Pest Animal and Weed Management Survey 2016/2019/2022

NSW land manager survey custom results

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We acknowledge the Traditional Custodians of Australia and their continuing connection to land and sea, waters, environment and community. We pay our respects to the Traditional Custodians of the lands we live and work on, their culture, and their Elders past and present.

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Introduction

This report presents requested custom survey results for NSW, derived from an [ABARES national survey of land managers](#). The ABARES survey focusses on pest animal and weed problems, impacts and management on agricultural land managers' properties and in their local area, and was undertaken in 2016, 2019 and 2022.

This report includes NSW specific survey output for the degree of the pest problem on property in the last 12 months for 2016, 2019 and 2022, and ranking the problem with Weeds of National Significance in 2019 and 2022. Equivalent national level values are in Figure 2 and Table 1 respectively in the national PAWS report (Stenekes et al. 2023).

The custom results are to support an independent state-wide [review into invasive species management for NSW](#) being conducted by the NSW Natural Resource Commission (NRC) that will be delivered to the NSW Government in May 2024.

Results

This custom report presents NSW results from the 2016, 2019 and 2022 surveys. In most cases the results have been rounded to whole numbers, but sometimes decimal places have been included to show smaller changes.

A value of significance (p-value) has been calculated, to indicate evidence of 'meaningful change' across years. As such, the results might show:

- Statistically significant difference (e.g. by convention p-value < 0.05) with a relatively large change in estimates. This is of greatest importance because it suggests a meaningful change in the pest animal or weed problem, impact, or management at the NSW scale.

- Statistically significant difference (e.g. by convention p-value < 0.05) with a relatively small change in estimate. Although this indicates evidence of a difference in values across years the change is not particularly meaningful at a NSW scale.

The analysis at the NSW state scale, presented here, may obscure substantial differences that occur at smaller scales such as NRM Region. Therefore, a regional level analysis for 2016 and 2019 can be found online at agriculture.gov.au/pws-results in a Tableau dashboard which highlights these differences. Regional level analysis for 2022 will be added to this dashboard in 2024. A map showing the Natural Resource Management Regions (NRM 2016) used in the sample design for the ABARES pest animal and weed management survey series is included in **Appendix A: Map key**.

The survey response rates for NSW and other states are shown in **Appendix B: Response rates**. In this report, the survey responses were weighted to account for the different response rates across NRM region, industry and farm size so the estimated values more accurately represent the total land manager population for the survey year. The methods used in the analysis are described in Stenekes et al. (2023, Appendix B: Methods) and ABARES (2011).

There are many factors that may lead to change in pest animal and weed problems, impacts and management activity between surveys. These include climatic conditions (e.g. heavy rainfall, floods or drought) which influence pest and weed populations and distributions, a change in land use which changes land manager perception or tolerance of species, the effectiveness of any wide-spread management over time, or natural ecological events such as plagues. However, there is no attempt to explain the cause of trends here; this would require greater investigation, and have more meaning at the regional scale, which is beyond the scope of this report.

Pest animals and weed problems - NSW agricultural land managers' properties

Pest animals

Land managers were asked to indicate the degree of the pest animal problem on the property (ranging from 'no', 'minor' or 'major' problem) in the past 12 months for a defined set of pest species. The results refer to:

- Feral animals:
  - wild dogs
  - foxes
  - rabbits/hares
  - introduced pest birds (e.g. Starling, Indian myna)
  - feral deer
  - feral pigs
  - feral camels
  - feral goats
  - feral horses/donkeys
  - feral cats
  - mice/rats (mice and rats were listed separately in wave 3, 2022)
- native animals and birds (e.g. kangaroos, crows, possums, etc)
- insects (e.g. locusts, flies, aphids, etc)
- fresh water pests (e.g. carp, perch, exotic turtles, etc) and
- other pests (e.g. parasites, slugs, nematodes, mites, etc).

Figure 1 shows the 2016, 2019 and 2022 responses for specific problem-level ratings for each pest animal species/group for NSW land managers. The focus is on the perceived severity of the problem they cause for agricultural enterprises.

Problems with some species continue to be very common in NSW, with about 50% of NSW land managers, or more, reporting native animals and birds, rodents (rats and/or mice) and foxes had caused either minor or major problems on their properties in the 12 months prior to the 2016, 2019 and 2022 surveys.

Figure 1 shows a small decline in the problem with foxes (66% in 2016 to 59% in 2022) and an increase in the problem with feral pigs (29% in 2016 to 36% in 2022) and feral deer (8% in 2016 to 14% in 2022). There is a possible trend down in the percentage of landholders that consider rabbits/hares a minor problem, but no change in the percentage of landholders that consider them a major problem. Problems caused by native animals/birds varied across surveys, with the highest percentage of landholders considering them a problem in 2019 (67%).

Species causing major problems on agricultural properties in 2022 were mice (reported by 24% of land managers in 2022), native animals and birds (reported by 23% of land managers, down from 41% in 2019), feral pigs (reported by 21% of land managers in 2022, up from 13% in 2019), foxes (reported by 18% of land managers, down from 23% in 2019), and rats (reported by 18% of land managers in 2022). There was little evidence of change across years in those reporting any problem for wild dogs, introduced pest birds, feral goats, feral cats, fresh water pests, insects and other insect pests (p-values were above 0.05).

Figure 1 Degree (%) of the pest problem on property in the last 12 months (given they reported any problem) — subset of NSW land managers
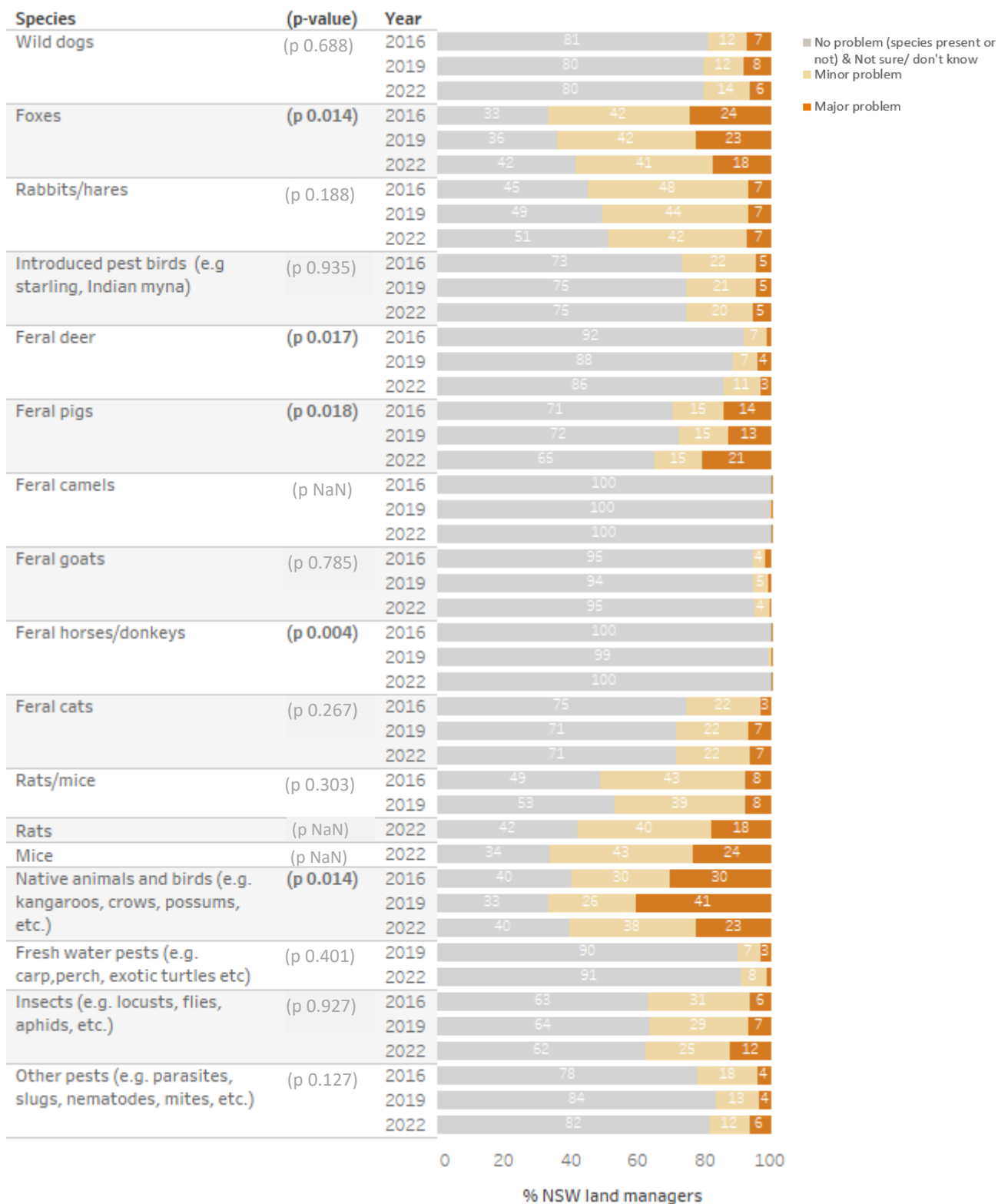
Source: ABARES pest and weed survey series 2016, 2019 and 2022. The 'No problem' response option includes species present but not a problem, and species not present on the property. Rats were listed separately from mice from 2022 onwards. The category 'Fresh water pests (e.g. carp, perch, exotic turtles, etc)' was added from 2019 onwards. Logistic regression revealed that there was a statistically significant difference in the proportion of land managers with a pest problem (% yes/no) between any years if the p-value is <0.05 (in brackets in chart). NaN means the change test is not applicable because there was only one year of data or there were zero observations.

Weeds

A weed was defined as any unwanted plant that requires some form of action to reduce its economic, environmental, human health and amenity impacts. Thirty-two Weeds of National Significance (WoNS) were agreed to by Australian governments based on an assessment process that prioritised these weeds according to their invasiveness, potential for spread, their environmental, social and economic impacts, and ability to be successfully managed.

The occurrence and impact from WoNS were not uniform across Australia and can be specific to particular regions. The list of WoNS was provided to respondents in the surveys and can be accessed from the Department of Environment and Energy website (Australian Government 2017).

In the 2019 and 2022 surveys, respondents who reported a problem were asked to rate the degree of the problem (ranging from 'no', 'minor' or 'major' problem) with every WoNS. The results are presented in Table 1.

The most widespread problematic WoNS for NSW land managers—ranked in order from most to least proportion with the problem—are summarised in Table 1 (columns 5 and 6 show the rank given to each WoNS). The proportion of NSW land managers experiencing problems with a specific WoNS in any survey was never more than about 30%. In 2022, more land managers reported either major or minor problems with Blackberry (reported by 29% of respondents), Fireweed (22.2%), African boxthorn (19%), Lantana (14%), Serrated tussock (13%) and Silverleaf nightshade (13%) than other WoNS on their properties in the last 12 months. Ranks stayed broadly consistent between the two surveys (Column 7).

There was a meaningful increase in the number of land managers reporting a problem with Parthenium weed from 0.4% in 2019 to 1.3% in 2022 and it went up 4 places in rank, and Bellyache bush from 0% in 2019 up to 0.4% in 2022, but a very small base of less than 1% of NSW land managers are experiencing these problems. There was little evidence of meaningful change in the proportion of respondents with other specific weed problems at the NSW state level (Table 1, where p-values were >0.05).

Table 1 Ranking the problem with Weeds of National Significance in 2019 and 2022 – subset of NSW land managers

Weeds of National Significance	% NSW land managers with any problem		Change in % NSW land managers with any problem across years significant if p <0.05 **a**	2019 rank	2022 rank	diff in rank 2019-22
	2019	2022	p value			
Terrestrial weeds						
African boxthorn	17	19	0.361	3	3	0
Asparagus fern (including climbing)	1	2	0.382	17	15	2
Athel pine	0.2	0.7	0.179	26	22	4
Bitou bush/boneseed	0.9	1.8	0.298	19	14	5
Blackberry	31	29	0.320	1	1	0
Bridal creeper/Bridal veil creeper	1	2	0.242	19	17	2
Brooms (incl. Scotch, Montpellier, Flaxleaf)	2	3	0.138	12	9	3
Cat's claw creeper	2	2	0.607	11	16	-5
Chilean needle grass	3	5	0.348	9	8	1
Bellyache bush	0.0	0.4	**0.000**	29	26	3
Fireweed	20.6	22.2	0.452	2	2	0
Gamba grass	0.1	0.4	0.346	27	26	1
Gorse	2	1	0.300	14	21	-7
Lantana	14	14	0.974	5	4	1
Mesquite	0.3	0.2	0.252	24	28	-4
Madeira vine	1.8	2.2	0.699	13	13	0
Mimosa	2	3	0.190	16	12	4
Parkinsonia	0.0	0.0	NaN	29	31	-2
Parthenium weed	0.4	1.3	**0.027**	23	18	5
Pond apple	0.0	0.0	NaN	29	31	-2
Prickly acacia	2	1	0.546	15	19	-4
Opuntioid cacti (incl. prickly pear)	7	6	0.401	7	7	0
Rubber vine	1	1	0.492	21	24	-3
Serrated tussock	14	13	0.798	4	5	-1
Silverleaf nightshade	11	13	0.270	6	6	0
Willows (except weeping willows, pussy willow and sterile pussy willow)	4	3	0.356	8	11	-3
Aquatic weeds						
Alligator weed	0.5	0.5	0.982	22	25	-3
Cabomba	0.1	0.2	0.364	27	28	-1
Sagittaria/Delta arrowhead	0.3	0.7	0.112	25	22	3
Hymenachne	0.0	0.1	0.057	29	30	-1
Salvinia	1.0	1.0	0.914	18	20	-2
Water hyacinth	2.8	3.0	0.910	10	10	0

Source: ABARES pest and weed survey 2019, 2022. Darker shading reflects a higher ranking. **a** Logistic regression revealed that there was a statistically significant difference in the proportion of land managers with a weed problem (% yes/no) between any years if the p-value is <0.05. NaN means the change test is not applicable because there were zero observations.

Appendix A: Map key
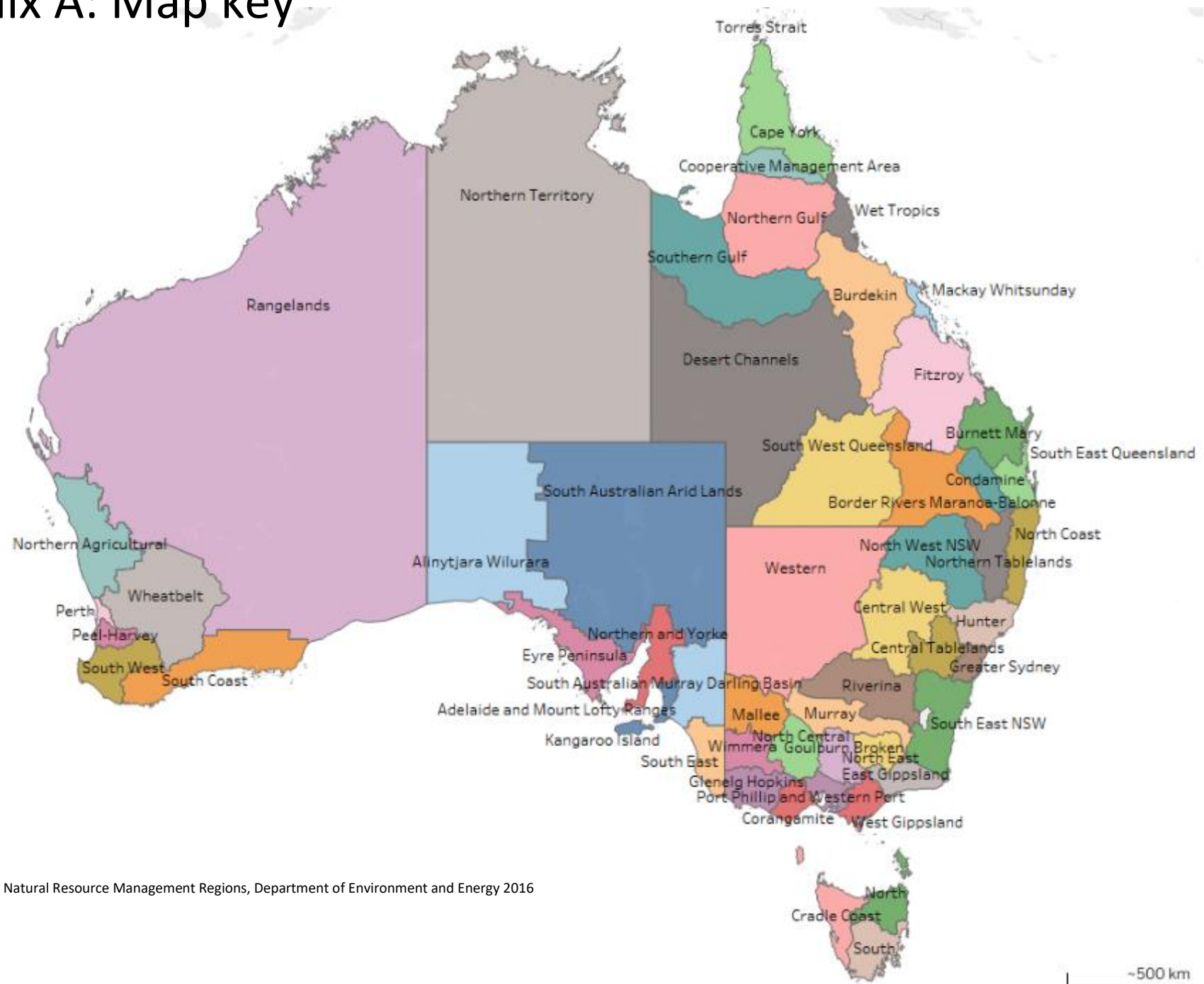
Source: Natural Resource Management Regions, Department of Environment and Energy 2016

Appendix B: Response rates

Table A 1 summarises all modes of response to the ABARES pest and weed survey series 2016, 2019 and 2022 by NRM region, including surveys received via online and hardcopy postal formats.

Table A 1 Survey response rate by NRM region

State	NRM region	2016			2019			2022		
		Farms invited	Total responses	Response rate **a** (%)	Farms invited	Total responses	Response rate **a** (%)	Farms invited	Total responses	Response rate **a** (%)
NSW	Central Tablelands	182	85	47	205	92	45	336	123	37
	Central West	308	166	54	389	192	49	319	130	41
	Greater Sydney	291	145	50	333	145	44	312	100	32
	Hunter	247	120	49	286	140	49	385	123	32
	Murray	300	143	48	330	156	47	292	106	36
	North Coast	319	147	46	378	174	46	483	155	32
	North West NSW	328	159	48	438	213	49	301	114	38
	Northern Tablelands	113	49	43	117	62	53	248	104	42
	Riverina	454	221	49	623	290	47	411	162	39
	South East NSW	245	125	51	289	154	53	403	174	43
	Western	153	73	48	182	91	50	199	69	35
VIC	Corangamite	254	127	50	327	137	42	354	130	37
	East Gippsland	35	18	51	158	88	56	153	72	47
	Glenelg Hopkins	296	162	55	425	194	46	341	155	45
	Goulburn Broken	369	167	45	439	178	41	446	157	35
	Mallee	318	163	51	365	149	41	245	88	36
	North Central	360	171	48	448	202	45	423	145	34
	North East	115	61	53	140	82	59	300	125	42
	Port Phillip and Western Port	433	205	47	500	223	45	436	149	34
	West Gippsland	286	135	47	337	164	49	371	128	35
	Wimmera	202	106	52	216	128	59	202	93	46
QLD	Border Rivers Maranoa-Balonne	213	116	54	291	161	55	262	103	39
	Burdekin	193	89	46	234	127	54	208	84	40
	Burnett Mary	378	197	52	474	229	48	436	183	42
	Cape York	13	3	23	44	16	36	51	16	31
	Condamine	309	146	47	383	198	52	363	139	38
	Cooperative Management Area	0			3	0	0		**b**	
	Desert Channels	103	52	50	129	73	57	111	50	45
	Fitzroy	274	119	43	342	162	47	318	117	37
	Mackay Whitsunday	71	29	41	90	53	59	167	54	32
	Northern Gulf	70	29	41	81	41	51	124	38	31
	South East Queensland	457	217	47	555	261	47	443	173	39
	South West Queensland	51	21	41	106	49	46	99	46	46
	Southern Gulf	54	22	41	77	35	45	88	40	45
	Wet Tropics	231	111	48	282	154	55	302	102	34
SA	Adelaide and Mount Lofty Ranges	426	207	49	498	240	48	363	138	38
	Alinytjara Wilurara	4	0	0	0	0		0	0	
	Eyre Peninsula	154	87	56	232	123	53	140	61	44
	Kangaroo Island	21	10	48	54	25	46	90	36	40
	Northern and Yorke	283	161	57	360	193	54	266	115	43
	South Australian Arid Lands	26	14	54	32	18	56	97	38	39
	South Australian Murray Darling Basin	531	253	48	652	326	50	377	145	38
	South East	326	148	45	368	204	55	297	117	39
WA	Wheatbelt	309	155	50	410	200	49	251	97	39
	Northern Agricultural	222	111	50	275	137	50	196	74	38
	Peel-Harvey	161	76	47	172	91	53	194	77	40
	Perth	187	66	35	204	82	40	178	51	29
	Rangelands	101	32	32	112	45	40	153	56	37
	South Coast	223	107	48	287	164	57	225	95	42
	South West	436	219	50	512	232	45	345	145	42
TAS	North	460	226	49	545	287	53	247	117	47
	Cradle Coast	469	207	44	564	258	46	260	120	46
	South	280	142	51	339	182	54	193	91	47
NT	Northern Territory	276	101	37	350	131	37	126	33	26
ACT	Australian Capital Territory	0			0			68	27	40
	Open online link (non-sample)		249			308			107	
Aust	**All a**	**12,920**	**6,470**	**52**	**15,982**	**8,059**	**52**	**13,998**	**5,487**	**41**

Note: There were 158 responses (in 2019) where no NRM region nor postcode was able to be assigned. **a** Adjusted response rate is shown for Aust (All), which is the response rate for the agricultural sample after excluding ineligible sample points, such as 'return to sender' (i.e. no forwarding address, not known at address), and 'out of scope' (e.g. deceased, or no longer owns or manages the property). Response rates (%) shown by NRM region are raw (unadjusted for ineligible sample points). **b** Cooperative Management Area was combined with Cape York NRM for sampling purposes in 2022 due to its small number of farm units.

References

ABARES 2011, *Survey methods and definitions,* Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra, available at https://www.agriculture.gov.au/abares/research-topics/surveys/farm-definitions-methods#references.

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