final report

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Prepared by: Watts, PJ, Keane, OB and Ni Cheallaigh

FSA Consulting

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Meat & Livestock Australia Limited
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Feedlot industry GIS database

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Abstract

In 1990, the “Lot Feeding in Australia” book was produced. It reported the results of a survey that was undertaken to gain an insight into the general management and husbandry practices adopted by lotfeeders at that time. Since that time, there has not been any public collection or collation of equivalent information, to the point where there is currently a lack of feedlot industry data in the public domain. As an industry representative, Meat & Livestock Australia (MLA) recognises there is a need for a quality industry dataset that industry can draw on in the event of an industry or regional based issue (e.g. disease outbreak).

In 2007, FSA Consulting developed an in-house database of feedlot information by collating data collected from an assortment of sources over the previous 15 years. At the time, Geographic Information System (GIS) software was utilised to analyse the status of the Australian feedlot industry, comparing it to the 1990 results. FSA Consulting continues to update this dataset with new data as it becomes available. These data are contained in spreadsheet form, and have been used in previous MLA projects to provide feedlot statistics at various levels.

Given the status of feedlots has changed since 2007, it was considered worthwhile to again utilise this information to create a series of GIS maps highlighting the various changes in feedlot infrastructure, capacity and location that have occurred relative to 1990 and 2007. These maps and the associated tables are presented in this report.

Executive Summary

In 1990, the “Lot Feeding in Australia” book was produced. It reported the results of a survey that was undertaken to gain an insight into the general management and husbandry practices adopted by lotfeeders at that time. Since that time, there has not been any public collection or collation of equivalent information, to the point where there is currently a lack of feedlot industry data in the public domain.

In 2007, FSA Consulting developed an in-house database of feedlot information by collating data collected from an assortment of sources over the previous 15 years. At the time, Geographic Information System (GIS) software was utilised to analyse the status of the Australian feedlot industry, comparing it to the 1990 results. FSA Consulting continuously updates the Feedlot Industry Database with new data as it becomes available.

Given the status of feedlots has changed since 2007, it was considered worthwhile to again utilise this information to create a series of GIS maps highlighting the various changes in feedlot infrastructure, capacity and location that have occurred relative to 1990 and 2007. These maps and the associated tables are presented in this report.

Specific results from the project include:

- the state distribution of Australian feedlots has not changed significantly over time. Queensland has dominated both in number and capacity of individual feedlots.

- the results for current pen capacity reveal that the Australian feedlot industry is still growing. This increase is linked to an increase in size capacities as opposed to an increase in individual feedlot numbers.

- a comparison between 1990, 2007 and the current major feedlots illustrated how the top end of the feedlot industry has changed over 22 years. The minimum capacity included in the 1990 survey was 4000 head. This increased to 12 000 in 2012.

- feedlots have adapted their location in relation to annual and seasonal rainfall. Annual rainfall of greater than 750 mm has proved to be a limiting factor in the development of new feedlots, with little growth in these areas. It was discovered that seasonal rainfall distribution did not appear to be a limiting factor for the feedlot industry.

- examination of feedlot distribution by river catchment showed the majority of feedlots are located in the Murray Darling and North East Coast catchments, with current capacities being 771 741 head and 301 865 head respectively. The study also deduced that 25% of the total industry capacity is located in the Great Artesian Basin.

- assessment of the location of feedlots in relation to petroleum lease areas revealed that 7% of the total industry capacity is located within these areas.

The maps created from this study illustrated the distribution of feedlots throughout Australia in relation to a number of parameters, providing MLA and industry with an overview of the status of the feedlot industry. The project also demonstrated that the GIS dataset is a useful resource that can be used by MLA and industry for a number of future studies. Maintaining the database in this manner provides the most effective utilisation of this resource and allows the industry and Meat & Livestock Australia (MLA) to respond in a timely manner to relevant issues.

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1.1 Background

The Australian beef industry is the largest agricultural industry in Australia with the feedlot sector now playing a major role within it. The feedlot industry has a value of production of approximately $2.7 billion while employing approximately 2000 people directly and almost 7000 more indirectly. There are about 800 feedlots throughout Australia with the majority located in areas that are in close proximity to cattle and grain supplies namely south east Qld; the northern tablelands of NSW and the Riverina area of NSW with expanding numbers in Victoria, South Australia and Western Australia.

The large number of feedlots in Australia attracts community expectations for a high standard of environmental performance, including continuous improvement. The Australian red meat industry, as with most primary industries, is coming under increasing pressure from both the community and government to document and justify its impacts on the environment.

This project will utilise the FSA Consulting Feedlot Industry Database (FID) to prepare a series of maps that show the changes in feedlot infrastructure, capacity and location over time. To produce the specified maps, FSA Consulting will need to update and expand their current FID.

1.2 Project Objectives

The project objectives were to produce a series of maps that highlight changes in feedlot infrastructure, capacity and location over time, exact details of time frame to be determined once available data is assessed.

2 Methodology

The project was conducted in a number of stages. These included:

1. Project meeting with MLA and Industry. Content of the maps agreed. A meeting was held in Toowoomba to discuss the content and level of detail to be included in the maps. FSA Consulting briefed MLA on the data they possess and discussed additional data to be collected and collated. MLA provided FSA Consulting with particular requests to be addressed in the maps.
2. Collection of feedlot statistics. The existing FSA Consulting proprietary feedlot database was updated to incorporate retrospective details on feedlot development, capacity and location necessary to produce the required maps. The base for the feedlot dataset was the amalgamation of known data on feedlots from various sources, including the licensing authorities in each State, feedlots known to FSA Consulting through their work, industry magazines and from the list of the National Feedlot Accreditation Scheme (NFAS).
3. Preparation of a series of maps. A series of maps were prepared to highlight the various changes to the industry requested by MLA and industry.

3 Definitions and data sources

3.1 Feedlot definition

From the National Feedlot Guidelines (ARMCANZ 2012), a beef cattle feedlot is a confined yard area with watering and feeding facilities, where cattle are completely hand or mechanically fed for the purpose of beef production. This definition includes both covered and uncovered yards.

The above definition does not include the feeding or penning of cattle in the following situations:

- For weaning, dipping or similar husbandry practices;
- For milk production;
- At a depot operated exclusively for the assembly of cattle for live export;
- For drought or emergency feeding purposes;
- At a slaughtering facility; or
- In recognised saleyards.

This definition is of relevance as there is some uncertainty regarding some large facilities in northern Queensland and the Northern Territory as to whether they are solely live export assembly facilities or whether they are sometimes used as feedlots. These facilities have been included in this data.

3.2 Pen capacity

Currently, there is a downturn in feedlot production due to economic and climatic circumstances. Hence, many feedlots are operating at low occupancy and some, such as JBS Prime City, are closed. Many small opportunity feedlots may not have been used for 2-3 years. However, for consistency, it was decided that all viable pen capacity would be included in the data presented.

Hence, in this report, pen capacity means the number of head that could legally be fed in a feedlot, as it is currently constructed, irrespective of its recent utilisation.

As there are inconsistencies across States on capacity definition, the term “head” and “standard cattle unit (SCU)” have been taken to have the same meaning.

3.3 Data sources

Data for this project has been sourced from a wide variety of sources including state licensing information, industry magazines and newspapers, ALFA quarterly reports, discussions with lot feeders and FSA Consulting’s own IP.

It is important to note that, except for Queensland, the data on small feedlots (<1000 head) is difficult to obtain. However, in Queensland, the publically-available feedlot register provides data on all feedlots. This means that the data on small feedlots is good in Queensland and poor in other states. The data presented in this report should be interpreted accordingly.

4 Feedlot location maps

4.1 Location by State and capacity distribution

4.1.1 Analysis of feedlot distribution by State (2012)

Table 1 and

Figure 1 provide an analysis of the current distribution of feedlots by State. Currently, Queensland has the most feedlots by count and capacity. Although New South Wales and Western Australia both had a similar number of individual feedlots (93 and 94 respectively), their capacities are significantly different (368,036 and 121,435 respectively). This was reflected by New South Wales' average being over three times greater than the average of Western Australia. On average capacity, (disregarding both Northern Territory and Tasmania both with a single feedlot), New South Wales and Victoria had the highest average capacity, while Queensland and Western Australia average were mid range, while South Australia had the lowest average.

TABLE 1 – DISTRIBUTION OF FEEDLOTS BY STATE (2012)

State	No. of Feedlots	%	Average Capacity	Pen Capacity	% Industry Capacity
QLD	581	68.3	1,199	696,450	52.2

NSW	93	10.9	3,957	368,036	27.6
WA	94	11.1	1,292	121,435	9.1
VIC	28	3.3	2,914	81,597	6.1
SA	53	6.2	959	50,834	3.8
TAS	1	0.1	12,500	12,500	0.9
NT	1	0.1	4,000	4,000	0.3
TOTAL	851	100	1,569	1,334,852	100

4.1.2 Analysis of feedlot distribution by State (2006)

Table 2 provides an analysis of the 2006 distribution of feedlots by State (Davidson 2007). Queensland had the most feedlots by count and capacity in 2006.

TABLE 2 – DISTRIBUTION OF FEEDLOTS BY STATE (2006)

State	No. of Feedlots	%	Average Capacity	Pen Capacity	% Industry Capacity
QLD	592	67.1	1,011	598,680	50.8
NSW	95	10.8	3,847	365,486	31.0
WA	100	11.3	997	99,711	8.5
VIC	20	2.3	3,316	66,325	5.6
SA	73	8.3	384	28,017	2.4
TAS	1	0.1	12,500	12,500	1.1
NT	1	0.1	8,000	8,000	0.7
TOTAL	882	100	1,336	1,178,719	100

4.1.3 Analysis of feedlot distribution by State (1990)

Table 3 provides an analysis of the 1990 distribution of feedlots by State (Tucker et al. 1991).

TABLE 3 – DISTRIBUTION OF FEEDLOTS BY STATE (1990)

State	No. of Feedlots	%	Pen Capacity	% Industry Capacity
QLD	471	75	262,200	54
NSW	90	14	120,865	25
WA	34	5	33,720	7
VIC	7	1	42,840	9
TAS	1	<1	2,000	<1
SA	27	4	22,560	5
NT	1	<1	700	<1
Total	631	100	484,885	100

4.1.4 Discussion of State distribution of feedlots

Although there has been some minor movement in terms of relative state numbers of individual feedlots and capacities, the proportion of individual feedlots within the states has remained generally unchanged in the past 22 years. Queensland has dominated both in number and capacity of individual feedlots.

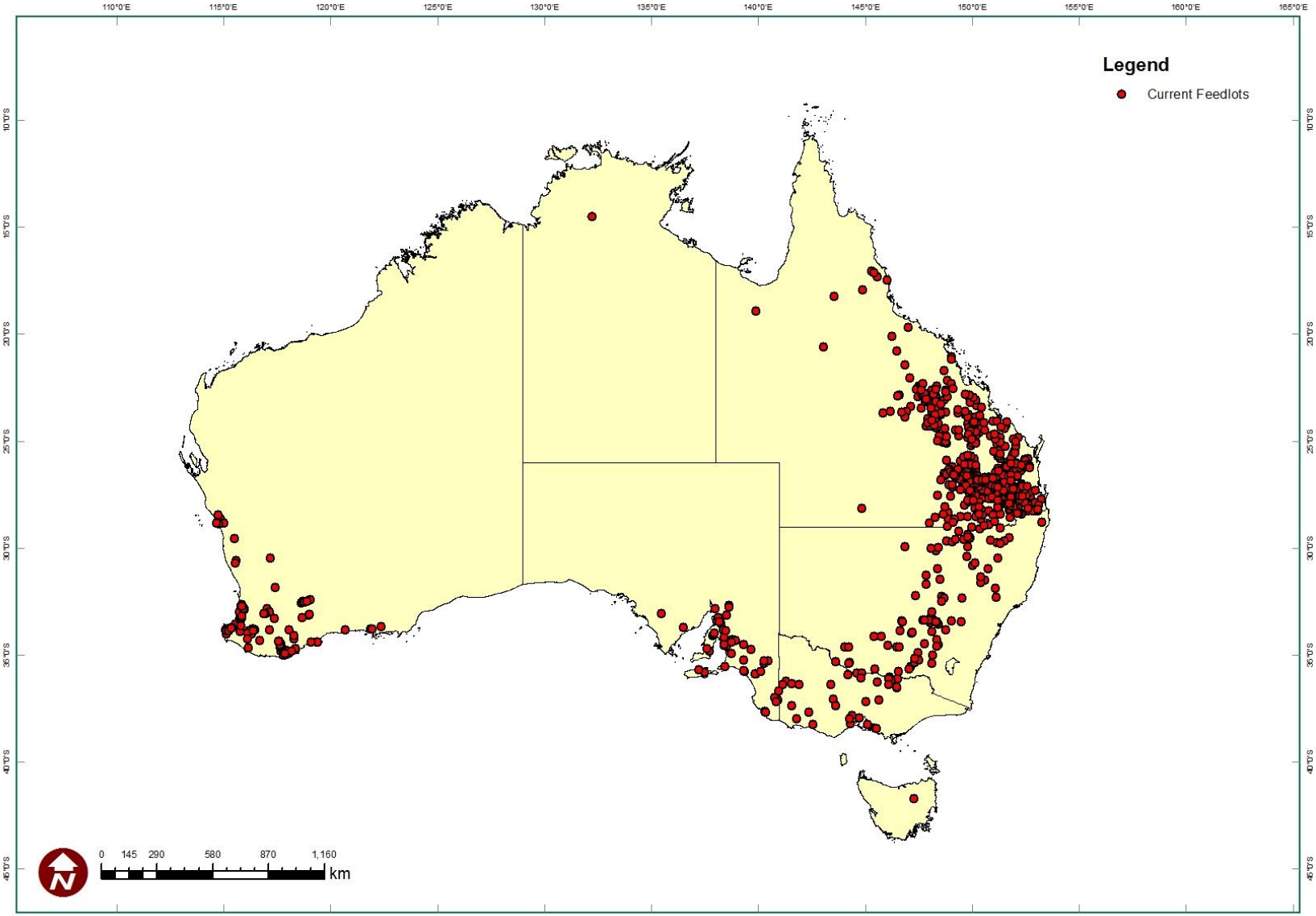

FIGURE 1 – LOCATION OF FEEDLOTS ACROSS AUSTRALIA (2012)

4.1.5 Size distribution of feedlots (2012)

Based on the current data, Table 4 and Figures 2-6 provide an analysis of total pen capacity for feedlots of different size range. The current analysis illustrates that 24.68% of feedlots (1000 head of cattle+) currently have 85% of the feedlot capacity. Applying a cutoff on feedlot size of 5000 head of cattle or above revealed that 7.76% of feedlots contain 63% of capacity.

TABLE 4 – SIZE DISTRIBUTION OF FEEDLOTS (2012)

Feedlot Size Range	No. of Feedlots	%	Average Capacity	Pen Capacity	% Industry Capacity
< 400	417	49.0	147	61,423	5
400 to 999	224	26.3	628	140,778	11
1000 to 4999	144	16.9	1,980	285,088	21
5000 to 9999	36	4.2	6,528	235,020	18
>10000	30	3.5	20,418	612,543	46
Summary of >5000	***66***	***7.8***	***12,842***	***847,563***	***63***
Grand Total:	851	100	1,569	1,334,852	100

4.1.6 Size distribution of feedlots (2006)

The 2006 analysis is summarised in Table 5 (Davidson 2007). The 2006 analysis revealed that 22.1% of feedlots (1000 head of cattle +) were producing 83.8% of the capacity of feedlot cattle. Applying a cutoff on feedlot size of 5000 head of cattle and above revealed that approximately 6.1% of feedlots were contained approximately 61% of capacity.

TABLE 5 – SIZE DISTRIBUTION OF FEEDLOTS (2006)

Feedlot Size Range	No. of Feedlots	%	Average Capacity	Pen Capacity	% Industry Capacity
< 400	477	54.1	128	61,076	5.2
400 to 999	210	23.8	619	129,996	11.0
1000 to 4999	141	16.0	1,903	268,369	22.8
5000 to 9999	27	3.1	6,746	182,155	15.5
>10000	27	3.1	19,893	537,123	45.6
Summary of >5000	***54***	***6.1***	***13,320***	***719,278***	***61.0***
Grand Total:	882	100	1,336	1,178,719	100

4.1.7 Size distribution of feedlots (1990)

Applying the same criteria used in the current and 2006 data, Table 6 presents the 1990 data (Tucker et al. 1991). This shows that 16% of feedlots (1000 head of cattle +) represented 78% of pen capacity and 3.5% of feedlots, 5000 head of cattle or above represented 46% of pen capacity.

TABLE 6 – SIZE DISTRIBUTION OF FEEDLOTS (1990)

	No. of Feedlots	%	Average	Pen Capacity	% Industry Capacity
<50	140	22.1	46	6,400	1
50-399	284	45.0	151	42,950	9
400-999	106	16.8	535	56,705	12
1000-1999	42	6.7	1,174	49,320	10
2000-4999	37	5.9	2,864	105,990	22
>5000	22	3.5	10,160	223,520	46
Total	631	100	768	484,885	100

4.1.8 Discussion of feedlot capacity versus feedlot size

The results for current pen capacity illustrate that the Australian feedlot industry is still growing. The increase is not linked to the number of individual feedlots but to the changes in size capacities.

While noting comments made in Section 3.3, feedlots under the size of 400 head of cattle have experienced a major decrease, from 67% of individual feedlots in 1990 to 54% in 2006 and a further drop to 49% based on current figures. The decrease in percentage of individual feedlots is mirrored by a decrease in overall percentage capacity of feedlots. In 1990, the percentage capacity of individual feedlots under 400 head of cattle was 10%, this decreased to 5.2% in 2006 and fell marginally to 5.0% in 2012, based on current figures. The drop in the proportion of smaller individual feedlots can be seen as a number of expansions in 1990 feedlots, or alternatively that a large number of feedlots under 400 head of cattle were not counted in the survey.

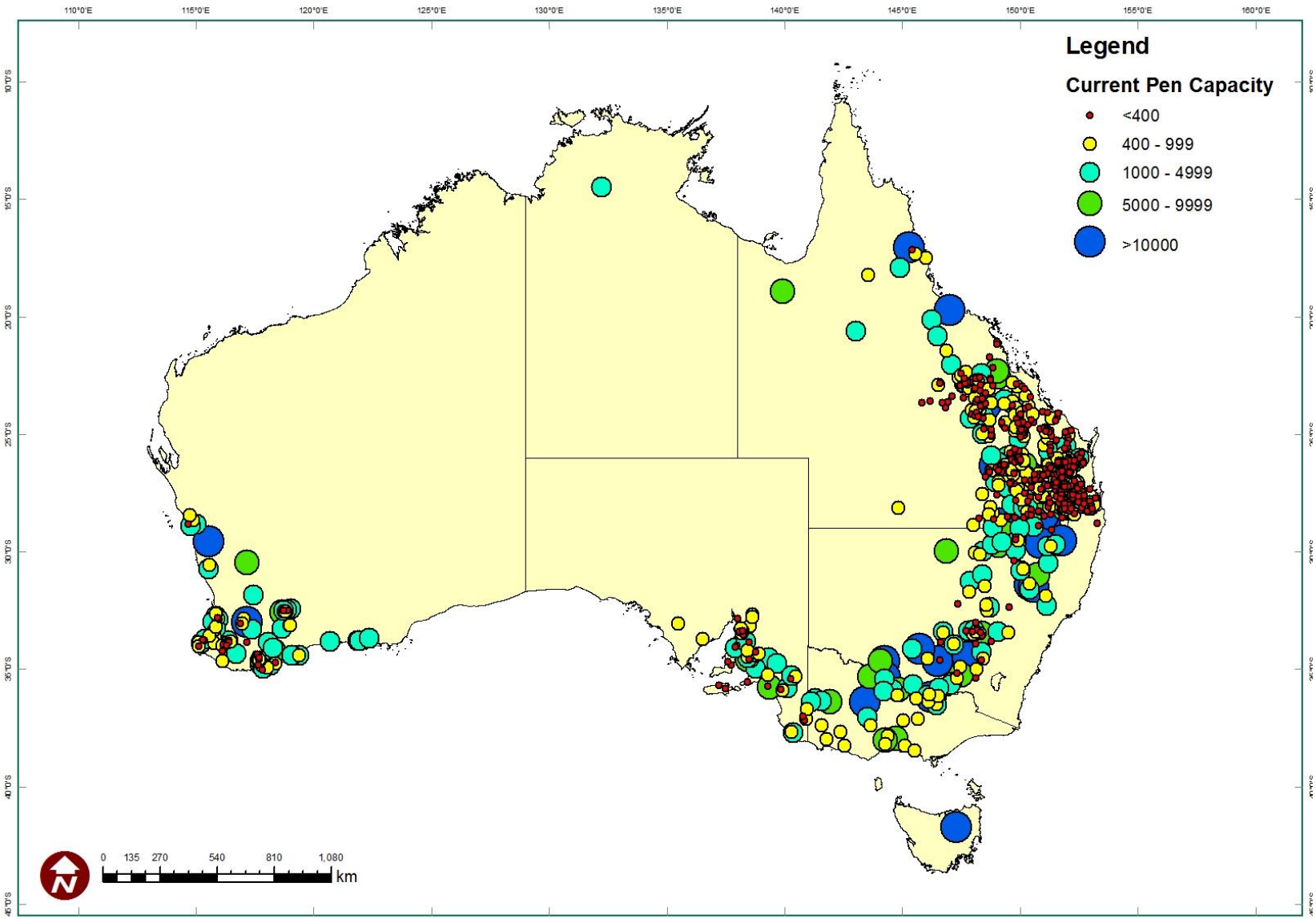

FIGURE 2 – FEEDLOT DISTRIBUTION BY FEEDLOT SIZE (2012)

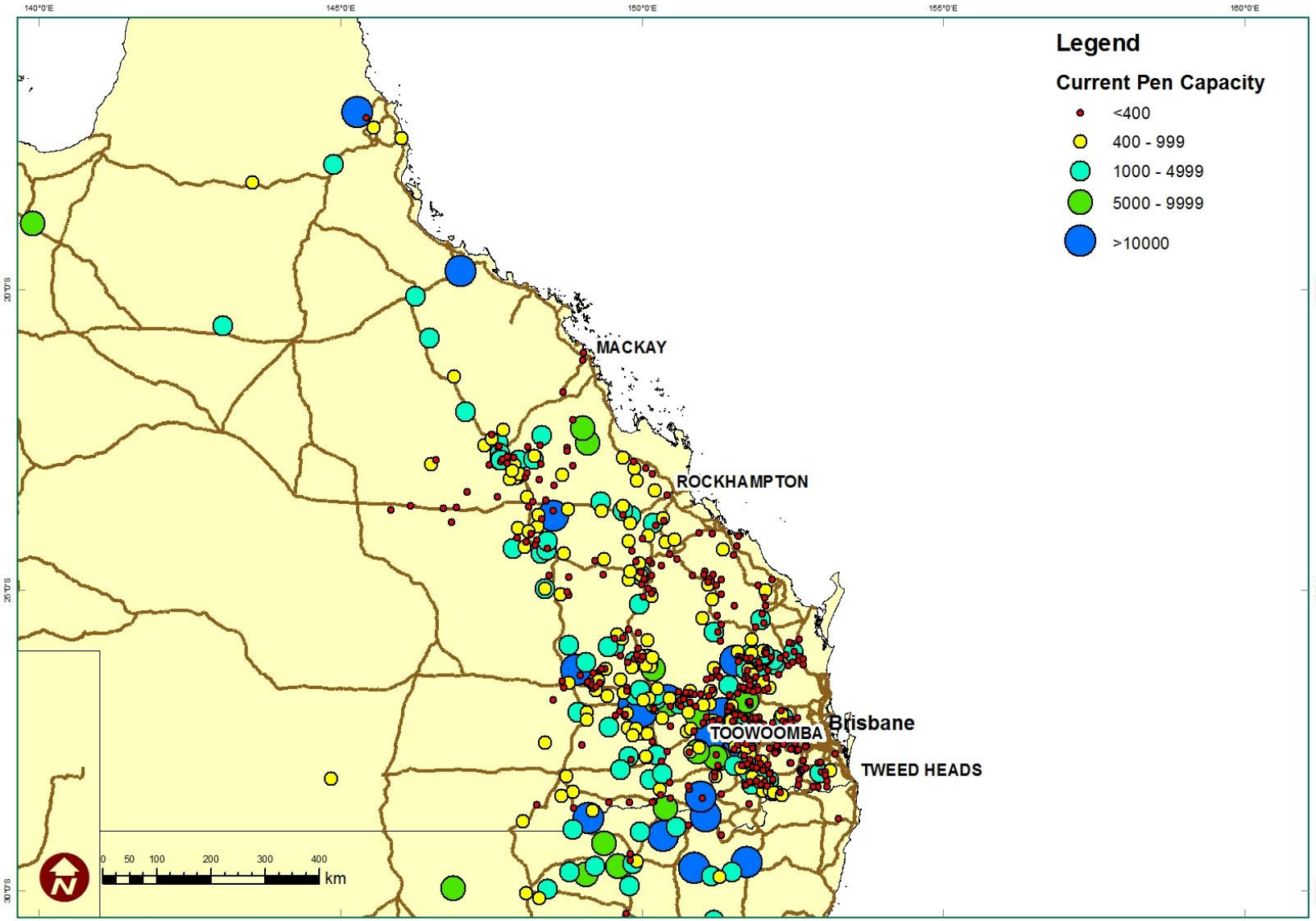

FIGURE 3 – FEEDLOT DISTRIBUTION BY FEEDLOT SIZE – QUEENSLAND (2012)

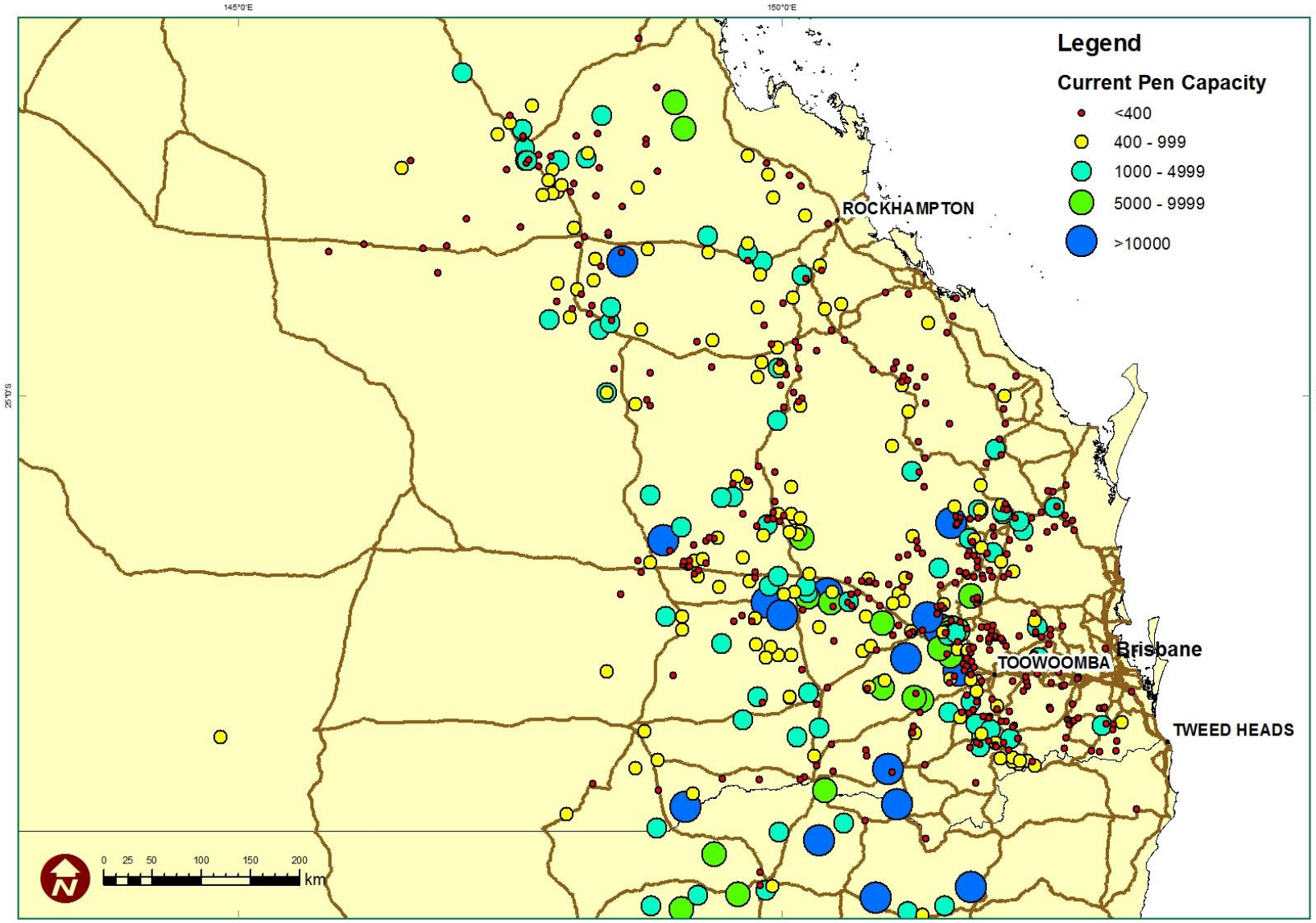

FIGURE 4 – FEEDLOT DISTRIBUTION BY FEEDLOT SIZE – SE QUEENSLAND (2012)

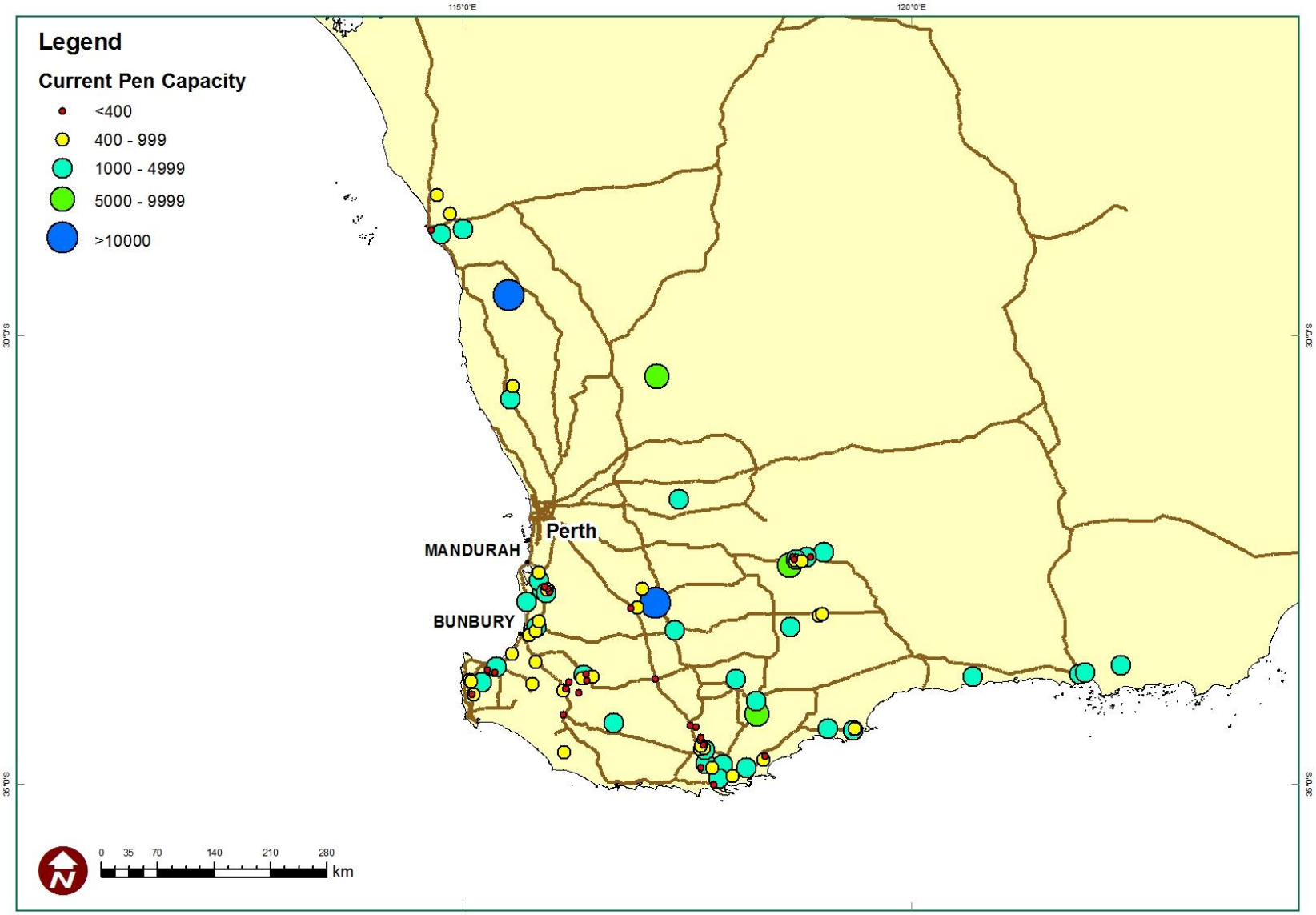

FIGURE 5 – FEEDLOT DISTRIBUTION BY FEEDLOT SIZE - WESTERN AUSTRALIA (2012)

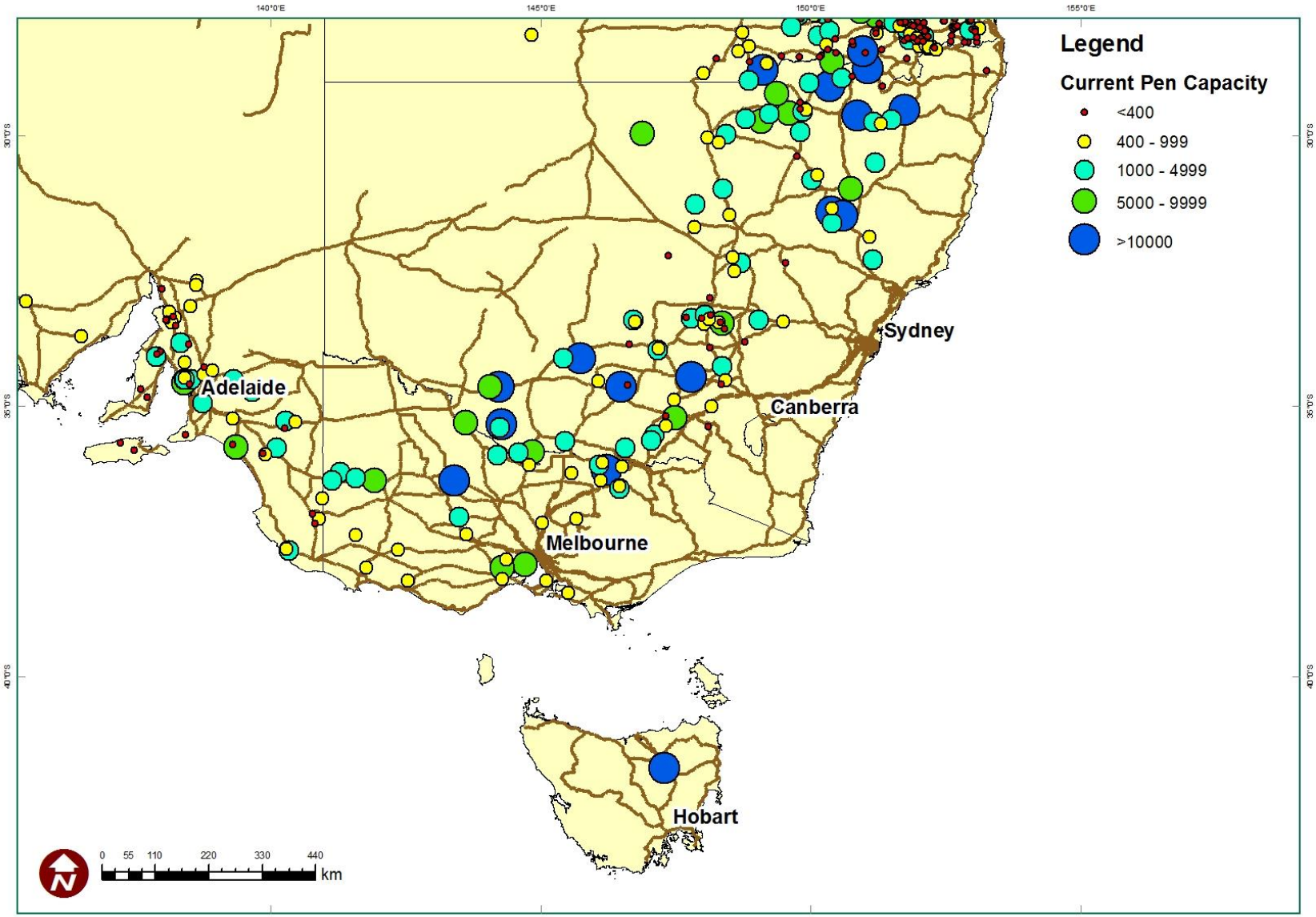

FIGURE 6 – FEEDLOT DISTRIBUTION BY FEEDLOT SIZE - NSW, VIC & TAS (2012)

4.2 Major Australian feedlots

4.2.1 Major Australian feedlots (2012)

Table 7 lists the current major Australian feedlots. The current top 22 feedlots were included in this summary. The top 22 were chosen as both the 2006 and the 1990 major Australian feedlot lists had 22 entries.

The top 22 have changed marginally since the 2006 analysis (Davidson 2007). There have been three additions to the current list since the 2006 analysis. The highest individual feedlot capacity (53,333 head of cattle) has remained unchanged since 2006. The lowest individual feedlot capacity has also remained unchanged (12,000 head of cattle). However, the entire capacity has increased by 8%, from 487,123 head of cattle in 2006 to 524,543 head of cattle based on current data. The top 22 feedlots make up 45% of the industry total pen capacity.

TABLE 7 – MAJOR AUSTRALIAN FEEDLOTS (2012)

Feedlot Name	Locality	State	Current Capacity
JBS Swift Riverina Beef (Rockdale)	YANCO	NSW	53,333
Whyalla	TEXAS	QLD	50,000
JBS Swift - Prime City	TABBITA	NSW	35,000
Grassdale	DALBY	QLD	34,000
Rangers Valley	GLEN INNES	NSW	32,000
Miamba (Condamine)	CONDAMINE	QLD	28,944
JBS Beef City	PURAWANDA	QLD	26,500
JBS Caroona	QUIRINDI	NSW	23,000
Bottle Tree	CHINCHILLA	QLD	22,266
Killara	QUIRINDI	NSW	20,000
Myola	NORTH STAR	NSW	20,000
Charlton	CHARLTON	VIC	20,000
ICM Peechelba	WANGARATTA	VIC	20,000
Smithfield	PROSTON	QLD	18,500
Sandalwood	DALBY	QLD	18,000
Jindalee	COOTAMUNDRA	NSW	18,000
Goonoo	COMET	QLD	17,500
Aronui	DALBY	QLD	15,000
Ravensworth	HAY	NSW	15,000
Nebru Plains*	THREE SPRINGS	WA	13,000
Tasmania Feedlot Pty Ltd	PERTH	TAS	12,500
JBS Mungindi	MUNGINDI	QLD	12,000
	TOTAL		524,543

*Nebru Plains is not shown on

Figure 7 and

Figure 8 as Western Australia is not covered.

4.2.2 Major Australian feedlots (2006)

The major Australian feedlots in 2006 (Davidson 2007) are listed in Table 8. The 2006 major Australian feedlots made up 41% of the Australian industry's total capacity.

Figure 7 shows the position of the current major Australian feedlots and the 2006 major Australian feedlots.

TABLE 8 – MAJOR AUSTRALIAN FEEDLOTS (2006)

Feedlot Name	Locality	State	2006 Capacity
Rockdale Beef Feedlot	YANCO	NSW	53,333
Whyalla	TEXAS	QLD	50,000
Prime City	TABBITA	NSW	35,000
Rangers Valley	GLEN INNES	NSW	30,000
Beef City	PURAWANDA	QLD	26,500
Caroona	QUIRINDI	NSW	24,000
Peechalbah	WANGARATTA	VIC	22,000
Myola	NORTH STAR	NSW	20,000
Killara	QUIRINDI	NSW	20,000
Charlton Feedlot	CHARLTON	VIC	20,000

Smithfield	PROSTON	QLD	18,500
Goonoo	COMET	QLD	17,500
Jindalee	COOTAMUNDRA	NSW	17,000
Sandalwood	DALBY	QLD	15,290
Miamba	CONDAMINE	QLD	15,000
Aronui	DALBY	QLD	15,000
Ravensworth	HAY	NSW	15,000
Mundindi	MUNGINDI	QLD	14,000
Yambinya	DENILIQUIN	NSW	13,500
Tasmania Feedlot	PERTH	TAS	12,500
Lillyvale	CONDAMINE	QLD	12,000
Brindley Park	ROMA	QLD	12,000
	TOTAL		487,123

4.2.3 Major Australian feedlots (1990)

The 22 major Australian feedlots in 1990 (Tucker et al. 1991) are presented in Table 9, including a notation on whether that feedlot closed in the last 22 years. Six feedlots that were in the 1990 top 22 have closed in the past 22 years.

Figure 8 shows the position of the current major Australian feedlots and the 1990 major Australian feedlots.

TABLE 9 – MAJOR AUSTRALIAN FEEDLOTS (1990)

Feedlot Name	Locality	State	Closed	Current Capacity
Beef City	PURRAWANDA	QLD		25,000
Whyalla	TEXAS	QLD		20,000
Charlton	CHARLTON	VIC		18,000
Peechalbah	WANGARATTA	VIC		17,000
Caroona	QUIRINDI	NSW		15,500
Rangers Valley	GLEN-INNES	NSW		12,000
Burdekin Valley Beeflot	HOME HILL	QLD	Y	12,000
AMH	BEAUDESERT	QLD	Y	12,000
Aronui	DALBY	QLD		10,000
Caroona	MUNGINDI	QLD		10,000

Jindalee	COOTAMUNDRA	NSW		9,000
Gunnee	DELUNGRA	NSW		8,000
Killara	QUIRINDI	NSW		6,500
Crown Beef	STAWELL	VIC	Y	6,000
Lillyvale	CONDAMINE	QLD		5,300
Sandalwood	DALBY	QLD		5,000
Wide Bay	KILKIVAN	QLD		5,000
Gurley	MOREE	NSW	Y	5,000
Perenc	YASS	NSW	Y	5,000
Balgowan	ACLAND	QLD	Y	5,000
CRM (Ladysmith)	WAGGA WAGGA	NSW		4,500
Kurrawong	QUINALOW	QLD		4,000
	TOTAL			219,800

4.2.4 Discussion of the major Australian feedlots

A comparison between the 1990, 2006 and 2012 major Australian feedlots shows how the top end of the industry has changed over 22 years. The minimum capacity that was included in the 1990 feedlots survey was 4000 head. This increased to 12 000 head of cattle in 2006 and remained unchanged for the current analysis. The industry capacity for the top 22 feedlots has also changed. In 1990, total capacity of the top 22 feedlots totalled 219 800 head of cattle; in 2006 this figure rose to 478 123 head of cattle and further increased to 524 543 head for current capacity.

Geographically, New South Wales has seen the greatest growth in numbers of individual feedlots that have joined the top 22 since 1990. Tasmania was the only additional state to join the major feedlots list in 2006. Western Australia has joined the list since 2006 with the addition of Nebru Plains Feedlot at Three Springs.

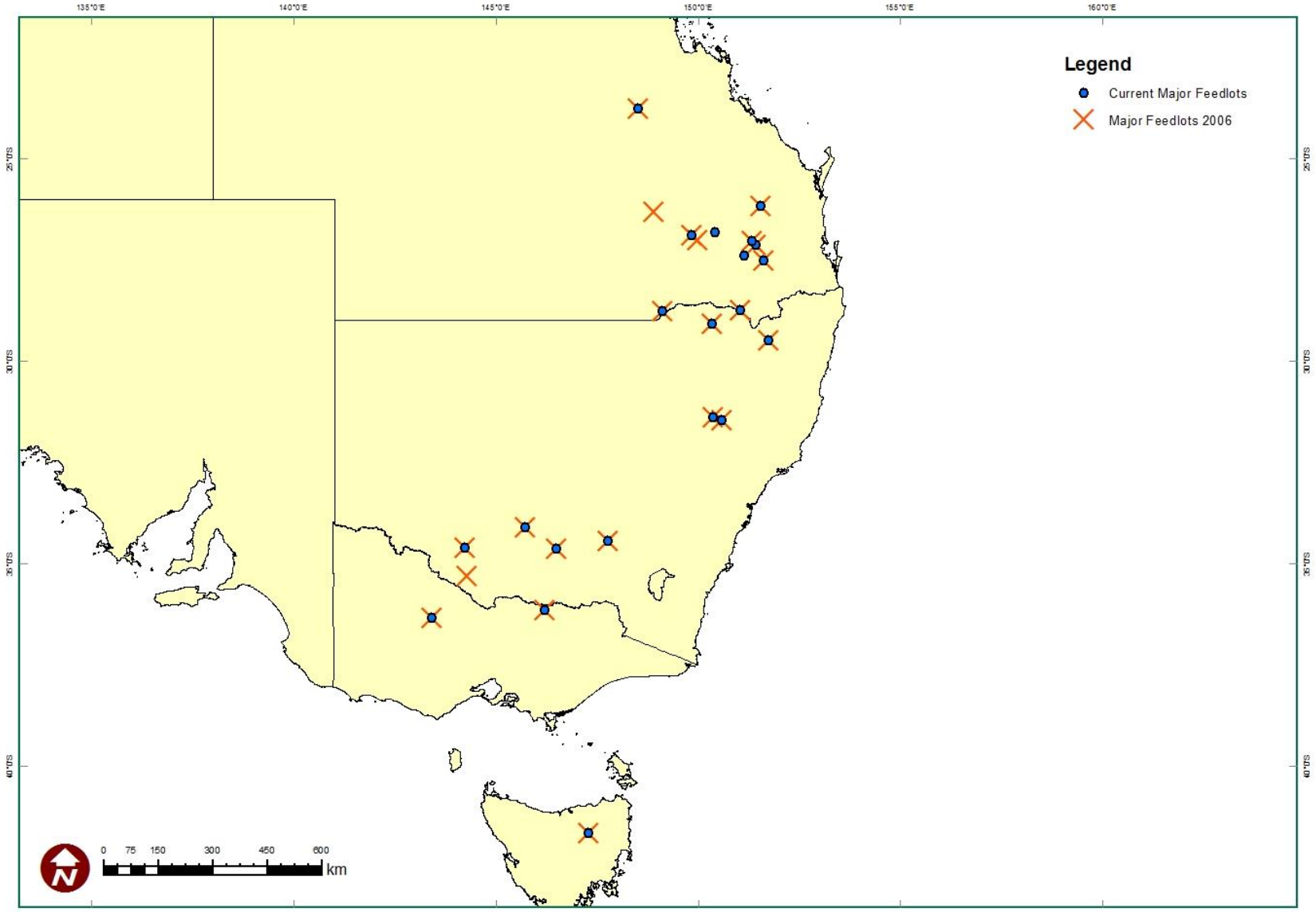

FIGURE 7 – COMPARISON OF MAJOR AUSTRALIAN FEEDLOTS – 2006 AND 2012

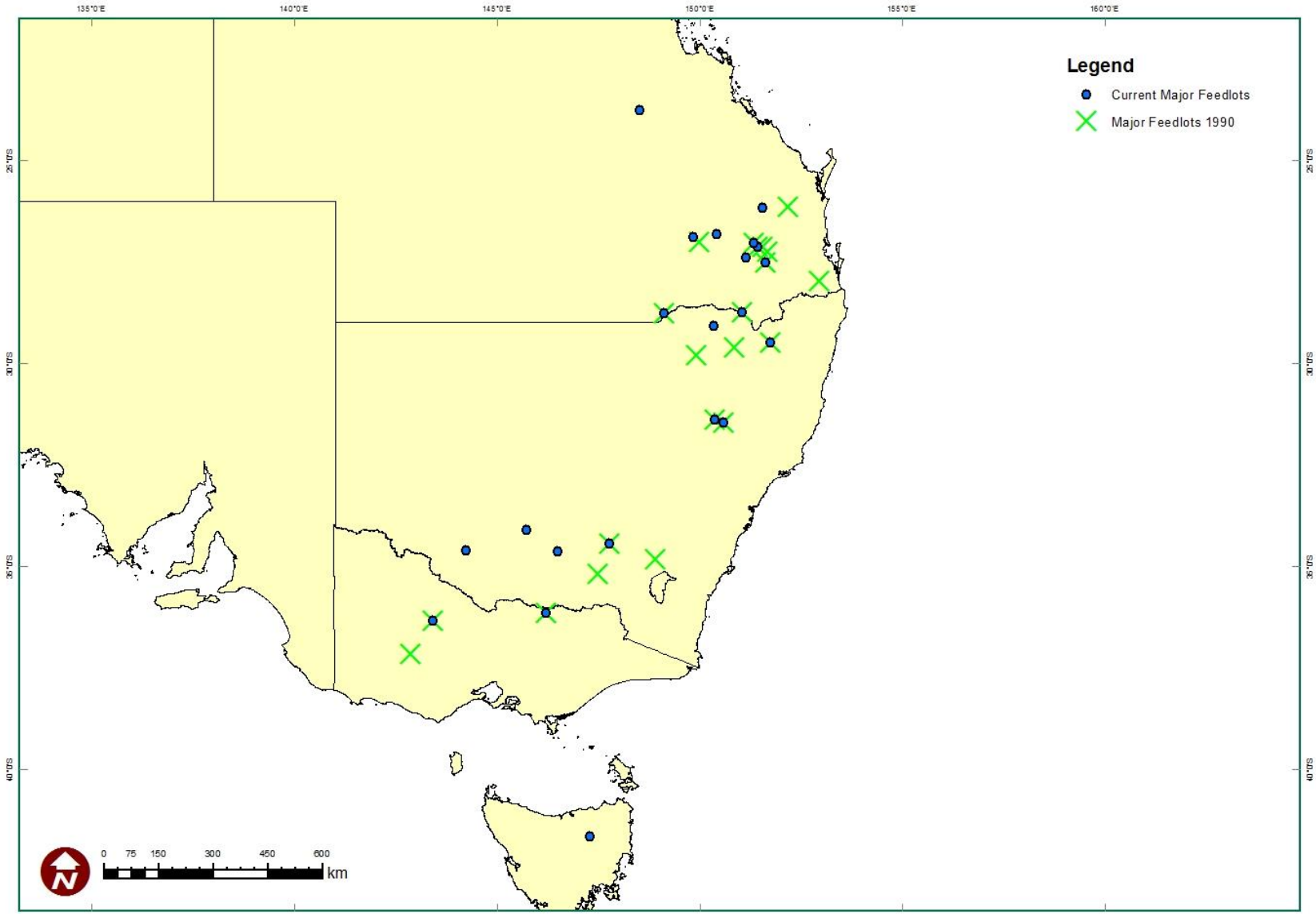

FIGURE 8 – COMPARISON OF MAJOR AUSTRALIAN FEEDLOTS – 1990 AND 2012

4.3 Location by climatic zone

4.3.1 Feedlot distribution with respect to mean annual rainfall

An important aspect of selecting sites for feedlots is annual rainfall. This single element is able to affect a variety of issues in every feedlot. Climatic conditions have an impact both on the environmental performance of a feedlot and the welfare of the animals fed there (Watts & Tucker 1994). Annual rainfall of less than 750 mm is recommended, due to the impact of a wet climate on potential for water pollution and an increase in odour generation.

4.3.1.1 Feedlot distribution with respect to mean annual rainfall (2012)

The rainfall data for Table 10 was sourced from the Bureau of Meteorology, 2006, using an annual rainfall map with isohyets with 50 mm intervals from 600 mm to 800 mm.

Table 10 shows a summary of Australia's current feedlots in areas with above and below 750 mm of annual rainfall.

Figure 9 shows the current feedlot distribution with annual rainfall. This shows that 26% of individual feedlots are in areas that have greater than 750 mm of annual rainfall. While this is a significant number of individual feedlots, it only represents 12% of Australia's current total pen capacity. Another distinction is found in the average feedlot capacity. Feedlots in areas with under 750 mm of annual rainfall have an average capacity that is 2.7 times greater than that of feedlots with annual rainfall greater than 750 mm.

TABLE 10 – LOCATION OF FEEDLOTS WITH RESPECT TO MEAN ANNUAL RAINFALL (2012)

	No. of Feedlots	%	Average Capacity	Pen Capacity	% Industry Capacity
Summary					
< 750 mm	628	74	1,874	1,176,767	88
> 750 mm	223	26	709	158,085	12
< 600 mm	142	17	2,566	364,406	27
600-650 mm	250	29	1,867	466,743	35
650-700 mm	143	17	1,809	258,752	19
700-750 mm	93	11	934	86,866	7
> 750 mm	223	26	709	158,085	12
TOTAL	**851**	**100**	**1,569**	**1,334,852**	**100**

4.3.1.2 Feedlot distribution with respect to mean annual rainfall (2006)

Table 11 shows a summary of Australia's feedlots in 2006 (Davidson 2007) that were situated in areas with annual rainfall above and below 750 mm.

4.3.1.3 Feedlot distribution with respect to mean annual rainfall (1990)

Table 12 shows a summary of Australia's feedlots in 1990 (Tucker et al. 1991) that were situated in areas with annual rainfall above and below 750 mm. The rainfall data from 1990 was sourced from the Dept. of Science, 1977 (sourced from (Tucker et al. 1991).

TABLE 11 – LOCATION OF FEEDLOTS WITH RESPECT TO MEAN ANNUAL RAINFALL (2006)

	No. of Feedlots	%	Average Capacity	Pen Capacity	% Industry Capacity
Summary					
< 750 mm	658	74.6	1,573	1,035,189	87.8
> 750 mm	224	25.4	641	143,530	12.2
< 600 mm	240	27.2	1,648	395,620	33.6
600-650 mm	183	20.8	1,761	322,319	27.3
650-700 mm	147	16.7	1,544	226,925	19.3
700-750 m	88	10.0	1,026	90,325	7.7
> 750 mm	224	25.4	641	143,530	12.2
TOTAL	882	100	1,336	1,178,719	100

TABLE 12 – LOCATION OF FEEDLOTS WITH RESPECT TO MEAN ANNUAL RAINFALL (1990)

	No. of feedlots	%	Average Capacity	Pen Capacity	% Industry Capacity
Summary					
< 750 mm	351	60.2	1,033	362,605	77

> 750 mm	232	39.8	466	108,160	23

< 500 mm	43	7.4	1,130	48,600	10
500-625 mm	96	16.5	1,525	146,465	31
625-750 mm	212	36.4	790	167,540	36
750-825 mm	92	15.8	481	44,260	9
>825 mm	140	24.0	456	63,900	14
TOTAL	583	100	807	470,830	100

4.3.1.4 Discussion of feedlot distribution with respect to mean annual rainfall

In most guidelines, it is suggested that feedlots be located in areas with an annual rainfall of less than 750 mm. This is because potential water pollution and odour problems are generally more difficult to manage in a wet climate. In 1990, 39.8% of individual feedlots were located in areas with higher than 750 mm of rainfall per year – this amounted to 23% of the industry capacity at the time. Currently, there are 26% of individual feedlots in areas with greater than 750 mm of annual rain. This accounts for 12% of the industry capacity. Although the physical number of feedlots only reduced from 232 feedlots in 1990 to 223 current feedlots, it shows that new feedlots were less inclined to locate in areas where annual rainfall exceeded 750 mm. This shows a clear trend for feedlots to move towards drier sites with fewer environmental issues and, usually, fewer close neighbours.

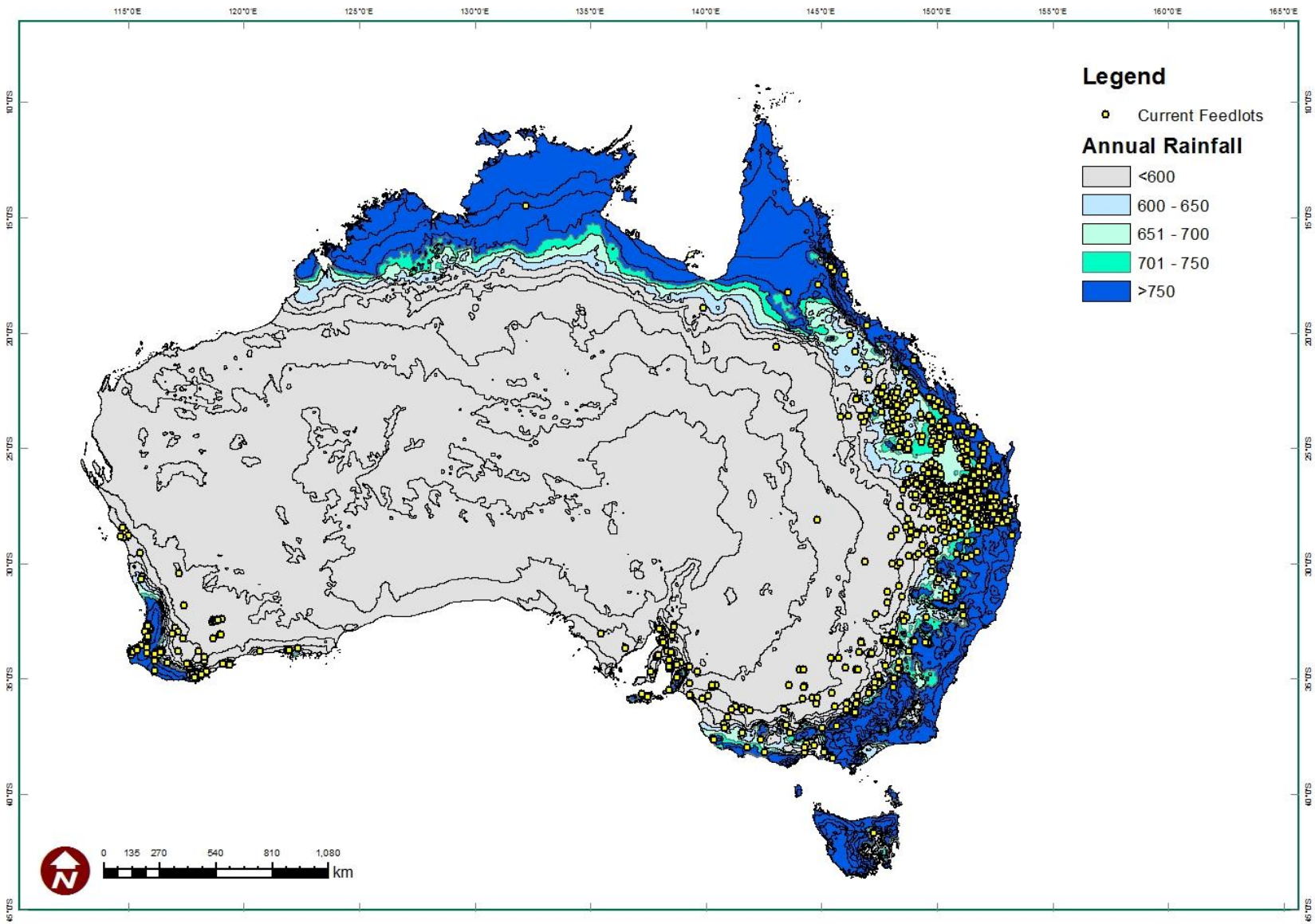

FIGURE 9 – FEEDLOT DISTRIBUTION VS MEAN ANNUAL RAINFALL (2012)

4.3.2 Feedlot distribution with respect to seasonal rainfall

The distribution of rainfall throughout the year has a significant bearing on the management of a feedlot (Tucker et al. 1991). Feedlots located in areas with high winter rainfall and low evaporation rates have problems with odour management, as a wet pad is the main cause of odour generation (Tucker et al. 1991).

Classifying feedlot distribution with respect to seasonal rainfall is useful in understanding the management issues that face Australian feedlots. In a wet environment, excess runoff quickly fills the sedimentation pond. Coupling this with a low evaporation rate, such as in winter months, the sediment load can become excessive before an opportunity presents to remove the accumulated solids from the bed of the basin.

The reason for preference for high evaporation and summer dominant rainfall is due to the high quantity of runoff that affects the pads can dry more rapidly after rainfall and hence the period in which odour is caused is reduced.

4.3.2.1 Feedlot distribution with respect to seasonal rainfall (2012)

Table 13 shows a summary of Australia's current feedlots in relation to seasonal rainfall.

Figure 10 shows the current feedlot distribution with seasonal rainfall. Currently, 22.8% of individual feedlots are located in winter dominant rainfall areas. This accounts for 26.7% of current pen capacity. There has been a fall in the number of individual feedlots located in winter dominant rainfall areas since 2006.

TABLE 13 – DISTRIBUTION OF FEEDLOTS IN SEASONAL RAINFALL ZONE (2012)

Climatic Zone	No. of Feedlots	%	Average Capacity	Pen Capacity	% Industry Capacity
Winter Dominant	53	6.2	1,214	64,354	4.8
Winter	141	16.6	2,075	292,521	21.9
Total Winter	***194***	***22.8***	***1,840***	***356,875***	***26.7***
Summer Dominant	33	3.9	1,999	65,973	4.9
Summer	577	67.8	1,282	739,705	55.4
Total Summer	***610***	***71.7***	***1,321***	***805,678***	***60.4***
Arid	1	0.1	400	400	>0.1
Uniform	46	5.4	3,737	171,899	12.9
TOTAL	851	100	1,569	1,334,852	100

4.3.2.2 Feedlot distribution with respect to seasonal rainfall (2006)

Table 14 shows the 2006 Australian feedlots in relation to seasonal rainfall (Davidson 2007).

4.3.2.3 Feedlot distribution with respect to seasonal rainfall (1990)

Table 15 shows the 1990 Australian feedlots in relation to seasonal rainfall (Tucker et al. 1991).

TABLE 14 – DISTRIBUTION OF FEEDLOTS IN SEASONAL RAINFALL ZONE (2006)

Climatic Zone	No of Feedlots	%	Average Capacity	Pen Capacity	% Industry Capacity
Winter Dominant	58	6.6	866	50,255	4.3
Winter	157	17.8	1,574	247,106	21.0
Total Winter	***215***	***24.4***	***1,383***	***297,361***	***25.2***
Summer Dominant	33	3.7	1,828	60,326	5.1
Summer	584	66.2	1,103	644,282	54.7
Total Summer	***617***	***69.9***	***1,142***	***704,608***	***59.8***
Arid	1	0.1	400	400	>0.1
Uniform	49	5.6	3,599	176,350	15.0
TOTAL	882	100	1,336	1,178,719	100

TABLE 15 – DISTRIBUTION OF FEEDLOTS IN SEASONAL RAINFALL ZONE (1990)

Climatic Zone	No. of Feedlots	%	Average Capacity	Pen Capacity	% Industry Capacity
Summer Dominant Rainfall – High Evap.	536	85	640	343,415	71
Uniform Rainfall	18	3	1,041	18,750	4
Winter Dominant Rainfall – Low Evap.	77	12	1,594	122,720	25
TOTAL	631	100	1,091	484,885	100

4.3.2.4 Discussion of feedlot distribution with respect to seasonal rainfall

The analysis shows changes between the distribution of individual feedlots in 1990 and current feedlots. The number of feedlots in winter dominant areas has significantly increased. The average capacity of current feedlots in these areas is 1840 head of cattle compared to 1594 head in 1990. This demonstrates that growth has occurred due to the opening of new feedlots as opposed to the expansion of existing feedlots. Placement of feedlots in winter dominant regions adds management pressures to the operation of a feedlot. The increase in numbers of individual feedlots in winter dominant regions would suggest this is not a limiting factor to the location of feedlots, and that other factors (e.g. Grain supply) are more important.

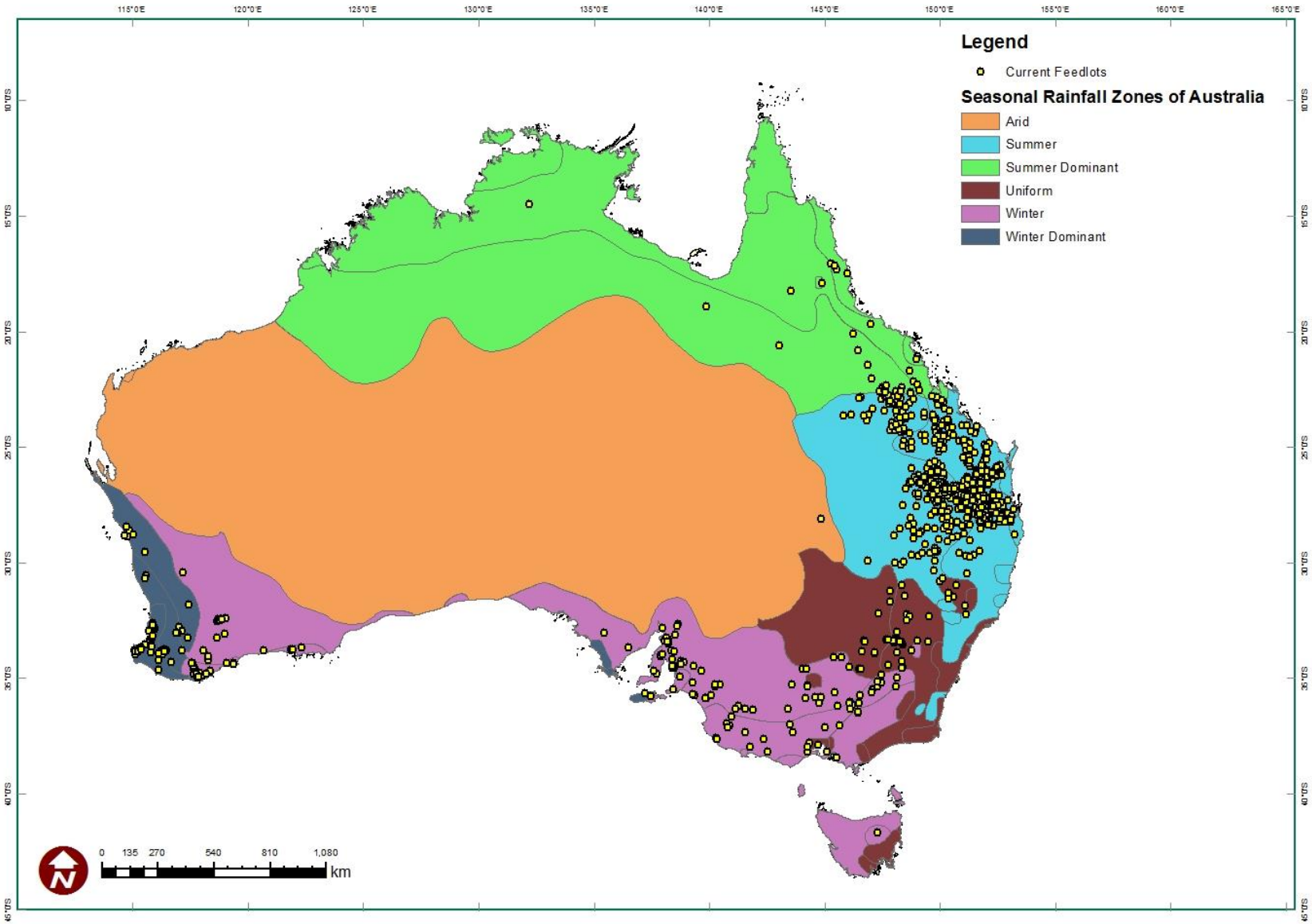

FIGURE 10 – FEEDLOTS DISTRIBUTION VS SEASONAL RAINFALL ZONE (2012)

4.4 Location by river catchment basin

4.4.1 Distribution of feedlot capacity by river catchment basin (2012)

The analysis of current distribution of feedlots with respect to river catchments considers Australia's 11 major catchments, outlined in Table 19. The majority of the industry capacity is located in the Murray Darling Basin (MDB) and the North East Coast (NEC) catchment. The MDB and NEC have a similar number of individual feedlots in them, 345 and 343 respectively. However, there is a significant difference in their capacities. The MDB accounts for 57.8% of the industry capacity whereas the NEC only accounts for 22.6% of the industry capacity.

TABLE 16 – DISTRIBUTION OF FEEDLOT CAPACITY BY RIVER CATCHMENT BASIN (2012)

	No. of Feedlots	%	Average Capacity	Pen Capacity	%
Murray Darling	345	40.5	2,237	771,714	57.8
North East Coast	343	40.3	880	301,865	22.6
South West Coast	87	10.2	1,629	141,691	10.6
South East Coast	25	2.9	1,022	25,549	1.9
Gulf of Carpentaria	4	0.5	3,490	13,960	1.0
Tasmania	1	0.1	150	150	0.0
South Australian Gulf	33	3.9	1,125	37,124	2.8
Timor Sea	1	0.1	10,000	10,000	0.7
Indian Ocean	6	0.7	2,300	13,799	1.0
Western Plateau	2	0.2	250	500	0.0
Lake Eyre	4	0.5	4,625	18,500	1.4
TOTAL	851	100	1,569	1,334,852	100

The distribution of the feedlots within the MDB is summarised in Table 17 and

Figure 11. The Condamine-Culgoa River basin holds 55.4% of the individual feedlots in the MDB but only 38.8% of the capacity for this catchment. The Border Rivers catchment accounts for 11.0% of the number of individual feedlots but accounts for 17.8% of the capacity for this catchment.

The distribution of the feedlots within the NEC is summarised in Table 18 and

Figure 12. The Fitzroy River Basin holds 42.7% of the individual feedlots in the NEC Catchment which accounts for 35.7% of the capacity for this catchment. About 67.8% of individual feedlots and 64.4% of capacity for this catchment are located within two basins, the Fitzroy River Basin and the Burnett River Basin. There are 14 individual feedlots located in the Burdekin Basin. This accounts for only 4.1% of the individual feedlots in the catchment but accounts for 14.3% of the capacity for this catchment.

TABLE 17 – DISTRIBUTION OF FEEDLOT CAPACITY IN THE MURRAY DARLING BASIN

	No. of Feedlots	%	Average Capacity	Pen Capacity	%
Condamine Culgoa	191	55.4	1,798	343,481	38.8
Border Rivers	38	11.0	4,162	158,145	17.8
Murrumbidgee	17	4.9	5,367	91,232	10.3
Lachlan	22	6.4	3,588	78,929	8.9
Namoi	11	3.2	5,082	55,899	6.3
Gwydir	12	3.5	2,837	34,049	3.8
Murray-Riverina	7	2.0	4,500	31,499	3.6
Ovens	6	1.7	4,020	24,120	2.7
Avoca	2	0.6	11,800	23,600	2.7
Moonie	12	3.5	862	10,338	1.2
Macquaire Bogan	9	2.6	928	8,349	0.9
Mallee	4	1.2	1,447	5,787	0.7
Lower Murray	4	1.2	2,550	10,200	1.2
Benanee	0	0.0	0	0	0.0
Wimmera Avon	2	0.6	3,500	7,000	0.8
Castlereagh	2	0.6	1,000	1,999	0.2
Broken River	2	0.6	687	1,374	0.2
Loddon River	2	0.6	800	1,600	0.2
Goulburn River	2	0.6	700	1,399	0.2
TOTAL	345	100	2,568	886,001	100

4.4.2 Distribution of feedlot capacity by river catchment basin (2006)

Table 19 summarises the distribution of feedlots in the 11 major catchments (Davidson 2007). Table 20 summarises the sub-distribution of feedlots within the Murray Darling Basin. Table 21 summarises the sub-distribution of feedlots within the North East Coast Catchment. The distribution is similar to the current distribution with the majority of feedlots occupying the Murray Darling Basin and also the North East Coast Catchment.

4.4.3 Distribution of feedlot capacity by river catchment basin (1990)

The 1990 survey (Tucker et al. 1991) sub-divided the distribution of feedlots by river catchment slightly differently to the 2006 data (Davidson 2007) and current data. This data is still useful for comparison with the 2006 data as it breaks down the two major catchments, MDB and NEC, for further examination.

The major changes that have occurred in terms of growth in catchments are; the total percentage of individual feedlots that have declined in the Murray Darling Catchment with a drop of the total percent of individual feedlots from 47.2% in 1990 to 40.5% for the current analysis. The percentage of individual feedlots in the North East Coast ("Queensland Coastal Basins" as described in Tucker et al. 1991) has stayed relatively the same. In 1990 the figure for individual feedlots in the NEC was 38.6%. This has marginally increased to 40.3% in the current analysis.

TABLE 18 – DISTRIBUTION OF FEEDLOT CAPACITY IN THE NE COAST CATCHMENT (2012)

	No. of Feedlots	%	Average Capacity	Pen Capacity	%
Fitzroy	146	42.7	530	77,374	35.7
Burnett	86	25.1	724	62,247	28.7
Mary	16	4.7	557	8,910	4.1
Burdekin	14	4.1	2,221	31,092	14.3
Brisbane	43	12.6	383	16,465	7.6
Logan Albert	20	5.8	651	13,018	6.0
Herbert	1	0.3	49	49	0.0
Barron	2	0.6	150	299	0.1
Boyne	1	0.3	3,500	3,500	1.6
Johnstone River	1	0.3	999	999	0.5
Styx	1	0.3	750	750	0.3
Kolan	2	0.6	49	98	0.0
Baffle Creek	3	0.9	216	648	0.3
Calliope	2	0.6	175	350	0.2
O-Connell	1	0.3	20	20	0.0
Pine River	1	0.3	700	700	0.3
Plane Creek	1	0.3	150	150	0.1
Haughton River	1	0.3	10,000	10,000	4.6
TOTAL	342	100	634	216,669	100

TABLE 19 – DISTRIBUTION OF FEEDLOT CAPACITY BY RIVER CATCHMENT BASIN (2006)

	Count	%	Average Capacity	Pen Capacity	%
Murray-Darling	347	39.3	2,277	790,241	67.0
North East Coast	348	39.5	603	209,833	17.8
South West Coast	94	10.7	1,013	95,251	8.1
South East Coast	26	3.0	897	23,313	2.0
Gulf of Carpentaria	4	0.5	5,250	20,999	1.8
Tasmania	1	0.1	12,500	12,500	1.1
South Australian Gulf	50	5.7	243	12,172	1.0
Timor Sea	1	0.1	8,000	8,000	0.7
Indian Ocean	5	0.6	592	2,960	0.3
Western Plateau	2	0.2	1,000	2,000	0.2
Lake Eyre	4	0.5	363	1,450	0.1
TOTAL	882	100	1,336	1,178,719	100

TABLE 20 – DISTRIBUTION OF FEEDLOT CAPACITY IN THE MURRAY DARLING BASIN (2006)

	No. of Feedlots	%	Average Capacity	Pen Capacity	%
Condamine-Culgoa	195	56.2	1,429	278,726	35.3
Border Rivers	37	10.7	3,723	137,764	17.4
Murrumbidgee	16	4.6	5,380	86,082	10.9
Lachlan	23	6.6	3,558	81,829	10.4
Namoi	10	2.9	5,870	58,699	7.4
Gwydir	12	3.5	2,754	33,049	4.2
Murray-Riverina	10	2.9	3,050	30,499	3.9
Ovens	6	1.7	4,353	26,120	3.3
Avoca	1	0.3	20,000	20,000	2.5
Moonie	12	3.5	862	10,338	1.3
Macquaire-Bogan	10	2.9	835	8,349	1.1
Mallee	6	1.7	965	5,787	0.7
Lower Murray	4	1.2	1,425	5,700	0.7
Benamee	1	0.3	2,500	2,500	0.3
Wimmera-Avon	1	0.3	2,000	2,000	0.3
Castlereagh	2	0.6	1,000	1,999	0.3
Broken River	1	0.3	800	800	0.1
TOTAL	347	100	2,277	790,241	100

TABLE 21 – DISTRIBUTION OF FEEDLOT CAPACITY IN THE NORTH EAST COAST CATCHMENT (2006)

	Count	%	Average Capacity	Pen Capacity	%
Fitzroy	149	42.8	762	113,534	54.1
Burnett	86	24.7	641	55,102	26.3
Mary	16	4.6	753	12,050	5.7
Burdekin	17	4.9	655	11,127	5.3
Brisbane	44	12.6	202	8,897	4.2
Logan Albert	20	5.8	174	3,485	1.7
Herbert	1	0.3	2,000	2,000	1.0
Barron	2	0.6	275	550	0.3
Boyne	1	0.3	500	500	0.2
Johnstone River	1	0.3	499	499	0.2
Styx	1	0.3	499	499	0.2
Kolan	2	0.6	230	460	0.2
Baffle Creek	3	0.9	150	450	0.2
Calliope	2	0.6	150	300	0.1
O-Connell	1	0.3	150	150	0.1
Pine River	1	0.3	150	150	0.1
Plane Creek	1	0.3	80	80	<0.1
TOTAL	348	100	603	209,833	100

TABLE 22 – DISTRIBUTION OF FEEDLOT CAPACITY BY RIVER CATCHMENT BASIN (1990)

	No. of Feedlots	%	Pen Capacity	%
QUEENSLAND COASTAL BASINS				
Qld. North Coast	3	1.4	12,550	14.2
Burdekin	0	0.0	0	0.0
Qld Central Coast	3	1.4	600	0.7
Fitzroy	65	30.1	27,870	31.5
Qld. South Coast	145	67.1	47,345	53.6
Total Qld. Coastal:	**216**	**38.6**	**88,365**	**19.2**
MURRAY-DARLING BASIN				
Upper Murray & Victoria	6	2.3	41,240	13.4
Murrumbidgee	10	3.8	13,450	4.4
Lachlan	4	1.5	10,250	3.3
Border Rivers	31	11.7	55,895	18.2
Moonie	17	6.4	5,510	1.8
Gwydir	7	2.7	16,300	5.3
Namoi	19	7.2	37,400	12.2
Castlereagh	3	1.1	1,800	0.6
Macquarie	5	1.9	6,400	2.1
Condamine-Culgoa	161	61.0	119,075	38.7
Other Murray-Darling	1	0.4	450	0.2
Total Murray-Darling:	**264**	**47.2**	**307,770**	**66.8**
OTHER BASINS				
New South Wales Coastal	16	20.3	9,040	14.0
Western Australia	29	36.7	18,120	28.0
South Australia (Central)	14	17.7	15,400	23.8
Others	20	25.3	22,210	34.3
Total Other Basins:	**79**	**14.1**	**64,770**	**14.1**
TOTAL	559	100	460,905	100

4.4.3.1 Discussion of feedlot distribution by river catchment basin

Examination of the two major basins, the Murray Darling Basin and the North East Coast Catchment, including their sub-catchments is limited by the lack of corresponding information reported in the 1990 data (Tucker et al. 1991). However, the data does demonstrate change. The Murray Darling Basin was home to 264 individual feedlots in 1990 with a capacity of 307 770 head. In 2006, this had grown to 347 feedlots with a capacity of 790 241 head. On analysis of the current feedlots the number of individual feedlots has slightly declined to 345 but the capacity has further increased to 771 741 head. In 1990, the North East Coast Catchment had 216 individual feedlots with a capacity of 88 365 head. This increased to 348 individual feedlots with 209 833 head of capacity in 2006. On analysis of the current feedlots, the number of individual feedlots has slightly declined to 343 but the capacity has further increased to 301 865 head of cattle.

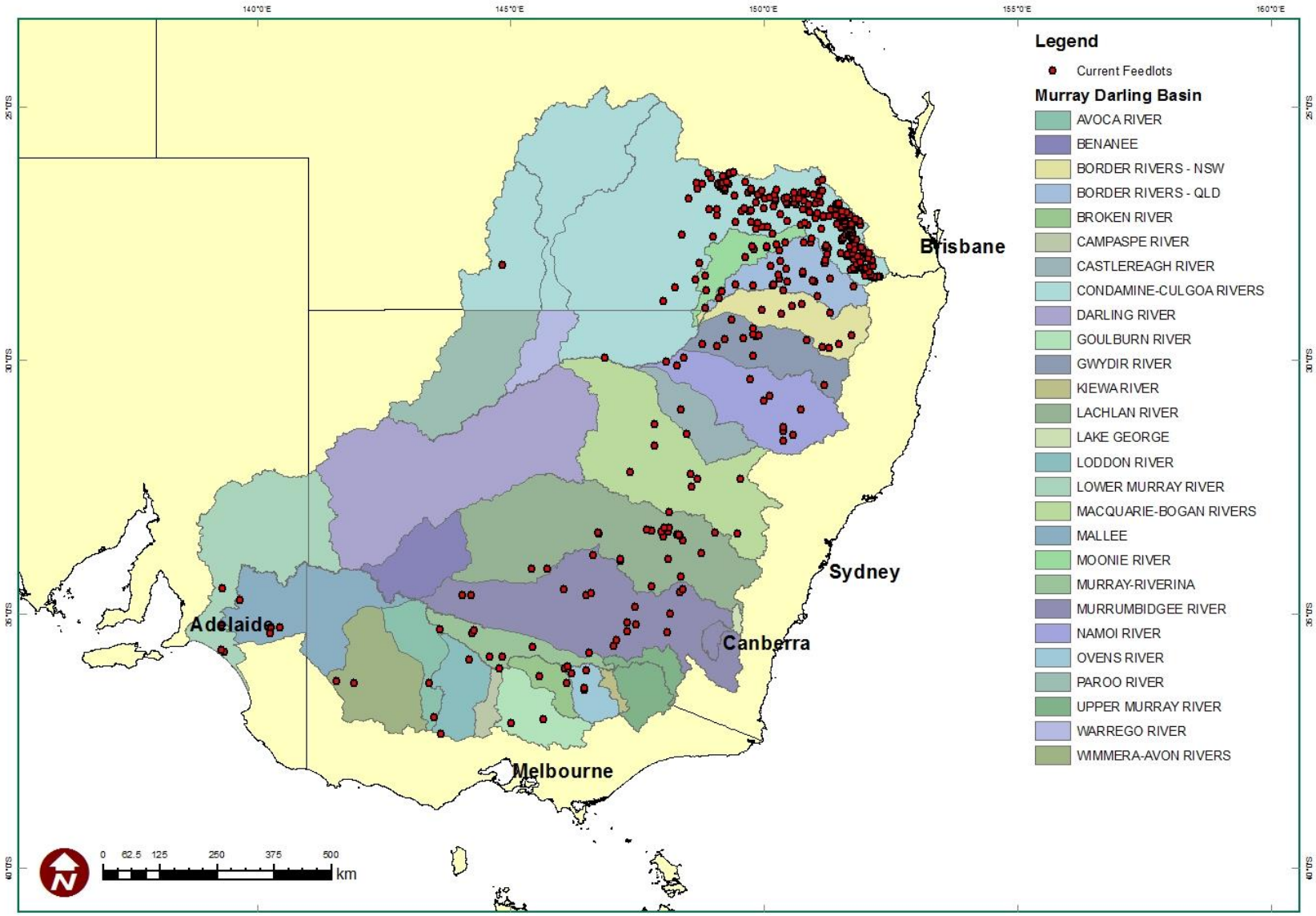

FIGURE 11 – FEEDLOT DISTRIBUTION IN THE MURRAY DARLING BASIN (2012)

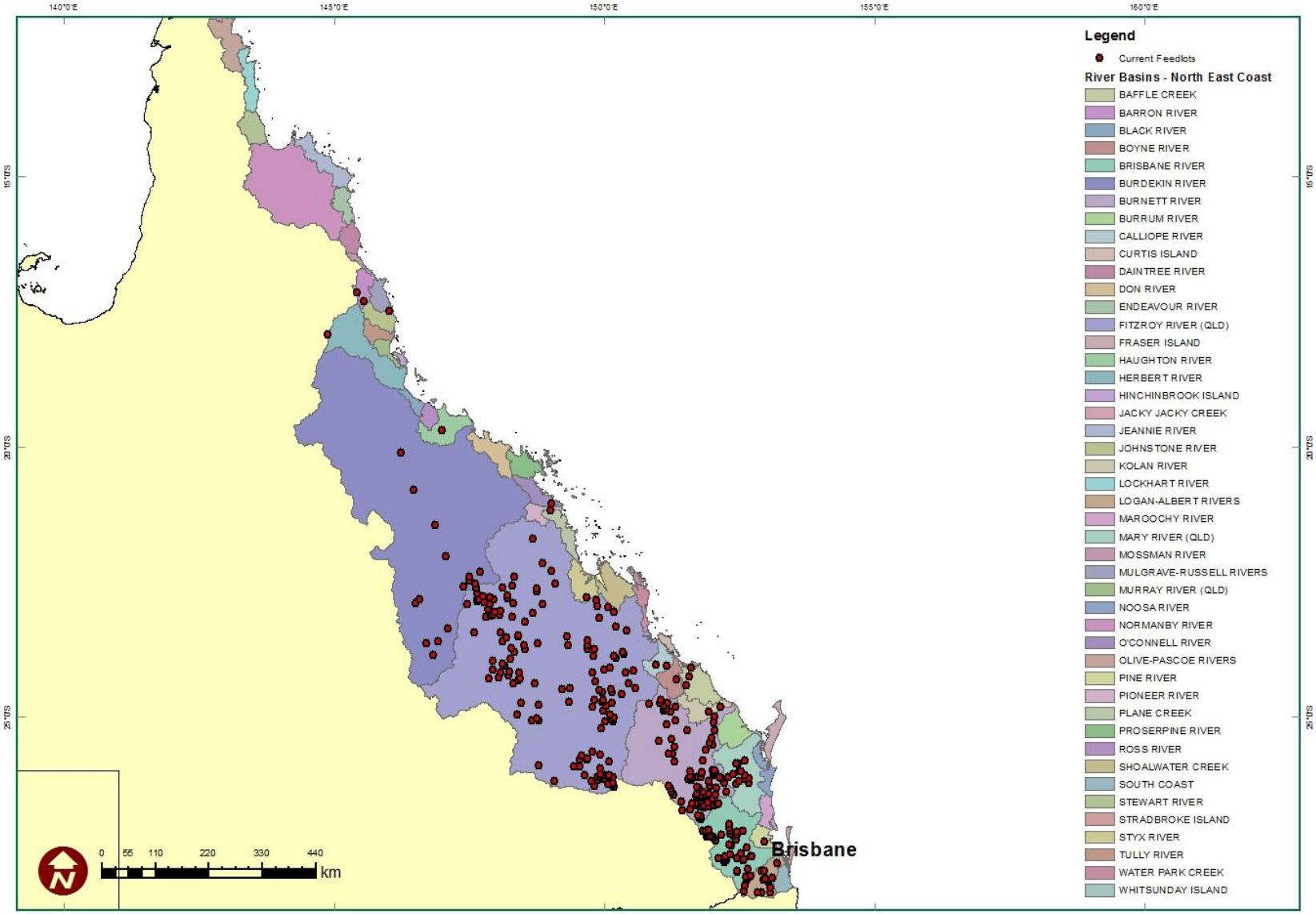

FIGURE 12 – FEEDLOT DISTRIBUTION IN THE NORTH EAST COAST CATCHMENT (2012)

4.5 Location by groundwater basins

A large number of individual feedlots are located within the Great Artesian Basin. There are 195 individual feedlots with 337 223 head of capacity, which accounts for 25% of the total industry capacity.

Figure 13 is a map of the distribution of feedlots in relation to the Great Artesian Basin (GAB).

4.6 Location by proximity to mining (petroleum) leases

Coal seam gas (CSG) has rapidly become a major industry in Australia during the last decade. The multi-billion dollar industry has also become a controversial and divisive one between feedlot owners and mining companies. It is still unclear whether the impact of the coal seam gas mining industry on the environment is as serious as some claim.

Australia is the driest continent on earth and as it pushes towards an ever increasing population it is imperative to be mindful of the fact that water is not a bountiful resource. With the increasing number of petroleum leases and gas producing CSG mines competing for water resources – feedlot owners could experience water security issues due to the greater economic potential associated with mining in Australia.

Figure 14 shows feedlots with a current pen capacity of greater than 2000 head of cattle and their location with respect to petroleum leases.

Table 23 lists 11 feedlots (of greater that 2000 head capacity) that are currently located within petroleum lease areas. These 11 feedlots account for approximately 7% of the total industry capacity.

TABLE 23 – CURRENT FEEDLOTS THAT ARE WITHIN PETROLEUM LEASE AREAS

Feedlot Name	Pen Capacity
Baker Brothers Family Trust	2,000
Grassdale	34,000
Wambo Feedlot (Little Back Creek)	8,000
Monclova	2,000
Wieambilla	5,000
Wallumba (Old Condabri)	8,800
Bottle Tree Feedlot	22,266
Condabri Feedlot	4,790
Roxborough	3,120
Brindley Park	12,000
Warnoah Feedlot	2,000

TOTAL	**103,976**

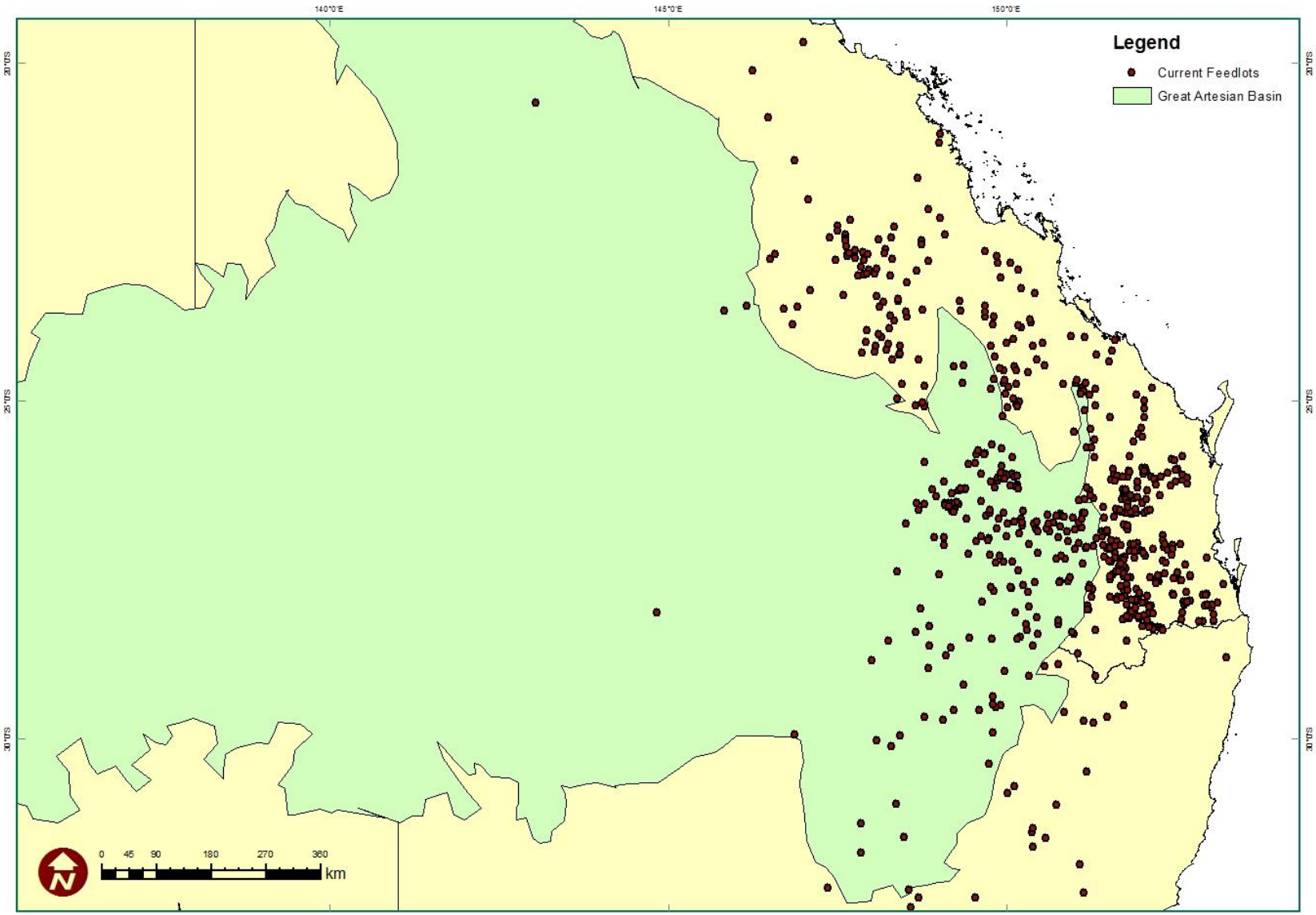

FIGURE 13 – DISTRIBUTION OF FEEDLOTS ACROSS THE GREAT ARTESIAN BASIN (2012)

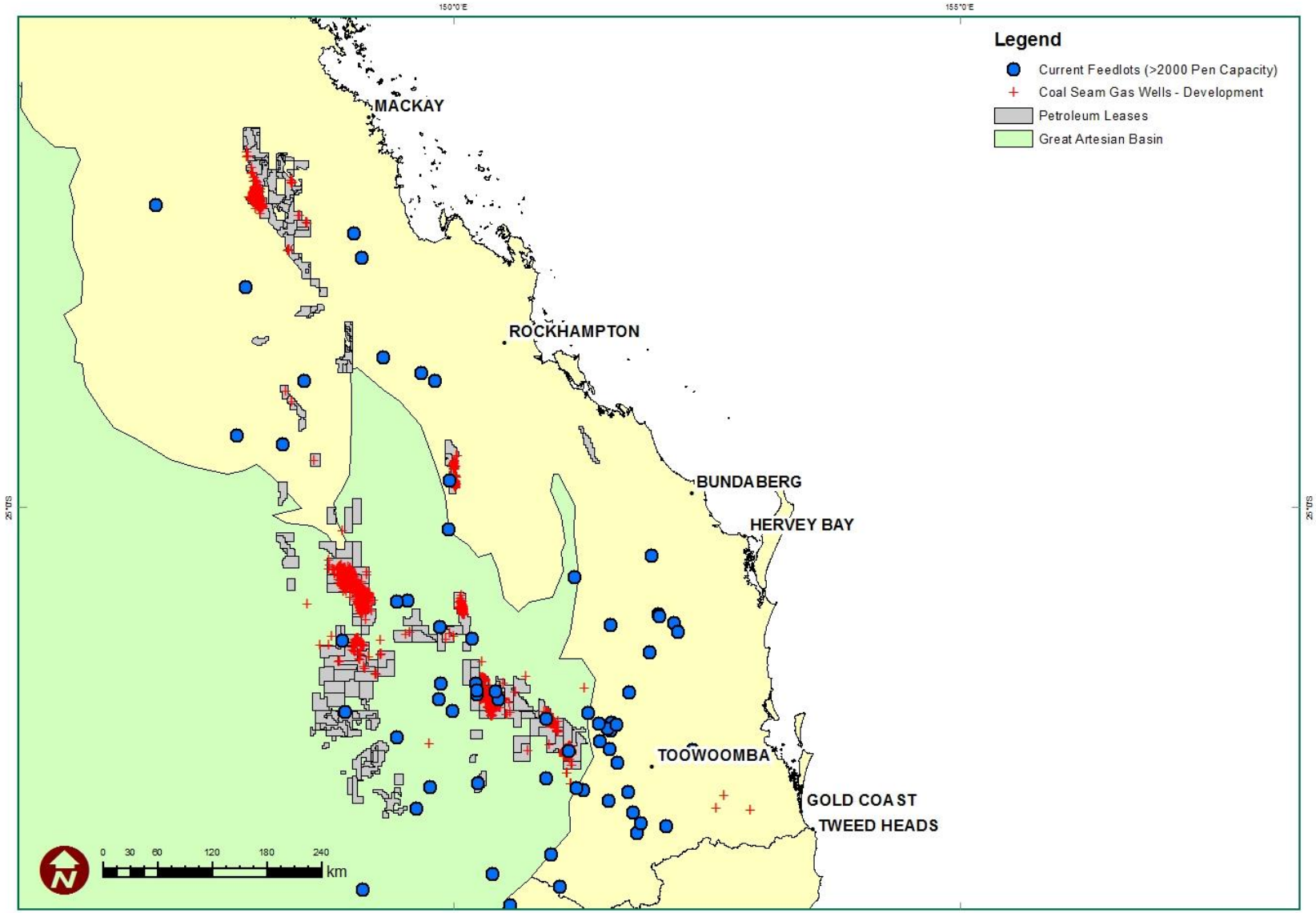

FIGURE 14 – DISTRIBUTION OF FEEDLOTS WITH PETROLEUM LEASES AND PRODUCTION CSG WELLS (2012)

5 References

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