3.8
<i>Ulex europaeus</i>	Gorse	14.1	42.0	34.0	20.0	4.0
<i>Erodium</i> spp.	Erodium, Crows foot, Storksbill, Corkscrew	13.8	12.2	61.2	20.4	6.1
<i>Pteridium esculentum</i>	Bracken fern	13.0	37.0	41.3	10.9	10.9
<i>Raphanus raphanistrum</i>	Wild radish, charlock	12.1	18.6	37.2	39.5	4.7
<i>Rumex acetosella</i>	Sorrel	11.9	38.1	47.6	11.9	2.4
<i>Xanthium spinosum</i>	Bathurst burr	11.6	31.7	31.7	22.0	14.6
<i>Cirsium vulgare</i> <sup>1</sup>	Black thistle, Spear thistle, Scotch thistle	11.6	24.4	51.2	22.0	2.4
<i>Holcus</i> spp.	Yorkshire fog, Fog grass	11.6	43.9	29.3	14.6	12.2
<i>Asphodelus fistulosus</i>	Onion weed	10.5	40.5	35.1	16.2	8.1
<i>Geranium</i> spp.	Geranium	9.3	12.1	60.6	24.2	3.0
<i>Juncus</i> spp.	Rushes, Pin rush, Toad rush	8.5	23.3	40.0	20.0	16.7
<i>Carthamus lanatus</i>	Saffron thistle	7.1	24.0	48.0	24.0	4.0
<i>Homeria</i> spp.	Cape tulip	5.9	47.6	19.0	19.0	14.3
<i>Cynodon dactylon</i>	Couch grass	5.6	20.0	50.0	30.0	0.0
<i>Juncus acutus</i>	Spiny rush	5.6	45.0	15.0	40.0	0.0

Species	Common names	Occurrence (%) <sup>1</sup>	Decreasing (%) <sup>1</sup>	Stable (%) <sup>1</sup>	Increasing (%) <sup>1</sup>	Stable (%) <sup>1</sup>
<i>Citrullus</i> spp.	Paddy melons, Melon, Camel melon, Afghan melon	5.1	22.2	55.6	16.7	5.6

<sup>1</sup> Results should be treated with caution due to confusion between the reporting of the common name “scotch thistle” to represent both *Onopordum* spp. and *Cirsium vulgare*. As a result *Onopordum* spp. is most likely over-reported whilst *Cirsium vulgare* is under-reported.

### **WESTERN PASTURE ZONE**

Paterson’s curse was again a commonly reported and frequently increasing problem of respondents from the western pasture region (Table 5.10). Other important commonly occurring weeds of this area were Bathurst burr, capeweed and saffron thistle. The heliotrope species were reported by 14.1% of respondents from the western pasture zone with a large proportion of these (38.2%) reporting them an increasing problem. Both common heliotrope and blue heliotrope were identified amongst the weeds of greatest significance to the Australian grazing industries, particularly for inland New South Wales (Grice 2002).

**Table 5.10 The most commonly reported weeds of respondents from the Western pasture zone (reported occurrence > 5%).**

Species	Common names	Occurrence (%) <sup>1</sup>	Decreasing (%) <sup>2</sup>	Stable (%) <sup>2</sup>	Increasing (%) <sup>2</sup>	Stable (%) <sup>2</sup>
<i>Echium plantagineum</i>	Paterson's curse	53.9	24.6	31.5	40.0	3.8
<i>Xanthium spinosum</i>	Bathurst burr	47.7	43.5	38.3	12.2	6.1
<i>Arctotheca calendula</i>	Capeweed	37.8	22.0	52.7	20.9	4.4
<i>Carthamus lanatus</i>	Saffron thistle	37.8	30.8	39.6	26.4	3.3
<i>Hordeum</i> spp.	Barley grass	32.4	19.2	52.6	21.8	6.4
<i>Marrubium vulgare</i>	Horehound	24.1	34.5	37.9	17.2	10.3
<i>Onopordum</i> spp. <sup>1</sup>	Scotch thistle, Illyrian thistle, Onopordum thistle, Cotton thistle, Blue thistle	22.4	31.5	40.7	22.2	5.6
<i>Vulpia</i> spp.	Silver grass, Rats tail fescue, Vulpia	19.9	39.6	33.3	22.9	4.2
<i>Hypericum perforatum</i>	St John's wort	18.3	40.9	31.8	18.2	9.1
<i>Rubus fruticosus</i> agg.	Blackberry	17.0	46.3	24.4	24.4	4.9
<i>Silybum marianum</i>	Variegated thistle, Cabbage thistle	14.9	36.1	33.3	16.7	13.9
<i>Heliotropium</i> spp	Heliotrope, Blue heliotrope	14.1	14.7	44.1	38.2	2.9
<i>Citrullus</i> spp.	Paddy melons, Melon, Camel melon, Afghan melon	13.7	24.2	54.5	18.2	3.0
<i>Lolium rigidum</i> Gaud.	Annual ryegrass	13.7	24.2	48.5	27.3	0.0
<i>Raphanus raphanistrum</i>	Wild radish, Charlock	13.3	18.8	43.8	34.4	3.1
<i>Erodium</i> spp.	Erodium, Crows foot, Storksbill, Corkscrew	12.4	23.3	63.3	13.3	0.0
Thistles (generic conglomeration)	Thistles	11.6	28.6	64.3	3.6	3.6
<i>Bromus</i> spp.	Brome grass, Soft brome, Rip gut brome	10.8	26.9	34.6	30.8	7.7
<i>Rumex</i> spp. (docks)	Dock, Curled dock	10.0	29.2	33.3	25.0	12.5
<i>Chondrilla juncea</i>	Skeleton weed	10.0	25.0	54.2	16.7	4.2
<i>Solanum elaeagnifolium</i>	Silverleaf nightshade, Deadly nightshade	9.1	22.7	45.5	31.8	0.0
<i>Emex australis</i>	Cat head, three corner jack, Spiny emex	8.7	4.8	23.8	71.4	0.0

5 Weeds of southern Australian pastures

Species	Common names	Occurrence (%) <sup>1</sup>	Decreasing (%) <sup>1</sup>	Stable (%) <sup>1</sup>	Increasing (%) <sup>1</sup>	Stable (%) <sup>1</sup>
<i>Avena</i> spp.	Wild oats	8.7	23.8	66.7	0.0	9.5
<i>Polygonum aviculare</i>	Wireweed, hogweed	8.7	19.0	61.9	14.3	4.8
<i>Rumex acetosella</i>	Sorrel	8.3	45.0	40.0	15.0	0.0
<i>Rosa rubiginosa</i>	Sweet briar, Briar rose, Briars	8.3	65.0	30.0	0.0	5.0
<i>Tribulus terrestris</i>	Caltrop, Yellow vine	7.1	17.6	29.4	52.9	0.0
<i>Cynodon dactylon</i>	Couch grass	7.1	23.5	29.4	47.1	0.0
<i>Brassica rapa</i>	Wild turnip	7.1	41.2	47.1	11.8	0.0
<i>Lycium ferocissimum</i>	African boxthorn, Boxthorn	6.6	56.3	18.8	25.0	0.0
<i>Cirsium vulgare</i> <sup>1</sup>	Black thistle, Spear thistle, Scotch thistle	6.6	31.3	56.3	0.0	12.5
<i>Sclerolaena birchii</i>	Galvanised burr	6.2	13.3	26.7	46.7	13.3
<i>Alternanthera pungens</i>	Khaki weed	6.2	20.0	46.7	33.3	0.0
<i>Juncus</i> spp.	Rushes, Pin rush, Toad rush	6.2	13.3	46.7	26.7	13.3
<i>Centaurea calcitrapa</i>	Star thistle	6.2	20.0	40.0	40.0	0.0
<i>Asphodelus fistulosus</i>	Onion weed	5.8	28.6	42.9	28.6	0.0

<sup>1</sup> Results should be treated with caution due to confusion between the reporting of the common name “scotch thistle” to represent both *Onopordum* spp. and *Cirsium vulgare*. As a result *Onopordum* spp. is most likely over-reported whilst *Cirsium vulgare* is under-reported.

#### WEEDS OF RESPONDENTS FROM THE WESTERN AUSTRALIAN PASTURE ZONE

Although the most commonly reported species in the Western Australian pasture zone (47.8%), only 7.0% of respondents indicated that capeweed was an increasing problem. The majority considered it a decreasing or stable problem (Table 5.11). Revell *et al.* (2002) noted, with particular reference to Western Australia, that capeweed is frequently considered an important feed source when pastures fail. Spiny emex, dock and *Citrullus* species, whilst not frequently reported in the eastern states, were common amongst Western Australian producers. A number of less frequently reported weed species were found to be increasing problems for those respondents with them. These included Paterson’s curse, caltrop, bull rush

and silver leaf nightshade. All these species are recognised as important weeds of pastures and crops in Western Australia by other authors (Revell *et al.* 2002).

**Table 5.11 The most commonly reported weeds of respondents from the Western Australian pasture zone (reported occurrence > 5%).**

Species	Common names	Occurrence (%)	Decreasing (%)	Stable (%)	Increasing (%)	Stable (%)
<i>Arctotheca calendula</i>	Capeweed	47.8	32.6	55.8	7.0	4.7
<i>Emex australis</i>	Cat head, Three corner jack, Spiny emex	46.7	9.5	52.4	35.7	2.4
<i>Rumex</i> spp. (docks)	Dock, Curled dock	45.6	24.4	51.2	22.0	2.4
<i>Hordeum</i> spp.	Barley grass	37.8	23.5	50.0	23.5	2.9
<i>Citrullus</i> spp.	Paddy melons, Melon, Camel melon, Afghan melon	30.0	18.5	48.1	25.9	7.4
<i>Vulpia</i> spp.	Silver grass, Rats tail fescue, Vulpia	26.7	29.2	41.7	25.0	4.2
<i>Raphanus raphanistrum</i>	Wild radish, charlock	25.6	8.7	60.9	30.4	0.0
Thistles (generic conglomeration)	Thistles	18.9	35.3	52.9	11.8	0.0
<i>Lolium rigidum</i>	Annual ryegrass	16.7	20.0	46.7	26.7	6.7
<i>Homeria</i> spp.	Cape tulip	14.4	23.1	53.8	23.1	0.0
<i>Erodium</i> spp.	Erodium, Crows foot, Storksbill, Corkscrew	14.4	23.1	61.5	7.7	7.7
<i>Mentha pulegium</i>	Pennyroyal	14.4	23.1	30.8	46.2	0.0
<i>Rumex acetosella</i>	Sorrel	14.4	30.8	53.8	7.7	7.7
<i>Stipa</i> spp.	Spear Grass	13.3	41.7	58.3	0.0	0.0
<i>Bromus</i> spp	Brome grass, Soft brome, Rip gut brome	12.2	45.5	36.4	18.2	0.0
<i>Romulea rosea</i> var. <i>australis</i>	Onion grass, Guildford grass	12.2	18.2	63.6	18.2	0.0
<i>Avena</i> spp.	Wild oats	12.2	36.4	45.5	18.2	0.0
<i>Geranium</i> spp	Geranium	10.0	22.2	66.7	11.1	0.0
<i>Onopordum</i> spp. <sup>1</sup>	Scotch thistle, Illyrian thistle, Onopordum Thistle, Cotton thistle, Blue thistle	10.0	22.2	33.3	44.4	0.0
<i>Echium plantagineum</i>	Paterson's curse	8.9	0.0	12.5	87.5	0.0
<i>Brassica rapa</i>	Wild turnip	8.9	37.5	37.5	25.0	0.0
<i>Rubus fruticosus</i>	Blackberry	7.8	0.0	57.1	42.9	0.0
<i>Typha</i> spp.	Bulrush, Cumbungi	7.8	0.0	42.9	57.1	0.0
<i>Pteridium esculentum</i>	Bracken fern	6.7	33.3	33.3	16.7	16.7
<i>Tribulus terrestris</i>	Caltrop, Yellow vine	6.7	0.0	33.3	66.7	0.0

Species	Common names	Occurrence (%) <sup>1</sup>	Decreasing (%)	Stable (%)	Increasing (%)	Stable (%)
<i>Solanum hoplopetalum</i>	Afghan thistle	5.6	20.0	20.0	60.0	0.0
<i>Eragrostis curvula</i>	African lovegrass	5.6	40.0	40.0	20.0	0.0
<i>Salvia reflexa</i>	Mint weed	5.6	0.0	60.0	40.0	0.0
<i>Solanum elaeagnifolium</i>	Silverleaf nightshade, Deadly nightshade	5.6	0.0	40.0	60.0	0.0
<i>Silybum marianum</i>	Variegated thistle, Cabbage thistle	5.6	60.0	40.0	0.0	0.0

<sup>1</sup> Results should be treated with caution due to confusion between the reporting of the common name “scotch thistle” to represent both *Onopordum* spp. and *Cirsium vulgare*. As a result *Onopordum* spp. is most likely over-reported whilst *Cirsium vulgare* is under-reported.

### THE UNDER-REPORTING OF IMPORTANT WEEDS

A botanical survey undertaken by Dellow *et al.* (2002) of the perennial pasture zone of New South Wales (equivalent to the northern and central pasture zones defined in this study) identified the most commonly occurring weeds of pastures. *Vulpia* (*Vulpia* spp.), soft brome (*Bromus molliformis*) and flat weed (*Hypochaeris radicata*) were the three most commonly occurring weeds. Whilst *vulpia* was commonly reported amongst respondents to this survey, Dellow *et al.* (2002) found it in 88% of paddocks surveyed, much more than the reported occurrence amongst respondents in either the Northern or central pasture zones. *Bromus* spp. were reported by only 5.9% of all respondents and flat weed by only 0.9%. Whilst commonly found in paddocks these weeds appear to be under-reported by producers. All three species are known to provide some short term seasonal feed and so it may be that producers do not consider them weeds if they are grazed. Whilst a lack of ability to identify the annual grasses may be a problem, as has been identified in chapter 4 of this thesis, flat weed is easily recognisable and yet remains under-reported. It may also be a case of graziers failing to recognise these species as reducing potential productivity and thus rather than weedy species they are simply considered part of the sward.

## CONCLUSIONS

Graziers in southern Australia identify a vast array of species as weeds. However, despite this diversity, there are a number of key species which are a common problem for many graziers across the industry. Broadleaf weeds, and particularly the annual species, clearly dominate the most commonly reported weeds of graziers in southern Australia. Across all respondents the most commonly reported weeds were: capeweed, Paterson's curse, barley grass, saffron thistle and blackberry. Of these most frequently reported species, Paterson's curse is perhaps the most concerning with over 40% of respondents reporting this weed suggesting that it was an increasing problem (Table 5.6).

The most commonly reported weed species varied between the regions. The annual and perennial broadleaf species dominated the northern zone however the perennial and annual grass species appeared to be the most commonly reported increasing problems. The most commonly reported weed amongst graziers from the central pasture zone was serrated tussock, reported by 69%. Whilst the most commonly reported weed of graziers from the southern pasture zone was capeweed, Paterson's curse was suggested to be an increasing problem by more respondents. Graziers from the western pasture zone also reported Paterson's curse as a commonly increasing weed.

The lessor reported most commonly increasing weeds were dominated by the perennial grasses such as coolatai grass, Chilean needle grass and *Sporobolus* species. Viper's bugloss was also reported as a commonly increasing problem. The survey also revealed some weed species to be increasing problems in some of the pasture zones including spiny emex and cassinia.

Four key weeds were selected for further analysis in the subsequent chapters of this thesis. One weed from each of four functional groups was selected. For the annual broad leaf species capeweed was selected, for the perennial broadleaf species blackberry was selected, for the annual grass barley grass was selected and for the perennial grass serrated tussock was selected. These weeds were chosen as they were the most commonly reported species in each of these functional groups and the analysis procedures undertaken later in this thesis required species with the greatest number of respondents reporting them.

These species were not amongst the most commonly reported increasing problems. However, the fact that more respondents reported them as stable or decreasing provided an opportunity to identify the controls that graziers' were implementing to achieve these more favourable changes. The analysis of weeds that are predominantly increasing problems may provide valuable information. However, this was not undertaken for this thesis for the sake of brevity.