

final report

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Determination of Benefits from Pasture Improvement

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CONTENTS

	Page number
i LIST OF TABLES	4
ii LIST OF FIGURES	7
iii LIST OF MAPS	8
1. EXECUTIVE SUMMARY.	13
2. INTRODUCTION AND OBJECTIVES.	15
3. SURVEY DATABASE.	18
3.1 Description	18
3.2 Pasture Codes	23
3.3 Species Codes	23
3.4 Distribution of pasture species	28
3.5 Estimated botanical composition	30
3.6 Other survey questions	31
4. MODELLING ADAPTATION	33
5. ECONOMIC ANALYSIS	33
6. DATA INTEGRATION AND ANALYSIS	35
6.1 Comparison of potential zones with surveyed presence	35
6.2 Methods for refining areas	37
6.3 Estimated areas sown to major species by State	41
6.4 Potential areas of adaptation for major species by State	41
6.5 Comparison of AgStats and survey estimates for stocking rate	41
7. CONCLUSIONS	82

8. REPORTS AND PUBLICATIONS	83
9. ACKNOWLEDGMENTS	84
10. REFERENCES	85
11. MAPS	86
12. APPENDIX	228
12.1 Survey Form	228
12.2 Description of survey database structure	233
12.3 Species recorded in survey database	246
12.4 Cultivars recorded in survey database	254
12.5 Potential error sources in survey database	256
12.6 Model algorithms	259

LIST OF TABLES

	Page number
Table 1. Summary of survey database.	21
Table 2. Total number of LGAs with responses to each question.	22
Table 3. Standard and additional pasture codes assigned in Phase I.	24
Table 4. Pasture types for new pasture codes assigned in Phase II.	26
Table 5. Summary of species codes assigned.	27
Table 6. Economic models for subterranean clover-based pastures on representative farms in three regions of Victoria.	34
Table 7. Using various methods for the refinement of estimates of the pastured area of an SLA/LGA.	40
Table 8. Estimated area of pasture containing various species for all agricultural SLA's for NSW.	43
Table 9. Estimated area of pasture containing various species for all agricultural SLA's for Queensland.	47
Table 10. Estimated area of pasture containing various species for all agricultural SLA's for South Australia.	49
Table 11. Estimated area of pasture containing various species for all agricultural LGA's for Tasmania.	52
Table 12. Estimated area of pasture containing various species for all agricultural SLA's for Victoria.	53
Table 13. Estimated area of pasture containing various species for all agricultural SLA's for Western Australia.	58
Table 14. Areas of potential suitability for various species for all agricultural SLA's for NSW.	61
Table 15. Areas of potential suitability for various species for all agricultural SLA's for Queensland.	65
Table 16. Areas of potential suitability for various species for all agricultural SLA's for South Australia.	68
Table 17. Areas of potential suitability for various species for all	

agricultural LGA's for Tasmania.	71
Table 18. Areas of potential suitability for various species for all agricultural SLA's for Victoria.	72
Table 19. Areas of potential suitability for various species for all agricultural SLA's for Western Australia.	77
Table 20. a) Estimated total area of pasture containing particular species together with area of native pasture types for each State . Estimates for Queensland are less reliable due to the incomplete state of the Form B data. b) estimated potential area of adaptation for major pastures species for each State.	80
Table 21. Surveyed estimates and AgStats derived calculations of stocking rates for the Severn LGA/SLA.	81

Appendix Tables

Table I. Form A data structure.	233
Table II. Form B Q1-4 data structure.	234
Table III. Form B Q5-6 data structure.	235
Table IV. Form B Q7 data structure.	236
Table V. Form B Q8-9 data structure.	237
Table VI. Form B Q10 data structure.	238
Table VII. Form B Q11-13 data structure.	239
Table VIII. Form B Q14 data structure.	240
Table IX. Form B Q15 data structure.	241
Table X. Form B Q16 data structure.	242
Table XI. Form B Q17-18 data structure.	243
Table XII. Presence in LGAs of modelled adaptation zones for species.	244
Table XIII. Correspondence between Statistical Local Areas and Local Government Areas used for the original survey for Mainland Australia and excluding Tasmania.	245
Table XIV. List of species recorded in the database.	246

Table XV. Cultivars recorded in the survey database.	254
Table XVI. Procedures adopted for checking errors in the survey database.	256
Table XVII. Potential sources of error in the survey database.	257
Table XVIII. Model algorithms for 16 species.	259
Table XIX. Model algorithms for subterranean clover cultivars.	261

LIST OF FIGURES

	Page number
Figure 1. Flow diagram describing the project. a) Phase I. b) Phase II.	16,17
Figure 2. Flow diagram showing the critical linkages in the survey database.	20
Figure 3. NDVI profiles in 1993 for forest, improved pasture and native pasture areas from land cover classes reclassified on the basis of area estimates from the survey database for the Severn LGA/SLA.	39

LIST OF MAPS

Map 1. Statistical Local Area boundaries (1993/94) used for mapping a) NSW; b) Queensland; c) South Australia; d) Victoria; e) Western Australia; and Local Government Areas used for mapping f) Tasmania.	87
Map 2. Distribution of pasture containing subterranean clover. a) Eastern Australia. b) Western Australia.	99
Map 3. Distribution of pasture containing balansa clover. a) Eastern Australia. b) Western Australia.	101
Map 4. Distribution of pasture containing Persian clover in Eastern Australia.	103
Map 5. Distribution of pasture containing medics. a) Eastern Australia. b) Western Australia.	104
Map 6. Distribution of pasture containing barrel medic. a) Eastern Australia. b) Western Australia.	106
Map 7. Distribution of pasture containing strand medic. a) Eastern Australia. b) Western Australia.	108
Map 8. Distribution of pasture containing burr medic. a) Eastern Australia. b) Western Australia.	110
Map 9. Distribution of pasture containing yellow serradella. a) Eastern Australia. b) Western Australia.	112
Map 10. Distribution of pasture containing white clover. a) Eastern Australia. b) Western Australia.	114
Map 11. Distribution of pasture containing lucerne. a) Eastern Australia. b) Western Australia.	116
Map 12. Distribution of pasture containing red clover in Eastern Australia.	118
Map 13. Distribution of pasture containing phalaris. a) Eastern Australia. b) Western Australia.	119
Map 14. Distribution of pasture containing perennial ryegrass. a) Eastern Australia. b) Western Australia.	121
Map 15. Distribution of pasture containing cocksfoot. a) Eastern Australia. b) Western Australia.	123

Map 16. Distribution of pasture containing tall fescue. a) Eastern Australia. b) Western Australia.	125
Map 17. Distribution of unimproved native pasture. a) Eastern Australia. b) Western Australia.	127
Map 18. Distribution of fertilised native pasture. a) Eastern Australia. b) Western Australia.	129
Map 19. Distribution of fertilised and oversown native pasture in Eastern Australia.	131
Map 20. Distribution of subterranean clover cultivar Goulburn. a) Eastern Australia. b) Western Australia.	132
Map 21. Distribution of subterranean clover cultivar Seaton Park. a) Eastern Australia. b) Western Australia.	134
Map 22. Distribution of subterranean clover cultivar Geraldton in Western Australia.	136
Map 23. Distribution of subterranean clover cultivar Trikkala. a) Eastern Australia. b) Western Australia.	137
Map 24. Distribution of subterranean clover cultivar Clare in Western Australia.	139
Map 25. Distribution of perennial ryegrass cultivar Kangaroo Valley in Eastern Australia.	140
Map 26. Mean subterranean clover content of pastures. a) Eastern Australia. b) Western Australia.	141
Map 27. Mean phalaris content of pastures in Eastern Australia.	143
Map 28. Mean clover content of temperate perennial grass-based pastures in Eastern Australia.	144
Map 29. Mean capeweed content of annual pastures in Western Australia.	145
Map 30. Percentage of pasture used for livestock production a) annual subterranean clover-based pasture - eastern Australia; b) annual subterranean clover-based pasture - WA; c) perennial phalaris-based pasture - eastern Australia.	146
Map 31. Percentage of pasture used for wool, prime lamb, beef or dairying. a) annual subterranean clover-based pasture - eastern Australia; b) annual subterranean clover-based pasture - WA; c) perennial phalaris-based pasture - eastern Australia.	149

Map 32. Estimated actual carry capacity of pasture.	
a) annual subterranean clover-based pasture - eastern Australia;	
b) annual subterranean clover-based pasture - WA;	
c) perennial phalaris-based pasture - eastern Australia.	152
Map 33. Proportion of irrigated or dryland pasture.	
a) annual subterranean clover-based pasture - eastern Australia;	
b) perennial phalaris-based pasture - eastern Australia.	155
Map 34. Average % ground cover in autumn.	
a) annual subterranean clover-based pasture - eastern Australia;	157
b) annual subterranean clover-based pasture - WA;	
c) perennial phalaris-based pasture - eastern Australia.	
Map 35. Percentage of pasture below optimum or in decline.	
a) annual subterranean clover-based pasture - eastern Australia;	
b) annual subterranean clover-based pasture - WA;	
c) perennial phalaris-based pasture - eastern Australia.	160
Map 36. Major factor leading to below optimum or declining subterranean clover-based pasture.	
a) weed infestation - eastern Australia;	
b) weed infestation - WA;	
c) insect pests - eastern Australia;	
d) insect pests - WA; and phalaris-based pasture;	
e) overstocking - eastern Australia;	
and f) declining fertility - eastern Australia.	163
Map 37. Relative contribution of pasture type to soil erosion or retention.	
a) annual subterranean clover-based pasture - eastern Australia;	
b) annual subterranean clover-based pasture - WA;	
c) perennial phalaris-based pasture - eastern Australia.	169
Map 38. Modelled potential distribution of subterranean clover cultivars.	
a) Eastern Australia. b) Western Australia.	172
Map 39. Modelled potential distribution of balansa clover.	
a) Eastern Australia. b) Western Australia.	174
Map 40. Modelled potential distribution of Persian clover.	
a) Eastern Australia. b) Western Australia.	176
Map 41. Modelled potential distribution of barrel medic.	
a) Eastern Australia. b) Western Australia.	178
Map 42. Modelled potential distribution of yellow serradella cultivars.	
a) Eastern Australia. b) Western Australia.	180

Map 43. Modelled potential distribution of white clover. a) Eastern Australia. b) Western Australia.	182
Map 44. Modelled potential distribution of lucerne. a) Eastern Australia. b) Western Australia.	184
Map 45. Modelled potential distribution of red clover. a) Eastern Australia. b) Western Australia.	186
Map 46. Modelled potential distribution of phalaris. a) Eastern Australia. b) Western Australia.	188
Map 47. Modelled potential distribution of perennial ryegrass. a) Eastern Australia. b) Western Australia.	190
Map 48. Modelled potential distribution of cocksfoot. a) Eastern Australia. b) Western Australia.	192
Map 49. Modelled potential distribution of tall fescue. a) Eastern Australia. b) Western Australia.	194
Map 50. Comparison of potential and actual distribution for subterranean clover. a) Eastern Australia. b) Western Australia.	196
Map 51. Comparison of potential and actual distribution for balansa clover. a) Eastern Australia. b) Western Australia.	198
Map 52. Comparison of potential and actual distribution for Persian clover. a) Eastern Australia. b) Western Australia.	200
Map 53. Comparison of potential and actual distribution for barrel medic. a) Eastern Australia. b) Western Australia.	202
Map 54. Comparison of potential and actual distribution for yellow serradella. a) Eastern Australia. b) Western Australia.	204
Map 55. Comparison of potential and actual distribution for white clover. a) Eastern Australia. b) Western Australia.	206
Map 56. Comparison of potential and actual distribution for lucerne. a) Eastern Australia. b) Western Australia.	208
Map 57. Comparison of potential and actual distribution for red clover. a) Eastern Australia. b) Western Australia.	210
Map 58. Comparison of potential and actual distribution for phalaris. a) Eastern Australia. b) Western Australia.	212
Map 59. Comparison of potential and actual distribution for	

perennial ryegrass. a) Eastern Australia. b) Western Australia.	214
Map 60. Comparison of potential and actual distribution for cocksfoot. a) Eastern Australia. b) Western Australia.	216
Map 61. Comparison of potential and actual distribution for tall fescue. a) Eastern Australia. b) Western Australia.	218
Map 62. Comparison of potential and actual distribution for Seaton Park subterranean clover. a) Eastern Australia. b) Western Australia.	220
Map 63. Comparison of potential and actual distribution for Trikkala subterranean clover. a) Eastern Australia. b) Western Australia.	222
Map 64. Comparison of potential and actual distribution for Geraldton subterranean clover. a) Eastern Australia. b) Western Australia.	224
Map 65. Twenty-one class vegetation map for Severn LGA based on classification of multi-temporal NDVI from NOAA AVHRR satellite data.	226
Map 66. Three class map of predominant pasture type for Severn LGA based on percentage area estimates for pasture types from the survey database.	227

1. EXECUTIVE SUMMARY.

A collaborative project to assess the current status of temperate pastures in southern Australia was initiated by the National Pasture Improvement Coordinating Committee in 1993. The project entitled "Determination of Industry Benefits from Pasture Improvement" involved the consulting company Greenwich Group as manager, all State departments of agriculture, CSIRO Division of Animal Production and the National Resource Information Centre. The project was made up of three parts, a survey, biogeographic modelling and economic modelling.

A survey of pasture types, their composition and associated attributes was carried out throughout southern Australia from June - October 1994. The census used Local Government Areas as the base geographical unit. Data were based on "desk estimates" by trained agriculturalists and answers to 18 questions were recorded on forms for each of 559 LGAs.

The survey database was completed and checked for accuracy and consistency. Outstanding or missing data were entered, errors in digitising corrected, and the consistency was checked by mapping answers for all questions.

The survey provides estimates of the percentage of each LGA occupied by particular pasture types. These pasture types are then described in terms of species present, their botanical composition, sown cultivars, purpose of pasture, main degradation issue if for Landcare, enterprise type, carrying capacity, irrigation percentage, ground cover in autumn and spring, condition of pasture, factors inducing decline, contribution to land degradation, and nutrient application and frequency.

Potential adaptation zones for the major temperate pasture species were modelled for southern Australia using climate data and knowledge-based logical rules.

The value of the survey data for economic analysis was demonstrated by using subterranean clover data and related animal production for three regions of Victoria - N and S of North Central, and South West for four modelling scenarios.

This report presents a summary of:

- the structure of the survey database;
- the information available within the survey database;
- the results of biogeographic and economic modelling;
- the comparison of modelled and actual distributions;
- a complete reference set of maps describing the distribution of major species;
- examples of maps based on answers to other survey questions;
- complete tables of estimated actual and potential areas of the major pasture species;
- and examples of integration with other spatial information to refine and enhance the survey data.

The interpretation of the data acquired in this project and summarised here is for the user and reader to undertake. The survey data lend themselves to quite exhaustive analysis, and it is to be hoped that they will be put to good use.

Users of the survey database should be aware that:

errors may still exist in data fields for any pasture type or species not mapped in this report;

the database is made available in Microsoft Access export files which should be readily imported into any database system;

and the data constitute the informed opinions of professional agriculturalists but should not be mistaken for objective measurements.

2. INTRODUCTION AND OBJECTIVES.

In a competitive and fiscally tight environment, the allocation of funds for research on the improvement of temperate pasture species requires a quantitative basis for decision making. A project to develop a database which described the present use of pasture species, based on a survey of professional agriculturalists, was commenced in 1993 under the auspices of the National Pasture Improvement Coordinating Committee (NPICC). An assessment of the potential distribution of pasture species was also sought together with a pilot economic analysis of the potential benefits of improving the performance of an example species based on the information in the database. The project entitled "Determination of Benefits from Pasture Improvement" was carried out between 1994 and April 1997. The development of the database and example economic analysis has been described by Pearson et al. (1997). The modelling of potential adaptation of the major temperate pasture species has been described by Hill (1996).

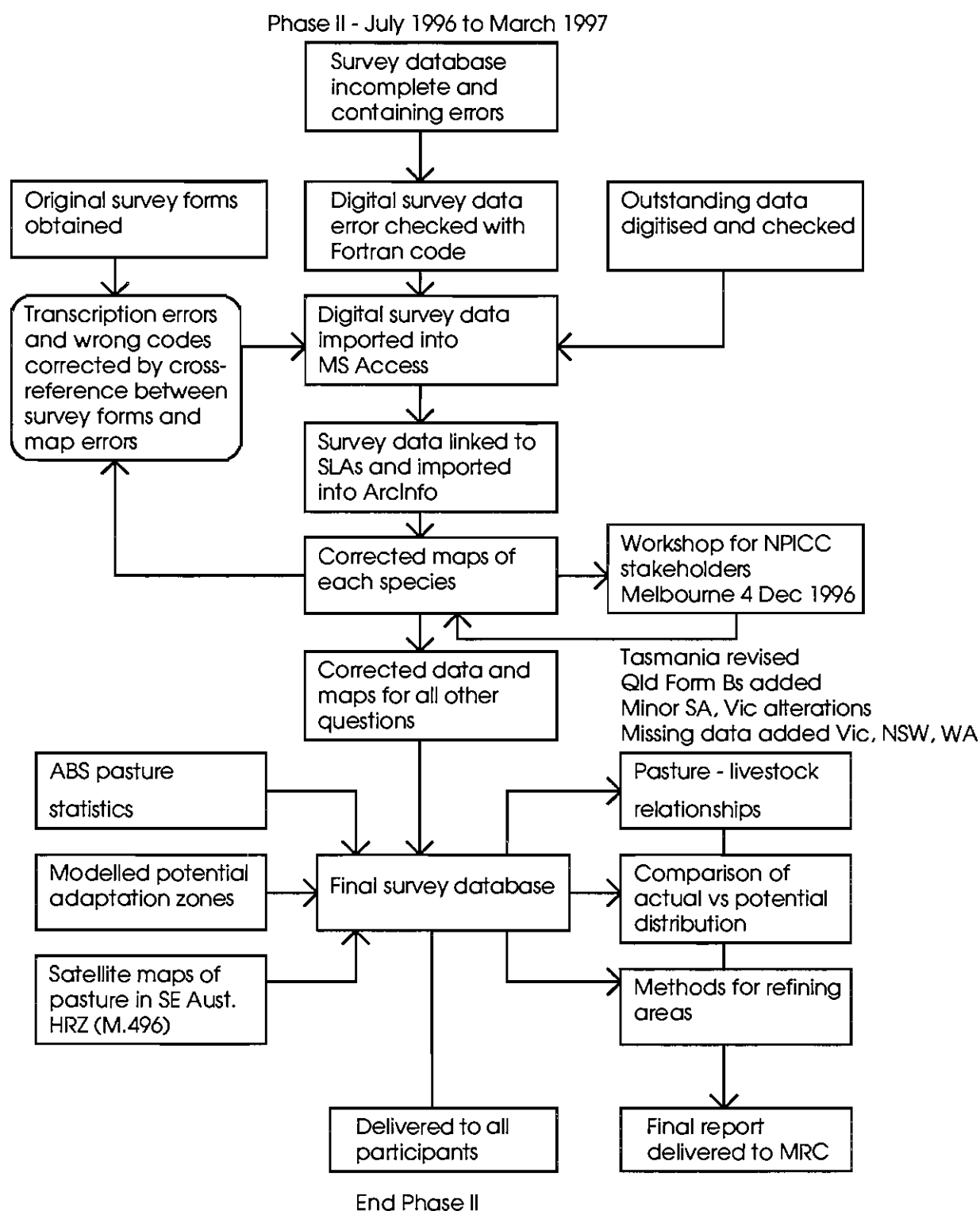
The processes involved in the project are summarised in Figures 1a and 1b. The first phase of the project (Figure 1a) involved the commissioning, design, distribution, completion, checking, digitising and preliminary examination of the survey. In addition, modelling of potential distribution and economic modelling on subterranean clover was also completed. The second phase (Figure 1b) involved the entry of outstanding data, correction of errors, comparative analysis of the survey and the modelling, holding of a national workshop and the completion of this final report. Details of methods and other procedures are given in Pearson et al. (1994; 1997) and Hill (1996).

The final report provides a definitive reference guide to the results of the project for use by NPICC in conjunction with further analyses from the digital survey database. The report has the following aims:

1. Describe in detail the nature of the database arising from the survey as a guide to those who will make further use of the digital data..
2. Provide a reference set of maps and tables which summarise the distribution of the major temperate pasture species as at mid-1994.
3. Provide a summary of the results of the agronomic and economic modelling.
4. Provide a reference set of maps which compare the actual and potential distribution of major pasture species.
5. Describe the use of remote sensing and agricultural statistics to refine area estimates from the survey.

In order to provide a more continuous text, and in view of the large number of maps presented, the report is layed out with text, figures, and tables at the beginning followed by the maps and then the appendices.

Figure 1b. Phase II of the NPICC project



3. SURVEY DATABASE

3.1 Description

The survey was based on the Local Government Area (LGA) as the spatial unit for aggregation. All data are linked to an LGA as the reference location in space and the minimum unit of area for which the data provide a sum or average. At the State level, the allocation of survey forms was based on the relationship between the area of responsibility of the selected trained agriculturalists and LGAs. Where district boundaries did not coincide with LGA boundaries this sometimes lead to confusion resulting in double or missing returns for border LGAs.

A copy of the original survey form is provided in Appendix section 12.1. The form consists of three parts - Form A, Form B, and Form C. Form C was ignored due to a poor response and coding difficulties.

Form A (Figure 2; Appendix 12.1) provides the key to the database. Respondents were asked to provide an estimate of the percentage of the "pastured" area of each LGA occupied by a set of listed pasture types, with the option to add additional distinct types. Therefore, the allocation of the agriculturalist's perception of what constitutes a particular pasture type to the listed or additional categories forms the basis for all other information in the database. Form A links a percentage area of pasture type to the minimum georeferenced spatial unit, an LGA.

For each pasture type, Form B (Figure 2; Appendix 12.1) contains a complete description of the species composition, cultivars, purpose, enterprise mix, carrying capacity, ground cover and various aspects of the condition of the pasture. All information in any single Form B is linked to the pasture type, and its percentage area of the LGA and therefore can only be expressed in mapping or tabulation with reference to the Form A data.

In order to integrate the survey data with agricultural statistics it was necessary to use common areas. Therefore the survey data were linked to Statistical Local Areas (SLA) used by the Australian Bureau of Statistics to compile the most recent, complete agricultural census which took place in 1994. In order to do this, LGA polygons were overlayed with the 1993/94 SLA polygons and examined for coincidence. In general SLA and LGA boundaries were identical. Some minor inconsistencies were encountered in Victoria, therefore mismatched data were linked to the best matching areas after individual querying. For Tasmania the differences between SLA and LGA boundaries were too great. As a result the survey is presented here using 1993/94 SLA boundaries for all mainland areas, and 1993 LGA boundaries for Tasmania. The survey database still contains the original reference codes for 1993 LGAs together with the codes for 1993/94 SLAs. Therefore, users may relate the survey data to either one of two polygon coverages.

Map 1a-f shows the areas used for mapping the survey results for each State together with names for each SLA in the case of mainland States and LGA in the case of Tasmania. The numbers and names correspond to those used for tabulation of area estimates later in this report.

Each of the data tables corresponding to a block of questions in the database is described in Appendix 12.2 (Tables I - XI). The data were collated, checked and interrogated in the

Microsoft Access database. These tables describe the data structure to be found in the digital copy of the database supplied to all collaborators in MS Access export format. Two additional tables have been added to the core database to be distributed. The first is a table which provides an index for each LGA indicating whether the potential adaptation zone for each species was present or absent (Table XII). Using this index, it should be possible for users to reproduce modelled adaptation zones at an SLA/LGA polygon resolution. The second table gives the correspondence between original survey LGAs and the SLAs used to map data in this report (Table XIII). This should enable users to reproduce maps presented in this report for Mainland Australia. Due to severe incompatibilities between 1993/94 SLAs, 1993 LGAs and original survey LGAs in Tasmania, production of maps from the survey requires interpolation of survey data to "best bet" fits of LGA or SLA boundaries unless using the original survey LGA boundary data.

A summary of responses to the survey is given in Table 1. In some States, as many as 20 pasture types were identified on Form A, but Form B was completed only for the main types resulting in some missing pasture descriptions. The most common pasture type in Queensland and NSW was unimproved native pasture. Subterranean clover-based pastures were most common in Victoria and WA, medic-based pastures were most common in SA, while perennial grass-based pastures were most common in Tasmania.

Missing pasture descriptions in Queensland mostly relate to very low area percentages of temperate pasture types in SE Queensland. Usually, the major part of any Queensland LGA was occupied by native perennial grass pastures. In coastal areas further north, tropical grass pastures were predominant. Mr Kevin Lowe provided missing data for lucerne which has been incorporated into the database. Other missing data relating to percentage areas as low as 0.1% were not considered important enough to justify the work involved in manual data entry.

The procedures used to check the database and the types of errors encountered are listed in Appendix 12.5 (Tables XVI and XVII). All errors encountered in processing and mapping have been corrected. However, errors relating to data entry from Phase I may still be present. Missing data for all of Q7 and much of Q 8-18 were entered and merged with the existing data. As a result, the database has a relatively complete set of responses to each question in each State with the exception of Q1-4 which was not answered in WA (Table 2a). In NSW and Victoria, this translated into the identification of more than 1000 pasture type x LGA responses (Table 2b).

Figure 2. Flow diagram showing the critical linkages in the survey database.

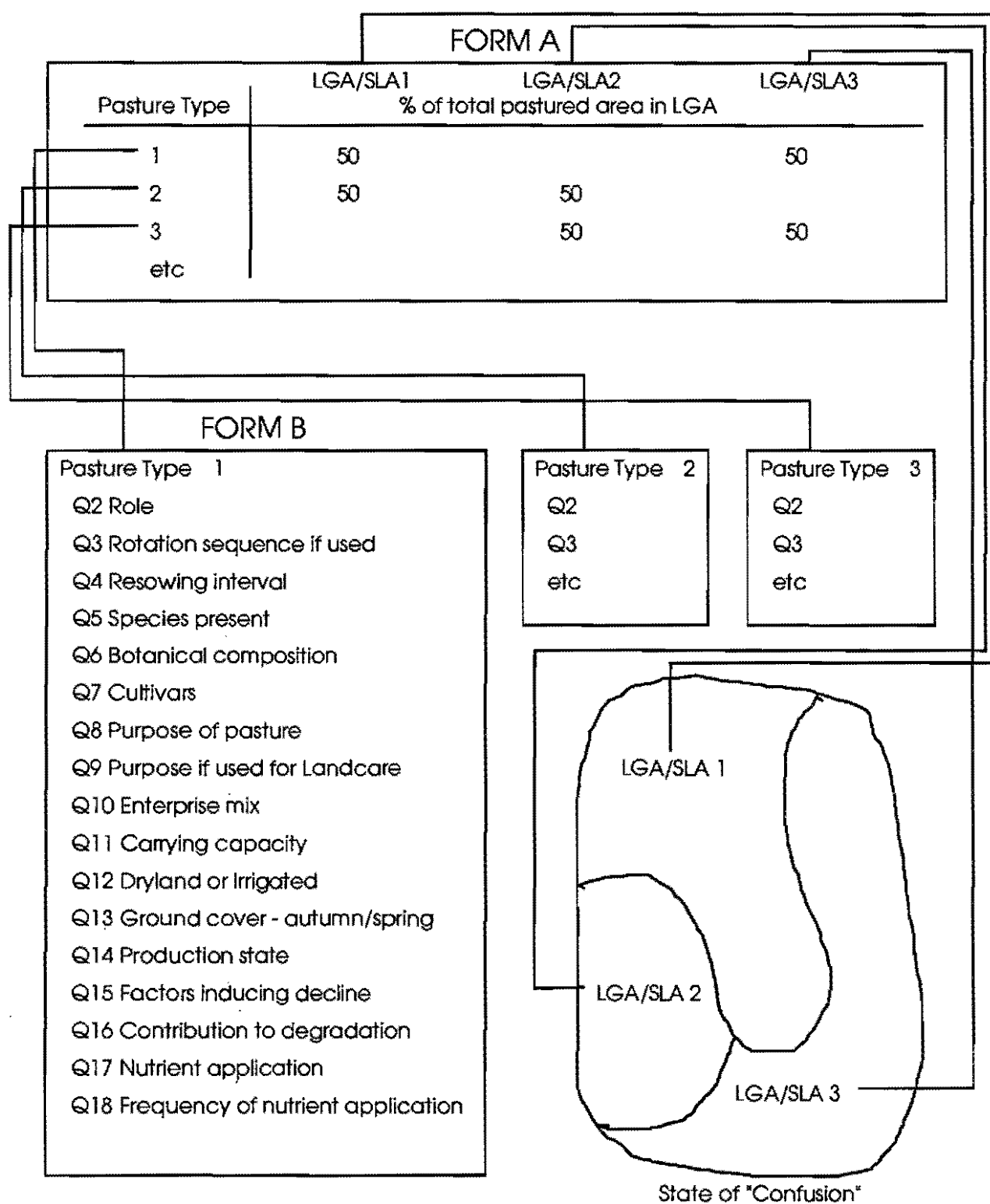


Table 1. Summary of NPICC database.

<i>State</i>	<i>Qld</i>	<i>NSW</i>	<i>Act</i>	<i>Vic</i>	<i>Tas*</i>	<i>SA</i>	<i>WA</i>	<i>Tot.</i>
Number of 1993/94 SLA's	192	176	1	212	44	113	132	870
No. of Agricultural SLA's (estimated)	122	142	1	196	40	107	119	727
No. of SLA's used	51	141	1	173	40	70	83	559
No. of Form A pasture_codes	392	1218	8	1452	216	504	415	4205
No. of Form B pasture_codes	165	1026	8	1178	202	360	386	3325
No. of pasture_codes with descriptions (FormB)	108	1047	8	1157	213	342	386	3261
No. of pasture codes where mean composition = zero	8	134	0	15	0	7	83	247
No. of Form B pasture_codes missing	222	191	0	279	14	141	25	872
No. of pasture codes	18	76	8	48	12	43	30	119
No. of pasture species	38	177	21	96	36	73	67	231
Most common pasture code	5.10	5.10	na	1.10	3.88	1.30	1.10	na
Second most common pasture code	4.10	2.10	na	2.10	3.45	1.10	4.30	
Most common species code by State	2000	708	2000	708	708	360	820	na
Most common species by State	Grass	Sub clover	Grass	Sub clover	Sub clover	Barley grass	Cape-weed	na
Second most common species code by State	703	703	1000	820	350	820	708	na
Second most common species by States	White clover	White clover	Dicot weeds	Cape-weed	Fog grass	Cape-weed	Sub clover	na

* 1993 LGAs for Tasmania

Table 2a. Total number of SLA/LGAs with responses to each question

State	Q1-4	Q5-6	Q7	Q8-9	Q10	Q11 -13	Q14	Q15	Q16	Q17- 18
ACT	1	1	1	1	1	1	1	1	1	1
NSW	78	140	130	141	139	140	140	141	140	126
QLD	36	48	36	46	46	45	46	46	46	39
SA	65	70	66	70	69	70	70	70	70	66
TAS	39	40	39	39	40	38	39	39	40	28
VIC	59	172	153	170	168	168	167	168	167	153
WA	0	83	82	83	82	83	83	83	83	82

Table 2b. Total number of responses (SLA/LGA x Pasture code)

State	Q1-4	Q5-6	Q7	Q8-9	Q10	Q11 -13	Q14	Q15	Q16	Q17- 18
ACT	8	8	8	8	8	8	8	8	8	7
NSW	614	1026	721	997	988	1002	1013	1012	1005	897
QLD	93	165	70	157	157	150	141	156	157	96
SA	311	360	284	328	344	353	345	346	348	322
TAS	197	202	176	211	202	181	196	198	201	81
VIC	416	1173	744	1094	1093	1113	1080	1122	1091	1003
WA	0	390	267	367	378	386	385	385	387	384

3.2 Pasture Codes

The full list of pasture types and corresponding codes is shown in Table 3. These codes appear in Form A and each has a separate Form B entry for every LGA location where the code is present. There are duplicated types eg. 3.15 = 3.27. However, we have retained them in their original assigned state in the database tables.

A simplified version of the code has been assigned. The new codes maintain a smaller number of basic pasture types and do not allow proliferation of minor variants (Table 4). They are based on the following rules.

1. The presence of any perennial sown species indicates a perennial pasture. Hence former annual legume types containing lucerne become lucerne-based pastures.
2. Perennial grass pastures are defined by the predominant perennial grass. Hence there is no distinction based on the legume content of the pasture. This can easily be assessed by eg. selecting all phalaris-based pasture (310) which has white clover alone as the legume companion in question 5 and 6 on Form B.
3. The pasture type is classified by the first named perennial grass. In many cases perennial grass pastures are mixtures of all four major species. It is more instructive to search the Form B tables for all instances of any particular species than to use pasture type from Form A.
4. Sub-tropical and tropical grass-based pastures are a different major grouping to temperate grass-based pastures.

This new code (Table 4) is highly simplified and requires that Form B pasture descriptions and data be summed or averaged over all the old pasture types contained in the new type. However, the new code does remove all of the minor variations and duplications in annual legume and perennial grass-based pastures, and separates sub-tropical and tropical grass pastures from the perennial grass group. If nothing else, it summarises the range of pastures surveyed in the project.

Users of the database should consider carefully whether there is any need to use the original pasture codes at the Form A level other than for georeferencing. It is recommended that queries be conducted on the Form B data and only use the Form A pasture codes as a basis for mapping or tabulation.

3.3 Species Codes

A large number of species are recorded in the database. A code has been assigned to each species identified with a botanical name (Table 5). Non-specific names have been aggregated together under a code for non-specific grasses and another code for unknown terms (Table 5). A full list of the species recorded in the database is given in Appendix 12.3 (Table XIV).

Table 3 (cont). Standard and additional pasture codes assigned in Phase I and simplified codes assigned in Phase II.

Code	Ncode	Annual or short-lived grass pastures	Code	Ncode	Perennial grass-based pastures
4.1	510	Annual or hexaploid ryegrass	3.51	460	Paspalum/white clover
4.2	510	Annual or hexaploid ryegrass/white clover	3.52	310	Phalaris/subterranean clover/lucerne/white clover
4.3	510	Barley grass	3.53	320	Tall fescue/Persian clover/lucerne
4.4	510	Oats	3.54	330	Perennial ryegrass/tall fescue/white clover
4.5	510	Prairie grass	3.55	320	Tall fescue/cockfoot/legume
4.6	510	Silk sorghum	3.88	330	Perennial ryegrass/cockfoot/white clover
4.7	510	Persian clover/ryegrass	3.89	310	Phalaris/tall fescue/perennial ryegrass/white clover
4.8	510	Barley grass/medic	3.98	310	Phalaris/cockfoot/strawberry clover
4.9	510	Vulpia/subterranean clover	3.99	470	Tropical grasses
4.11	510	Bent grass			Native or naturalised pastures
4.12	510	Brome grass/capeweed	5.1	610	Unimproved native pasture - perennial
4.13	510	Barley grass/Vulpia/brome grass	5.2	620	Unimproved native pasture - winter annual
4.14	510	Millet/forage sorghum			
4.99	510	Silver grass	5.3	630	fertilised native pasture - perennial
			5.4	640	Fertilised and oversown - winter annual
			5.5	650	Fertilised and oversown - perennial
			5.6	660	Paspalum/other grasses
			5.7	670	Naturalised medics
			5.8	680	Fog grass/crested dogs tail/sweet vernal
			5.9	690	Saltbush
			5.99	690	Bluebush

Table 4. Pasture types for new pasture codes.

Ncode	Pasture type	Ncode	Pasture type
110	Subterranean cover-based pastures (all species)	310	Phalaris-based pastures
120	Medic-based pastures	320	Tall fescue-based pastures
130	Serradella-based pastures	330	Perennial ryegrass-based pastures
140	Persian clover pastures	340	Cocksfoot-based pastures
150	Balansa clover pastures	350	Other perennial grass-based pastures eg. veldt grass
160	Berseem clover pastures	460	Sub-tropical grass-based pastures eg. kikuyu
170	Blue lupin stands	470	Tropical grass-based pastures eg. setaria
180	Rose clover pastures	510	Annual grass-based pastures
190	Other annual legume based pastures eg. Arrowleaf clover	610	Unimproved native pasture - perennials
210	Lucerne-based pastures	620	Unimproved native pasture - winter annuals
220	White clover-based pastures	630	Fertilised native pasture - perennial
230	Red clover pastures	640	Fertilised and oversown - winter annual
240	Strawberry clover pastures	650	Fertilised and oversown - perennial
250	Lotus-based pastures	660	Paspalum/other grasses
280	Tagasaste stands	670	Naturalised medics
		680	Fog grass/crested dogs tail/sweet vernal
		690	Shrublands eg. saltbush, bluebush
		710	Broadleaf herbaceous pastures eg chicory, kale

Table 5. Summary of species codes

Species category	Code	Num- ber of codes	Range - Botanical names	Range - Common names
Grasses	10 - 591	106	Agropyron to Vulpia	Tall wheatgrass to silvergrass
Legumes	600 - 720	44	Chamaecytisus to Vicia	Tagasaste to vetch
Monocot and Dicot volunteers	800 - 1420	73	Allium to Zygophyllum	Onion to Twinleaf
Rushes and sedges	1500 - 1530	7	Cyperus - Scirpus	Nutgrass - Pin Rush
Shrubs	1600 - 1614	5	Atriplex - Maireana	Saltbush Bluebush
Non-specific grasses	2000	1	Poaceae	????? grass
Non-specific terms	3000	1	Unknown	??????

3.4 Distribution of Pasture Species

In this section, we provide maps depicting the distribution of the major temperate pasture species from the survey responses. The distribution of species is mapped using the species descriptions from Form B Q 5-6 (Appendix I, Table III) to detect the presence of a species in any pasture type, then summing the % area for each pasture type involved to give a total % area of pasture containing a particular species. The maps show a number of different "null" classes: areas not surveyed; areas surveyed but having no response on Form B for a pasture type given on Form A; non- freehold-leasehold land eg. Aboriginal land, State forests etc; and areas with 0% coverage of pasture containing a particular species.

The maps indicate the percentage of pastured area in an LGA having pasture types which contain the particular species as a constituent of the sward. Hence they are based on information in Form B questions 5 and 6 describing the botanical composition of each pasture type. The comments describing species distribution below assume that the survey is an accurate reflection of reality in terms of a *significant* presence of any particular species.

Maps are also provided for three types of native pasture. These are broad pasture groups containing many species and are mapped directly from the data on Form A for these pasture types.

3.4.1 Annual Legumes

The distribution of the major annual legumes is shown in Maps 2 through 9. Subterranean clover (*Trifolium subterraneum*, *T. yanninicum*, *T. brachycalycinum*) is typically widespread and occurs in a high percentage of the pastured area in both eastern and Western Australia (Map 2a, b). Balansa clover (*Trifolium balansae*) is restricted to southern NSW, northern Victoria, parts of SA and inland WA at a low percentage of the pastured area (Map 3a, b). However, it occupies most pastures on the west coast of WA south of Perth (Map 3b). Persian clover (*Trifolium resupinatum*) has a scattered, but isolated distribution in eastern Australia at a low percentage of the pastured area (Map 4) and no significant presence in WA.

Medics as a generic group are widely distributed in inland Victoria and NSW and most of SA in a high proportion of the pastured area (Map 5a), and on the eastern edge of the agricultural zone in WA in a low proportion of the pastured area (Map 5b). Selected medic species are presented with barrel medic (*Medicago truncatula*) (Map 6a, b) predominant in SA and the central east of WA, strand medic (*M. littoralis*) (Map 7a, b) significant only in SA and around Esperance in WA (Map 7b), and burr medic (*M. polymorpha*) significant in SA, the northwest of NSW (Map 8a) and the central east of WA (Map 8 b).

Yellow serradella (*Ornithopus compressus*) occurs in a low percentage of the pastured area on the northwestern slopes and plains of NSW and just south of Adelaide in eastern Australia (Map 9a). It occupies the most significant percentage of pastures in the Esperance/Jerramungup area of WA (Map 9b) with a lower abundance level north of Perth.

3.4.2 Perennial Legumes

White clover (*Trifolium repens*) has a distribution associated with the coast and Tablelands, and irrigation areas of eastern Australia (Map 10a) and is most common in eastern Victoria ,

Tasmania and on the south coast and Central Tablelands of NSW. Its distribution is restricted to the west coast south of Perth in WA (Map 10b).

Lucerne (*Medicago sativa*) is very broadly distributed throughout eastern Australia (Map 12a) on a low percentage of the pastured area reflecting its use predominantly as a special purpose forage. In WA, its distribution is restricted to the Jerramungup/Esperance area (Map 12b).

Red clover (*Trifolium pratense*) is predominantly used in northern NSW (Map 12).

3.4.3 Perennial Grasses

Phalaris (*Phalaris aquatica*) has a broad distribution in eastern Australia (Map 13a) on up to 20% of the pastured area except for the central and southern Tablelands of NSW and the southeast of SA where it occupies 50% or more of the pastures. In WA, phalaris is found in low abundance around Esperance (Map 13b).

Perennial ryegrass (*Lolium perenne*) is the predominant perennial grass in northern Tasmania, southern Victoria and the northern section of the Northern Tablelands of NSW, and a significant species in irrigation areas and the central Tablelands of NSW (Map 14a). In WA, it is restricted to coastal locations in a low percentage of pastures (Map 14b).

Cocksfoot (*Dactylis glomerata*) is found on the Tablelands of NSW, in eastern and western Victoria, south eastern SA and most of Tasmania (Map 15 a). It is most abundant in eastern Victoria, parts of the Southern and Northern Tablelands of NSW and central Tasmania. Its distribution in WA is the same as for phalaris (Map 15b).

Tall fescue (*Festuca arundinacea*) is found in southeastern SA, western Victoria and the Tablelands of NSW (Map 16a), but is most abundant on the Northern Tablelands of NSW where growth potential is maximised by summer rainfall and mild temperatures. In WA, it is also found in low abundance around Esperance (Map 16 b).

3.4.4 Native Pastures

Unimproved native pasture occurs in virtually the whole of the surveyed area of eastern Australia (Map 17a), but is the predominant pasture type west of the cropping zone in NSW and outside the cropping areas in south east Queensland. In WA it is restricted to low abundance around Geraldton (Map 17b).

Fertilised native pasture occurs on the slopes and Tablelands in NSW and Victoria (Map 18a) and near Geraldton in WA (Map 18b) mostly as less than 20-30% of the pasture. Fertilised and oversown pasture occurs throughout the coast and Tableland areas of NSW (Map 19) and forms up to 50% of the pasture in the Monaro and Southern Highlands.

3.4.5 Cultivars

Using the data from Question 7 on Form B, it is possible to map the presence of cultivars. Such maps may be one of the most useful products of the database since they give an indication of the geographical extent of old established cultivars and the geographical penetration of new cultivars. They also provide an assessment of whether the cultivar is

reaching its target zone, or is showing significantly broader adaptation than envisaged at release. We provide just a few examples for subterranean clover in Maps 20 through 24.

Goulburn is a relatively recent release which appears to have gained good acceptance on the Slopes and Tablelands of central and southern NSW, and north eastern Victoria (Map 20a) and in the south western extremities of WA (Map 20b). Seaton Park is a well established, successful mid season cultivar which occurs in most of the subterranean clover zone in eastern Australia (Map 21a), and the main medium rainfall areas of WA (Map 21b). Geraldton is an old oestrogenic cultivar absent in eastern Australia, but still a major component of WA pastures north of Katanning (Map 22).

Yanninicum subterranean clovers were originally recommended for wet soils, however Trikkala has shown much broader adaptation occurring throughout the eastern Australia from the Central Tablelands south (Map 23a) and in similar areas to Seaton Park in WA (Map 23b). Clare is the oldest of the *brachycalycinum* cultivars recommended for heavy neutral to alkaline clay soils. This appears to be reflected in its distribution which includes the Upper Hunter Valley and Northern Slopes of NSW, and the higher rainfall areas of SA north of Adelaide (Map 24).

A final example of cultivar distribution is provided for the perennial ryegrass cultivar Kangaroo Valley which is distributed throughout the Tablelands of NSW and the irrigation areas of northern Victoria (Map 25).

3.5 Estimated Botanical Composition

Detailed estimates of the botanical composition of each pasture type are provided in Form B Q6 (Appendix 12.2; Table III). A full analysis and presentation of these data is beyond the scope of this final report. However, some examples of the utility of these data are provided in Maps 26 - 29.

The subterranean clover content of pastures was generally highest in western NSW where use in a crop rotation might be more common, and lowest on the high rainfall margins of southern Victoria and northern Tablelands of NSW where white clover may be better suited (Map 26a). The subterranean clover content of Western Australian pastures is surprisingly low (Map 26b).

The phalaris content of pastures is generally greater than 30% in southern and central NSW and southern Victoria, but lower on the Northern Tablelands of NSW and in central Victoria and SA (Map 27). This may reflect a low rate of resowing of old pastures or management issues relating to grazing with sheep.

For perennial grass-based pasture, clover content is generally below 20% except in western Victoria, SE SA and some patches where irrigation may be used (Map 28). This widespread perception from agriculturalists suggests there is still plenty of scope for research on legume improvement and pasture management.

The survey database contains a large amount of data on weed content of pastures. These data are not always specific, in that some respondents described weeds only as "grass" or "broadleaf" whilst others gave detailed species lists. A full description of the weed data is beyond the scope of this report, however an example of the data is given by the average

capeweed content of pastures in Western Australia (Map 29). Except in coastal areas south of Perth, pastures contain between 10 and 40% capeweed throughout the agricultural zone confirming the perception of capeweed as the second most important pasture species.

3.6 Other Survey Questions

In this section, we provide maps depicting examples of the information available from Questions 8 to 16 (Figure 2; Appendix 12.1) for two pasture types - annual subterranean clover-based pasture and phalaris-based pasture. These pasture types were chosen because of their importance in the wheat/sheep and high rainfall zones respectively.

The survey suggests that subterranean clover-based pastures are predominantly used for grazing livestock in the Tablelands and Slopes of NSW, Western District and Highlands of Victoria, and the higher rainfall areas of WA (Map 30a, b). However, in the NSW, Victorian and WA wheat belts, use for livestock grazing drops to 60% or less and the role in the cropping cycle becomes more important (data not shown but available in the survey database). By contrast, phalaris-based pastures are used overwhelmingly for livestock grazing (Map 30c).

Wool production, interspersed with fat lambs, was the most important enterprise on subterranean clover-based pastures (Map 31a) with beef cattle becoming important in northern NSW, eastern Victoria and the south west coast of WA (Map 31b). Dairying was most significant in the irrigation area of northern Victoria. Phalaris-based pastures were predominantly used for beef production on the northern and southern Slopes of NSW, and for wool production on the Northern and Southern Tablelands of NSW and in western Victoria and central Tasmania (Map 31c).

The estimated average carrying capacity of subterranean clover-based pastures ranges from > 15 dse/ha in the irrigation areas of northern Victoria down to < 2.5 dse/ha at the arid margins of adaptation (Map 32a, b). The highest estimated dryland carrying capacities occur in the Western District of Victoria, and in the high rainfall areas of WA. Estimated carrying capacity on phalaris-based pastures is around 10-12 dse/ha in southern SA and Victoria, and the central Tablelands and Upper Hunter Valley in NSW (Map 32c). Apart from some irrigated stands, the rest of the phalaris-based pastures carry between 5 and 10 dse/ha.

Irrigated subterranean clover is concentrated in southwestern NSW and northern Victoria (Map 33a). There was no significant use of irrigation recorded in WA. Irrigation of phalaris-based pasture occurred at low levels in northern NSW and northern Victoria; most of the phalaris-based pasture in marginal adaptation areas on the North Coast and in the west of NSW was irrigated (Map 33b).

The estimates of average early autumn ground cover for subterranean clover-based pastures varied from very low to very high in eastern Australia (Map 34a). This variation may be as much a function of the type of pasture classified as "annual subterranean clover pasture" as of the management or environmental conditions. Tableland and higher rainfall pastures may tend to contain more species including volunteer perennials and be exposed to shorter summer drought. Some pastures classified as "annual subterranean clover" may correspond more to oversown native pasture. In WA, the estimates of ground cover reflect conditions in strictly "annual subterranean clover-based pastures" and may provide an accurate reflection of differences in management and environment (Map 34b). Estimated early autumn ground cover

is generally high for phalaris-based pastures (Map 34c) except on the south western Slopes of NSW and in western Victoria where removal of senescent herbage prior to the autumn break may be a common management strategy.

A very high percentage of both subterranean clover-based pasture (Map 35a, b) and phalaris-based pastures (Map 35c) were considered by respondents to be below optimum or in decline. Some of the major factors contributing to the decline in subterranean clover-based pastures were weed infestations (Map 36a, b) and insect pests (Map 36c, d)). Overstocking (Map 36e) and declining fertility (Map 36f) were some of the major factors in the decline of phalaris-based pastures.

Subterranean clover-based pasture was considered to be beneficial for reducing soil erosion in inland parts of NSW and Victoria and in SA (Map 37a), but considered to have some negative effect in southern Victoria. In WA, the effect of subterranean clover-based pasture was considered to be highly beneficial in reduction of erosion north of Perth, but having some negative effect in the central wheat-belt and southern areas (Map 37b). Not surprisingly, phalaris-based pasture was considered highly beneficial for reducing soil erosion (Map 37c).

The results of the modelling are summarised in Table 6 (after Table 6 in Pearson et al. 1997). The results are expressed in terms of improvement over the base model. An increase in pasture production does not result in a proportionate increase in livestock carried or in net farm returns due to resource substitution between competing enterprises on the farm (Pearson et al 1997). The survey database would appear to provide important basic data which will enable modelling of financial outcomes using a number of economic methodologies. The results from the management questions in the survey such as "percentage of pasture type below optimum or in decline" provide an obvious way of analysing potential benefits from better pasture management which is a major goal of the Sustainable Grazing Systems Key Program (MRC).

Table 6. (After Pearson et al. 1997). Economic models for subterranean clover-based pastures on representative farms in three regions of Victoria

<i>Region</i>	<i>Model based on survey mix of pastures</i>	<i>Scenario 1: remove constraint of existing pasture mix</i>	<i>Scenario 2: increase subterranean clover productivity to optimum defined in database</i>	<i>Scenario 3: increase by 5% above Scenario 2</i>	<i>Scenario 4: increase by 20% above Scenario 2</i>
north N. Central					
Net farm return (\$ per annum)	131,428	139,636	143,598	144,410	146,985
% change from previous scenario		6.25	2.84	3.42	5.26
Ten year NPV [#] (\$M per region)		15.1	7.3	8.8	13.6
south N. Central					
Net farm return (\$ per annum)	111,851	116,302	119,917	120,619	122,726
% change from previous scenario		3.98	3.11	3.71	5.52
Ten year NPV (\$M per region)		8.2	6.7	8.0	11.9
South Western					
Net farm return (\$ per annum)	94,044	108,703	n/a	112,091	122,256
% change from previous scenario		15.59	n/a	3.12	12.47
Ten year NPV (\$M per region)		40.8	n/a	9.4	37.7

[#] NPV - Net Present Value assuming adoption rate of 5% and discount rate of 5% over a 10 year period.

6. DATA INTEGRATION AND ANALYSIS

6.1 Comparison of actual and potential distribution

It is necessary to carry out a comparison of actual and potential distribution on the same data type. The modelling of potential adaptation was undertaken using raster data with a cell size of 0.025 degrees. The survey data are associated with polygons defining an LGA/SLA. Comparison based on polygons provides the clearest illustration of differences. Therefore a polygon coverage describing the modelled distribution was created by identifying all LGA polygons intersected by the modelled zone as "present in the model" and all LGA polygons not intersected by the modelled zone as "absent from the model". A new table containing presence/absence indices for each species and SLA/LGA has been included in the revised survey database (Table XII). Since the modelling selected suitability on the basis of climate, small elevated or unusual areas surrounded by large, obviously unsuitable areas, are included in the modelled zone. These small areas count as a "present" for the polygon version and therefore the potential zone tends to expand relative to the zones discussed in section 4 and Maps 38 - 49. Thus the model tends to be sensitive to insignificant areas of adaptation. It is instructive to retain this sensitivity for the comparison.

6.1.1 Annual Legumes

The survey and model match well for subterranean clover (Map 50a, b). In SA, medics are better suited in some of the potential subterranean clover zone due to soil factors. In western NSW and south eastern Queensland, small areas unreliable rainfall, soil factors and cropping may also favour medic species for long term, but episodic persistence. In WA, the potential and actual distributions match exactly since subterranean clover is the main pasture species in the whole south west (Map 50b).

Balansa clover is used through most of its potential distribution zone primarily in slopes and plains environments (Map 51a, b). Its absence from potential areas in northern NSW may relate to regeneration problems in these summer rainfall areas. In WA, it may only be a matter of time before it becomes more widespread since it is useful as a hay crop on winter waterlogged soils suited to Trikkala subterranean clover (Gillespie 1995).

Persian clover occurs sporadically throughout and even outside its modelled potential distribution zone (Map 52a). This is not surprising since it is usually best suited as a hay crop under irrigation and would usually only be sown dryland in winter waterlogged soils. Whilst parts of WA may be climatically suitable, the late maturity of the available cultivars and adaptation to heavy alkaline soils probably places it below a number of other species in order of preference (Map 52b).

The actual distribution of barrel medic exceeds the potential distribution at the arid western and northern margins (Map 53a) in eastern Australia. This reflects the persistence of the species in environments with low, unreliable rainfall. In the east and south, the potential barrel medic zone overlaps with that of subterranean clover which is usually preferred where it will persist. The same applies in WA, where barrel medic is used on the eastern margins of the subterranean clover zone (Map 53b).

The potential distribution of yellow serradella is similar to that of subterranean clover. As yet this potential has only been realised in the northwest of NSW and on the northern and southern coasts of south west WA (Map 54a, b). With new cultivars and other species of serradella already or soon to be available, it would seem to be only a matter of time before this genus in much more widespread.

6.1.2 Perennial Legumes

The actual and potential distributions for white clover match very well perhaps because white clover is widely adapted to soils, and very sensitive to drought ie. its distribution is mostly controlled by climate (Map 55 a, b). Areas of actual distribution outside the potential zone are associated with irrigation. Lack of actual distribution within the potential zone reflects the translation of isolated small areas in the modelled zone to the LGA/SLA scale (See Map 41). Potential and actual distribution in WA is confined to the coast from Perth to Albany in WA (Map 55b) although the Esperance area is optimistically shown as potentially suitable.

Lucerne distribution is probably controlled more by soil and management than by climate. Hence the actual and potential distributions are similar (Map 56a). A combination of intensive sheep grazing and impeded soil profiles tend to preclude lucerne use on the Northern Tablelands of NSW. In WA however, there would appear to be considerable potential for lucerne to be used in the grazing system provided a suitable management strategy can be devised for the late summer/autumn period (Map 56b). Red clover distribution has similar constants within a narrower climatic suitability; potential use is only realised to a major extent in northern and south eastern NSW (Map 57a, b).

6.1.3 Perennial Grasses

Among the perennial grasses, actual phalaris distribution matches the potential very well in eastern Australia; trace levels below the 1% threshold occur in south east Queensland (Map 57a). Potential in WA is only realised around the Capes and near Esperance (Map 57b). The main differences between actual and potential perennial ryegrass distribution (Map 58a, b) relate to widespread use under irrigation in southern NSW and northern Victoria, some underestimation of the modelled zone in SA, and the effect of scattered, small potential areas in southern and central NSW (see Map 47). For cocksfoot, potential and actual distributions match well in southern NSW and Victoria (Map 59a) but the potential are appears to be overestimated in the north and underestimated in SA. The pattern in WA is similar to phalaris (Map 59b). The patchy distribution of tall fescue within its potential zone (Map 60 a) may reflect the difference in drought tolerance between tall fescue and phalaris, and the limited potential for summer growth outside the Tableland and cool environments. Potential may be overestimated in WA for this reason (Map 60b).

6.1.4 Cultivars

Using subterranean clover cultivars as examples, Seaton Park distribution actually exceeds its nominal potential in eastern Australia spreading east onto the Tablelands in NSW and to the coast in south eastern Victoria, but not into central Tasmania (Map 62a) or to the east of Katanning in WA (Map 58b). Trikkala on the other hand is widespread in south eastern Australia (Map 63a) and reasonably common in south western Australia (Map 63b) but completely missing from potential areas in northern NSW. The reason for the patchy

distribution of many cultivars in WA, may relate to the widespread coverage of potential areas with Geraldton, an old oestrogenic cultivar completely missing from the eastern potential zone except for areas immediately north of Adelaide in SA (Map 64a).

6.2 Methods for Refining Areas

6.2.1 Agricultural Statistics

The survey data used for mapping defines percentages of the pastured area of LGA/SLAs covered by certain pasture types. On the Tablelands and Southern Highlands of NSW, in southern Victoria and in Tasmania, the freehold/leasehold areas of LGA/SLAs are 100% pasture. However, as one moves inland onto the Slopes and Plains, significant cropping occurs. The Australian Bureau of Statistics records the areas of crops and pastures in their agricultural census. The last full census occurred in 1993/94. However, the census is a survey which depends on a complete response which seldom occurs. Actual areas of pasture and crops from the ABS AgStats sometimes greatly underestimate the actual areas for any particular LGA because of incomplete responses. However, it is likely that the proportion of pasture to cropped area is approximately correct even if the actual areas are underestimated. Therefore, a better estimate of the area of pasture in any LGA occupied by any species can be obtained by adjusting the freehold/leasehold area for the percentage of pastured area calculated from the ABS AgStats.

$$\% \text{ pastured area} = \frac{\text{pasture area}}{\text{pasture area} + \text{cropped area}} \times 100$$

6.2.2 Satellite Mapping of Land Cover Classes

Satellite remote sensing may be used to define landcover classes for large regional areas. A recent study mapped pasture types for the high rainfall zone of Eastern Australia (Hill et al. 1996). This study provided maps of pasture cover at two resolutions, 1 km and 30 m, for a number of locations. An example of the low resolution data is provided for the Severn LGA/SLA (Map 65). The low resolution data provided more than 10 pasture classes based on seasonal greenness profiles, composition in terms of classes from the high resolution data, and degree of tree cover. The high resolution data provided six classes of pasture based on greenness in spring (data not given). Both classifications provide extra information which may be used to help in the interpretation of the survey results, and in turn the survey data can provide some validation data for the pasture types ascribed to the remotely sensed classes.

In order to relate the survey data to the classifications, we need to define the possible level of discrimination between pasture types based on greenness. For the Severn LGA, all pastures are perennial, since this is a summer rainfall area with very cold, frosty winters. Annual legumes are not important. The major species are exotic perennial legumes and grasses, and native perennial grasses. Native grass-based pastures predominate, but many were oversown with white clover at some stage during the last 40 years. The most heavily cleared areas are likely to be the most developed and to have the highest levels of improved pasture. The wooded areas are more likely to be dominated by native pasture with or without some white clover and fertiliser. Hence, all pastures except unimproved native could have significant greenness in

spring-summer, but only semi-improved or improved pastures will still be green in autumn and winter since native pasture is usually heavily frost affected.

It must be remembered that for the low resolution classification, 1 km² pixel contains a mixture of pasture types and that the classification can only indicate the proportion of improved versus native types for that 1 km². We need to examine the profiles for the best pasture classes and their areas and compare these with the estimates of % area for perennial grass-based pastures from the survey. We must assume that the greenest classes have the highest proportion of improved pasture and the less green classes the lowest proportion. In addition, the mixed pasture and woodland classes are most likely to be predominantly native pasture.

Map 65 shows a 21 class map of the Severn LGA. The blue areas constitute forest and can be removed from area calculations thus refining the pastured area estimate for Severn as shown in Table 7. A similar exercise can be undertaken for other LGA/SLAs (Table 7), however it makes less difference to the estimated pastured area where freehold/leasehold forest is less abundant.

The classes shown in Map 65 can be broken down as follows: N, K, M, L, R and S have significant proportions of improved pasture; T and I probably have a component of improved pasture, and a component of semi-improved pasture; G, E, U, D and B have a high proportion of woodland with low greenness levels suggesting predominantly native pasture; and F, C, H, and J are predominantly forest. The survey data for Severn suggest that about 55% of the pastured area is improved, and 45% of the pastured area is native pasture, some of which is unimproved, some fertilised and oversown with legumes. Based on the areas and greenness profiles of the map classes, the 21 class map can be reclassified to give a three class map showing forest, mainly improved and mainly native areas (Map 66). The greenness profiles for these three classes are shown in Figure 3. The improved pasture profile shows a marked spring-summer greening wave compared with the native pasture and forest. We may infer from this exercise, that the majority of the 55% improved pasture in Severn is located where the improved class occurs on Map 66, and the majority of the native pasture in Severn is located where the native class occurs on Map 66.

This example of integrating different sources of information to enhance interpretation depends on assumptions about the association of pasture type with greenness patterns, and assumptions about the accuracy of the survey area estimates. The analysis lends itself to a probabilistic rather than a deterministic interpretation.

Figure 3. Greenness (NDVI) profiles for 1993 for forest, improved pasture and native pasture for landcover classes reclassified on the basis of area estimates from the survey database for the Severn LGA/SLA

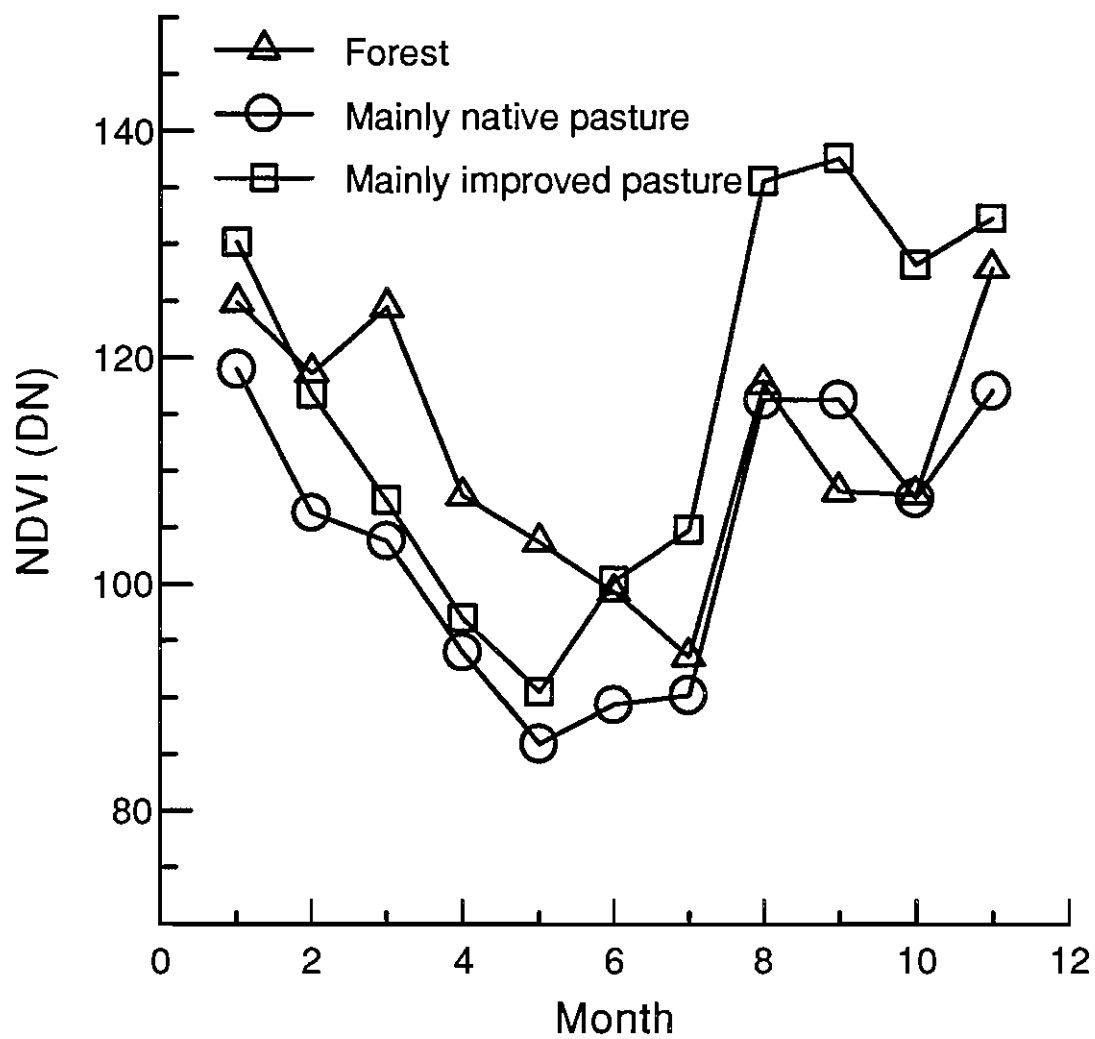


Table 7. Using various methods for refinement of the pastured area of an SLA/LGA

<i>LGA/SLA</i>	<i>TOTAL AREA OF LGA/SLA - area within LGA boundaries as calculated by ArcInfo in Lambert Conformal Conic projection (km²)</i>	<i>TOTAL AREA FREEHOLD and LEASEHOLD - based on the Land Tenure Map for Australia (km²)</i>	<i>PASTURED AREA OF FREEHOLD- LEASEHOLD LAND - based on AgStats <u>pasture</u> pasture + crop</i>	<i>AGRICULTURAL NDVI CLASSES -based on 1.1 km resolution pixels which include trees and other land uses, but excluding predominantly "treed" pixels (km²)</i>	<i>AGRICULTURAL TM CLASSES - based on 30 m pixels and excluding all "treed" pixels (km²)</i>
SEVERN (NSW)	5215	3824	3824	2486	2275
PARRY	4334	4333	3901	3625	2441
YASS	3147	2944	2944	2613	1961
BLAYNEY	1460	1456	1442	1445	1199
COOMA	4763	4072	4072	cloud affected	2149
YAKANDAND AH	1058	740	740	666	470
AVOCA (VIC)	1089	846	812	719	734
LEXTON	800	735	727	714	623
DUNDAS	3412	2576	2550	2424	1976
YANKALILLA (SA)	723	722	715	614	615

6.3 Estimated areas sown to major species by State

Estimates of the area of pasture in each SLA containing particular species are given for each State in Tables 8-13. For Tasmania, LGA areas are used because of the poor match with SLAs. The estimates are calculated as follows:

$$A = FL \times PP \times PPS$$

where A is area of pasture containing species Y;

FL is area of freehold/leasehold land;

PP is pasture proportion of total area (from AgStats - total pasture/(total pasture + field crop)); and PPS is proportion of pastured area containing species Y (from Form A and Form B).

If the survey data are taken as true, these estimates will tend to be inflated since significant areas of freehold/leasehold land are forested, used for horticulture or non-agricultural activities. Nevertheless, they provide perhaps the best data so far compiled on the use of pasture plants. Total areas of pasture containing particular species are given for each State in Table 22a.

6.4 Potential areas of adaptation for major species by State

Areas of potential adaptation for each species were obtained from the intersection between the potential adaptation zones for each species produced by modelling, masked to include freehold/leasehold land only, and the SLA areas used in mapping the survey. Once again, LGA areas are used for Tasmania. Estimates for SLAs in each State are presented in Tables 14-19. Total areas of potential adaptation for each State are given in Table 22b.

6.5 Comparison of AgStats and survey estimates for stocking rate

The Severn SLA/LGA is used as an example for comparison of estimates of stocking rates on various pasture types between the survey and agricultural statistics. Although pasture areas available in AgStats are often substantially less than remote sensing or land tenure mapping would suggest, animal data are generally more accurate and provide method for calculation of stocking rate based on satellite-derived areas.

Stock numbers for Severn from the AgStats database are:

Total sheep excluding lambs	486535
Breeding cattle	9467
Total cattle	129270

The agricultural area derived from satellite data is 227500 ha.

Therefore, using proportions of improved and native pasture from the survey data gives the following pasture areas:

NPICC survey	improved pasture	55%	125125 ha
	native pasture	45%	102375 ha

If we assume that:-

1 breeding cow = 1.5 AU (8 dse/ 12dse = dry cow / lactating cow)

1 AU = 8 dry sheep equiv.

Then,

Total number of AU	143471
Total number of sheep	486535
Total number of DSE	630000

When these values are used to calculate stocking rates for the survey pasture types using the survey stocking rate proportions, the results (Table 21) suggest that stocking rates may be overestimated in the survey for the Severn SLA/LGA.

Table 8. Estimated areas of pasture containing various species for all agricultural SLA's for NSW. Areas estimated using freehold/leasehold land area, percentage of pastured area from ABS AgStats, and percentage of pastured area occupied by particular species from survey Form A.

SLA id	1993/94 SLA_name	Area km ²	Past %	Sub clover	Balarra clover	Persian clover	All medic	Barrel medic	Strand medic	Burr medic	Serra-della	White clover	Lucerne	Red clover	Phalaris	Per ryegrass	Cocksfoot	Tall fescue	Unimp native	Fert native	Fert. Osown	
10050	Albury (C)	102	100	55	2		14					8	15			22	6	11				
10100	Armidale (C)	33																				
10250	Ballina (A)	449	99	36		18						125		18	18	18	18		227		67	
10300	Balranald (A)	19535	85				11582	165	165										8438			
10400	Barraba (A)	2780	99	1068								493	603			657	27	27	27	1534	28	329
10450	Bathurst (C)	229	97	208								136	7			112	40	85	11		40	
10550	Bega Valley (A)	2046	100	1248			184					1269	20	184	573	655	184		143	1198	184	
10600	Bellingen (A)	743	100	74								371		97		208	22		297		74	
10650	Berrigan (A)	1993	83	1387	66	17	182					132	66									
10700	Bingara (A)	2574	93	770								433	626			577	24		1419	25	168	
10800	Bland (A)	8171	72	1116	59		916	94		94			123						1151			
10851	Blayney (A) - Pt A	499	99	434								276	5			227	138	104	15	39	79	
10852	Blayney (A) - Pt B	957	99	830								528	9			434	264	198	28	75	151	
10900	Blue Mountains (C)	334	100									33							200			
10950	Bogan (A)	13470	75	203			4257	4257		203			2230						6588			
11000	Bombala (A)	2673	100	881								560	53	27	294		320	240	240	231	1201	
11050	Boorowa (A)	2458	97	2363									24		215		191		119		716	
11150	Bourke (A)	38057	100				18997			18997									18997			
11200	Brewarrina (A)	17944	96				12055	1722		10333			1722						17221			
11350	Byron (A)	501	100	35		20						135		20	15	15	15		250		75	
11401	Cabonne (A) - Pt A	731	94	548								308	27		473	110	226	21	55		137	
11402	Cabonne (A) - Pt B	498	99	360								163	5		410	79	114	10	89		123	
11403	Cabonne (A) - Pt C	4124	93	3018								1490	153		2598	802	1070	38	382		688	
11600	Carrathool (A)	17056	78	428	28		1083	1069				31				13	13	4	6683			
11650	Casino (A)	86	100	0		0						44							15		26	
11700	Central Darling (A)	48667	100				971	485		485			485						47317			
11720	Cessnock (C)	1031	100	206								62							565		206	
11750	Cobar (A)	40964	97				995	597		597			597						38673			
11800	Coffs Harbour (C)	525	100	16								121		26			16	10	378		26	
11850	Conargo (A)	3549	92	5	5		3246												3181			
11950	Coolah (A)	4287	91	2038			627			627	588	78	1019			39			627	663		
12000	Coolamon (A)	2332	73	898								183	183			58			271	61	7	
12050	Cooma-Monaro (A)	4071	100	1036								609	142	162	508		325	183	569	664	1706	
12100	Coonabarabran (A)	5881	89	2550			729			729	833	52	1457		52				1041	880		
12150	Coonamble (A)	8661	72				6171	50					167						5582			
12200	Cootamundra (A)	1451	87	1233									190		316		316		63	126		
12250	Copmanhurst (A)	2199	100									176	22			110			1889		110	
12300	Corowa (A)	2096	80	1218			84						134			84						
12350	Cowra (A)	2572	90	1089	48							70	324			116		116	46	603	144	
12400	Crookwell (A)	3440	100	1028									34			788		343	171	343	516	1028

Table 8 (cont) . Estimated areas of pasture containing various species for all agricultural SLA's for NSW. Areas estimated using freehold/leasehold land area, percentage of pastured area from ABS AgStats, and percentage of pastured area occupied by particular species from survey Form A.

SLA id	SLA_name	Area km ²	Past %	Sub clover	Balansa clover	Persian clover	All medic	Barrel medic	Strand medic	Burr medic	Serra- della	White clover	Luc-erne	Red clover	Phal-aris	Per-rye- grass	Cocks- foot	Tall fescue	Unimp native	Fert native	Fert. Osown
12450	Culcairn (A)	1539	85	1304			261							65	196				261		
12600	Dubbo (C)	2788	85	1205							24		614		71				1158		
12650	Dumaresq (A)	3011	100	390								781		781	240	631	480	721	721	747	901
12700	Dungog (A)	1697	99	334								284		33		67			669		334
12750	Eurobodalla (A)	876	100	543			140					491		9	79	184	289	79	70	580	140
12801	Evans (s) - Pt A	451	100	377								225		9		180	130	130	63		90
12802	Evans (A) - Pt B	3423	99	2847								1694		68		1356	983	983	474		678
12900	Forbes (A)	4498	79	1105	249		2102	71		499		71		285		1853			713		
12950	Gilgandra (A)	4333	70	1097			1950	122		1828	30		609						1828		
13000	Glen Innes (A)	63	98									32		0	2	13	47	31	44	6	15
13050	Gloucester (A)	2070	100	620								331				41			827		620
13100	Gosford (C)	403	100									322							81		
13200	Grafton (C)	77	100									39		2					25		12
13300	Greater Lithgow (C)	1648	100	1433							2	33		13		560		527	165		412
13350	Greater Taree (C)	2794	100									754		28	223				1759	206	
13400	Great Lakes (A)	2001	100	320								420							400		320
13450	Griffith (C)	1561	70	985			33	416	416			11		55			11	11	350		
13500	Gundagai (A)	2302	98	2361												337		337	675	230	
13550	Gunnedah (A)	4590	68				2642						466						2486	160	
13600	Gunning (A)	2115	100	1941								21			1097		928		127	253	422
13650	Guyra (A)	3698	100	517								1146			1146	296	961	739	813	825	998
13700	Harden (A)	1793	88	1539										31		94		94	47		157
13750	Hastings (A)	2031	100									710		20	122		122		325		406
13800	Hawkesbury (C)	592	100									472							118		
13850	Hay (A)	10646	98	312								156					52		9938		
13900	Holbrook (A)	2065	99	1857	50		306					449		102		510	306	286	20		
14050	Hume (A)	1866	91	1337	34		237					220		254		372	186	186			
14201	Inverell (A) - Pt A	6126	85	1308			4029					1099		1099	262	1099	157		262	3663	157
14202	Inverell (A) - Pt B	1521	94	614			871					542		542	186	542	114		186	714	71
14250	Jerilderie (A)	3248	81	121	118		2522							3					2382		
14300	Junee (A)	1939	82	1593									478		398		398		80	80	
14350	Kempsey (A)	2027	100									465		61	61		61		607		344
14400	Kiama (A)	1652	100									1322		33				33	33	90	33
14550	Kyogle (A)	2429	99	24		24						556			24		48		1039		725
14600	Lachlan (A)	14132	75	531			4250	3187								850			850	4271	
14650	Lake Macquarie (C)	456	100	46								46							91		46
14750	Lecton (A)	1123	73	658	41	8	189						49	66		66			148	41	
14850	Lismore (C)	1126	100	67		45						270		45	22	22	22		686		112
14950	Lockhart (A)	2793	79	2103	111									221		221			487		
15000	Macleay (A)	646	100									32							549		65
15050	Maitland (C)	372	99	147								29		18					110		147

Table 8 (cont). Estimated areas of pasture containing various species for all agricultural SLA's for NSW. Areas estimated using freehold/leasehold land area, percentage of pastured area from ABS AgStats, and percentage of pastured area occupied by particular species from survey Form A.

SLA id	SLA_name	Area km ²	Past %	Sub clover	Balansa clover	Persian clover	All medic	Barrel medic	Strand medic	Burr medic	Serra-della	White clover	Luc-erne	Red clover	Phal-aris	Per ryegrass	Cocks-foot	Tall fescue	Unimp native	Fert native	Fert. Osown
15100	Manilla (A)	2071	94	428								175	369		233	19			1303	19	175
15250	Merriwa (A)	2817	93	1442			1679					813	944		787				1049		629
15300	Moree Plains (A)	16690	58				9040	194		8846			680						8554		
15400	Mudgee (A)	4879	97	2661							95	998	713		713				808	1272	
15450	Mulwaree (A)	4549	99	1177									91		769		543	136	588	793	1132
15500	Murray (A)	3527	84	892		30	565					89	59						1933		
15550	Murrumbidgee (A)	3359	91	308	264		2763					8	14						2454		
15600	Murrumbidgee (A)	2341	88	1700			1311					676	717		656				287		1024
15650	Muswellbrook (A)	1750	99	503							9	434	329	9	78	9	78		572	382	425
15700	Nambucca (A)	856	100									282		43		43			257		128
15750	Narrabri (A)	8939	62	715			2914	1155		1760	715		440						4124	75	
15800	Narrandera (A)	3935	77	2690	396		1088						786						786	305	
15850	Narromine (A)	4954	65	321			2888	64					899		32				1925		
16000	Nundle (A)	1317	99	820		65	351			351		559	130		156	169	156	156	260	179	195
16050	Nymboida (A)	2422	100	73								338			97		73	24	1886		193
16100	Oberon (A)	1540	99	1346								979	15		612	612	337	46	122		291
16150	Orange (C)	266	97	204								113			183	49	75		21		62
16200	Parkes (A)	5511	74	2046	419		614	614		614			818						614		
16300	Parry (A)	4334	90	2146		195	1951			1366		390	1366		390				976	390	585
16400	Port Stephens (A)	582	99	231								46	29						174		231
16450	Quambeyan (C)	51																			
16500	Quirindi (A)	2834	78	931		44	1242					466	510		577			200	1109	134	355
16600	Richmond River (A)	1796	99	71		71						462				36			534		676
16750	Rylstone (A)	2219	99	1720							71	53	31		406		353		397		794
16800	Scone (A)	3481	100	2635			2080					1248	1352		1248				693		1387
16850	Severn (A)	3824	100									1713	190	190	761	2664	1713	2474	381	519	952
16900	Shellharbour (A)	131	100									109	4				3		3	1	3
17000	Singleton (A)	2673	99	598		53						745	399	13	40	66	40		957	553	558
17050	Snowy River (A)	3612	100	956								469	144		505		307	162	505	818	1516
17250	Tallaganda (A)	2386	100	973								570	50		322		370	222	251	159	859
17350	Ternora (A)	2684	79	1955	128		234						149		43		64		85		425
17400	Tenterfield (A)	5427	100									1083	271	108		2437	2166	2437	1896	536	1354
17450	Tumbarumba (A)	1615	99	1479	410							798	2		64	69	141	8	80	104	601
17500	Tumut (A)	1564	100	1420	619							593	16	16	148	70	211	16	94	109	780
17551	Tweed (A) - Pt A	115	100	1		1						25		1		1			45		41
17552	Tweed (A) - Pt B	929	100	9		9						204		9		9			362		334
17600	Ulmara (A)	1038	100									196	10						765		62
17650	Uralla (A)	3009	100	270								449		449	150	389	270	419	719	569	1228
17700	Urana (A)	3030	82	2367	133		523						125						1395		
17750	Wagga Wagga	4648	91	1832								742	371		117				1184	266	30
17800	Wakool (A)	7050	82	243			313	313				12	70			12					

SLA id	SLA_name	Area km ²	Past %	Sub clover	Balansa clover	Persian clover	All medic	Barrel medic	Strand medic	Burr medic	Serra-della	White clover	Luc-erne	Red clover	Phal-aris	Perrye-grass	Cocks-foot	Tall fescue	Unimp native	Fert native	Fert. Osown
17850	Walcha (A)	4046	100	728								1293		1293	525	849	647	1172	889	1238	970
17900	Walgett (A)	20791	79				13197			13197									16496		
17950	Warren (A)	10009	69	69			6854	69					485		69				6231		
18100	Weddin (A)	3140	83	1627	727		242					26	472		130		115	89	521	54	
18150	Wellington (A)	3813	90	2960	105							2058	1619		758		758		254		762
18200	Wentworth (A)	23229	89				9055	41		41			41						7956		
18300	Windouran (A)	4727	94	491			3881					45	45			45			3881		
18350	Wingecarribee (A)	1571	100	172								1144	31		78		47	94	125	77	31
18400	Wollondilly (A)	726	100									470		72		72			108		
18450	Wollongong (C)	312	100									262					6		9	19	6
18550	Wyong (A)	474	100	166								71							118		166
18600	Yallaroi (A)	4934	48				2141			2141			238						1998		
18650	Yarrowlumia (A)	1927	100	1633								77	19		903		115	77	96	884	38
18700	Yass (A)	2948	99	2449									29		1778		933	58	379	525	525
18750	Young (A)	2571	88	2215									45		68		68		90		113
18809	Unincorp. Far West	82065	100																40202		

SLA id	SLA_name	Area km ²	Past %	Sub clover	Balansa clover	Persian clover	All medic	Barrel medic	Strand medic	Burr medic	Serra-della	White clover	Luc-erne	Red clover	Phal-aris	Perrye-grass	Cocks-foot	Tall fescue	Unimp native	Fert native	Fert. Osown
17850	Walcha (A)	4046	100	728								1293		1293	525	849	647	1172	889	1238	970
17900	Walgett (A)	20791	79				13197			13197									16496		
17950	Warren (A)	10009	69	69			6854	69					485		69				6231		
18100	Weddin (A)	3140	83	1627	727		242					26	472		130		115	89	521	54	
18150	Wellington (A)	3813	90	2960	105							2058	1619		758		758		254		762
18200	Wentworth (A)	23229	89				9055	41		41			41						7956		
18300	Windouran (A)	4727	94	491			3881					45	45			45			3881		
18350	Wingecarribee (A)	1571	100	172								1144	31		78		47	94	125	77	31
18400	Wollondilly (A)	726	100									470		72		72			108		
18450	Wollongong (C)	312	100									262					6		9	19	6
18550	Wyong (A)	474	100	166								71							118		166
18600	Yallaroi (A)	4934	48				2141			2141			238						1998		
18650	Yarrowlumia (A)	1927	100	1633								77	19		903		115	77	96	884	38
18700	Yass (A)	2948	99	2449									29		1778		933	58	379	525	525
18750	Young (A)	2571	88	2215									45		68		68		90		113
18809	Unincorp. Far West	82065	100																40202		

Table 9. Estimated areas of pasture containing various species for all agricultural SLA's for Queensland. Areas estimated using freehold/leasehold land area, percentage of pastured area from ABS AgStats, and percentage of pastured area occupied by particular species from survey Form A.

SLA id	SLA_name	Area km ²	Past %	Sub clover	Balansa clover	Persian clover	All medic	Barrel medic	Strand medic	Burr medic	Serra-della	White clover	Luc-erne	Red clover	Phal-aris	Per rye-grass	Cocks-foot	Tall fescue	Unimp native	Fert native	Fert. Osown
30100	Warwick (S) - North	645	62				40	40					40						60		
30200	Atherton (S)	396	87	4		10						10							2		
30350	Banana (S)	14016	96																7750		
30650	Bendemere (S)	3217	89				57	57					6						739		
30700	Biggenden (S)	1148	98			28	135	135				62		17		22			861		
30800	Boonah (S)	1244	97			60						108	7					10	674		
32001	Caboolture (S) - Pt A	606	99									30							60		
32031	Caboolture (S) - Pt B	350	95									17							33		
32101	Calliope (S) - Pt A	393	100										0						319		
32104	Calliope (S) - Pt B	4983	100										5						4041		
32131	Caloundra (C) - Pt A	139	100																56		
32134	Caloundra (C) - Pt B	655	100																262		
32150	Cambooya (S)	587	61				36	36					25						36		
32350	Chinchilla (S)	5391	83										45						2233		
32400	Clifton (S)	815	39				31	31					31						31		
32900	Eacham (S)	660	100	5		14						10							12		
33050	Esk (S)	3045	98			6						21	45				3		2368	299	
33151	Fitzroy (S) - Pt A	15	100										0						12		
33154	Fitzroy (S) - Pt B	5474	100										5						4147		
33250	Gatton (S)	1316	97			3						123	159				3		817	127	
33400	Warwick (S) - East	1481	79				47	47					82						503		
33554	Burnett (S) - Pt B	1474	100									1							1449		
33700	Herberton (S)	7909	100	8		16						8							7892		
33900	Inglewood (S)	4668	92				86	86					43						2590		
34000	Isis (S)	1114	100																891		
34200	Jondaryan (S)	1783	27				19	19					34						48		
34250	Kilcoy (S)	758	100									38							568		
34400	Kolan (S)	3842	100																3073		
34450	Laidley (S)	639	92			1						10	59				1		397		
34550	Livingstone (S)	7392	100										15						4553		
34901	Maroochy (S) - Pt A	201	100									10							60		
34904	Maroochy (S) - Pt B	655	100									33							229		
35000	Millmerran (S)	3116	70				131	131					44						656		
35100	Miriam Vale (S)	2887	100									0							2020		
35150	Monto (S)	3459	97			29						29		23					3200	74	
35350	Mount Morgan (S)	420	100										0						388		
35550	Murilla (S)	5063	78				314	314					39						1571		
35751	Noosa (S) - Pt A	581	100									29							232		
36050	Pittsworth (S)	1013	35				14	14					17						42		

Table 9 (cont). Estimated areas of pasture containing various species for all agricultural SLA's for Queensland. Areas estimated using freehold/leasehold land area, percentage of pastured area from ABS AgStats, and percentage of pastured area occupied by particular species from survey Form A.

SLA id	SLA_name	Area km ²	Past %	Sub clover	Balansa clover	Persian clover	All medics	Barrel medic	Strand medic	Burr medic	Serra- della	White clover	Luc- eme	Red clover	Phal- aris	Per grass	rye- foot	Cocks- fescue	Tall fescue	Unimp native	Fert native	Fert. Osown
36450	Rosalie (S)	2008	71				57	57						57							215	
36500	Warwick (S) - West	1745	97				34	34						17							1217	
36600	Stanthorpe (S)	2297	100				46	46						23							1651	
36700	Tara (S)	9658	73											211							1334	
36750	Taroom (S)	13865	97				540	540						135							2296	
36900	Toowoomba (C)	110	100																			
37100	Waggamba (S)	12310	67				664	664						249							1410	
37150	Wagabo (S)	4660	46				64	64						21							299	

Table 10. Estimated areas of pasture containing various species for all agricultural SLA's for South Australia. Areas estimated using freehold/leasehold land area, percentage of pastured area from ABS AgStats, and percentage of pastured area occupied by particular species from survey Form A.

SLA id	SLA_name	Area km ²	Past %	Sub clover	Balansa clover	Persian clover	All medic	Barrel medic	Strand medic	Burr medic	Serra-della	White clover	Luc-erne	Red clover	Phal-aris	Per rye-grass	Cocks-foot	Tall fescue	Unimp native	Fert native	Fert. Osown
40140	Angaston (DC)	212	90	159												29	29	29			29
40210	Barmera (DC)	274	99				203	95		54									35		14
40280	Barossa (DC)	315	89	222												82	82	82			61
40350	Beachport (DC)	1231	99	709	371		43			37				24		489	12	367	122		40
40510	Blyth-Snowtown (DC)	1694	42	143			608	608													
40630	Browns Well (DC)	1748	67				763	763		294			176						200		41
40770	Burra Burra (DC)	2145	82	1166			919	848							177				265		
40840	Bute (DC)	950	29				262	262													
40980	Carrieton (DC)	1879	75				939			869									434		
41040	Central Yorke Peninsula (DC)	2523	42				952	952													
41120	Clare (DC)	597	73	362			78	78							22				65		
41190	Cleve (DC)																				
41400	Coonalpyn Downs (DC)	3369	95	354	227	194	64	64			3		774		194		194				
41540	Dudley (DC)	453	98	427	22		22					9			133	80	80				58
41750	Ellistown (DC)	5851	75				1974	1974	1974	1974									1097		
41890	Eudunda (DC)	724	56	122	122		325	203	203	325									77		
42310	Gumeracha (DC)	304	100	248								9			67	160	121		15		30
42380	Hallett (DC)	2257	86	1871			1910			58			19								
42520	Hawker (DC)	1859	99				1749			1749									92		
42740	Jamestown (DC)	1209	60	606	570		635	36		29			50								
42940	Kanyaka-Quom (DC)	2011	66				1332			1332											
43010	Kapunda (DC)	570	65	317	317		325	7	7	325									37		
43080	Karoonda-East Murray (DC)	3880	73				1982	1982		849				425					481	89	
43220	Kimba (DC)																				
43290	Kingscote (DC)	2792	98	2591	779		136					55			136	736	273				136
43360	Lacepede (DC)	3052	100	638			182					30	486		942	182	304	152	760		
43430	Lameroo (DC)	2256	76	86			1205	1205	1205			86	517						34		52
43570	Le Hunte (DC)	4733	53				1503	1503	1503	1503									250		
43640	Light (DC)	653	35	68	68		214	147	147	214									11		
43710	Lower Eyre Peninsula (DC)	3720	69	953	156		1546	1494		1546					26		26				
43780	Loxton (DC)	2809	57				1120	1120		400			160						208	131	
43850	Lucindale (DC)	2308	100	921								115	299		1197	322	691	207	138		

Table 10 (cont). Estimated areas of pasture containing various species for all agricultural SLA's for South Australia. Areas estimated using freehold/leasehold land area, percentage of pastured area from ABS AgStats, and percentage of pastured area occupied by particular species from survey Form A.

SLA id	SLA_name	Area km ²	Past %	Sub clover	Balansa clover	Persian clover	All medic	Barrel medic	Strand medic	Burr medic	Senna-della	White clover	Luc-erne	Red clover	Phal-aris	Perrye-grass	Cocks-foot	Tall fescue	Unimp native	Fert native	Fert. Osown
43920	Mallala (DC)	895	44				331	331	331	331									39	20	
43990	Mannum (DC)	669	58				343	335	335	335		35				12					
44130	Meningie (DC)	2554	95				1980	1980	1980	1980		97	242			97					
44200	Millicent (DC)	745	97	324	287	36							29		324	7	108	216			
44270	Minlaton (DC)	906	48	371			371	371													
44480	Morgan (DC)	2085	88				1568	1291		553									369	92	
44550	Mount Barker (DC)	572	98	447								28			95	335	252		28		56
44620	Mount Gambier (C)	26	100	2		2							1		2		2				
44690	Mount Gambier (DC)	781	100	70		62							39		70		70				
44760	Mount Pleasant (DC)	629	93	463											141	176	199		59		59
44830	Mount Remarkable (DC)	3101	55	1563	89		1461	1461					68		17						
44900	Munno Para (C)																				
45040	Murray Bridge (RC)	1772	75				1196	1196	1196	1196		93				27					
45180	Naracoorte (DC)	2118	96	816								143	245		980	306	572	163	143		
45280	Northern Yorke Peninsula (DC)	732	27				185	185													
45320	Onkaparinga (DC)	209	100	182								10			25	125	98		6		10
45390	Orroroo (DC)	1247	44	193			468	165		110											
45460	Paringa (DC)	7469	41				3272	4261		761									609	94	
45600	Peake (DC)	1840	79	72			795	795	795			217	650						29		43
45670	Penola (DC)	1311	99	310		13							13		362		181	52			
45810	Peterborough (DC)	2863	85	97			2352	218		2133			24						48		
45880	Pinnaroo (DC)	1683	64	54			759	759	759			54	325						22		33
45950	Pirie (DC)																				
46090	Pt. Augusta (C)	834	95				72			72									717		
46160	Pt. Broughton (DC)	562	29				155	155													
46230	Port Elliot & Goolwa (DC)	460	98	449	13	49	13	13			22	72			355	81	359				22
46370	Port MacDonnell (DC)	808	100	226		32	8						64		250		226	24			
46730	Ridley-Truro (DC)	2935	74				1623	1623		433			108						216	176	43
46790	Riverton (DC)	435	64	218	218		218			218									14	14	
46860	Robe (DC)	1069	99	287			159					43	159		404	106	181	64	128		
46930	Poberistown (DC)																				
46950	Rocky River (DC)	1130	45	353	50		378	318		10			25								
47000	Saddleworth & Auburn (DC)	773	66	358	358		384	26	26	384									41	36	
47280	Spalding (DC)	508	71	281			61	61							11				54		
47420	Strathalbyn (DC)	1208	84	726	50		202	151					50		121	252	222		30		50

Table 11. Estimated areas of pasture containing various species for all agricultural LGA's for Tasmania. Areas estimated using freehold/leasehold land area, percentage of pastured area from ABS AgStats, and percentage of pastured area occupied by particular species from survey Form A.

LGA ID	LGA_Name	Area km ²	Past %	Sub clover	Balansa clover	Persian clover	All medica	Barrel medic	Strand medic	Burr medic	Serra-della	White clover	Luc-erne	Red clover	Phal-arid	Perry-grass	Cocks-foot	Tall fescue	Unimp native	Fert native	Fert. Osown
60200	CAMPBELL TOWN	1257	99	1058								796			37	498	498		187		560
60400	BRUNY	230	99	217								205				205	91		11		11
60410	BRIGHTON	454	98	378								142			13	178	178		67		200
60600	BOTHWELL	1792	99	1508								1136			53	710	709		266		799
60611	BURNIE	538	100	535								481				481	134				
60811	ULVERSTONE	340	99	337								304				304	84				
60900	DELORAIN	791	99	783								705				705	196				
61100	ESPERANCE	171	99	161								153				153	68		8		8
61200	EVANDALE	819	99	811								730				730	203				81
61210	CIRCULAR HEAD	1340	100	1313								1313				1286	241	27			
61300	FINGAL	1036	99	871								328			31	410	410		154		461
61410	CLARENCE	241	100	229								217				217	97		12		12
61610	DEVONPORT	120	99	118								107				107	30				
61900	GREEN PONDS	430	99	361								136			13	170	170		64		191
62000	HAMILTON	1591	99	1339								504			47	630	630		236		709
62010	FLINDERS	707	100	601								226			21	283	283		106		318
62211	GEORGE TOWN	453	100	451								406				406	113				45
62410	GLAMORGAN	681	99	576								217			20	271	271		102		305
62900	LONGFORD	883	99	874								787				787	219				87
63010	HUON	404	100	384								364				364	162		20		20
63100	OATLANDS	1450	99	1220								459			43	574	574		215		646
63200	PENGUIN	226	99	224								201				201	56				
63210	KENTISH	563	99	558								502				502	140				
63400	PORTLAND	320	99	317								301				301	95				
63410	KING ISLAND	983	100	963								963				943	177	20			
63600	RICHMOND	531	99	447								168			16	210	210		79		237
63700	RINGAROOMA	720	99	712								677				677	214				
63800	ROSS	956	99	805								303			28	379	379		142		426
63811	LATROBE	335	99	332								298				298	83				53
64000	SCOTSDALE	746	99	738								701				701	221				
64013	LAUNCESTON	1115	*	331								221				221	221				110
64200	SPRING BAY	764	99	643								242			23	303	303		113		340
64211	WESTBURY	768	99	760								410				684	190				76
64400	TASMAN	314	99	295								280				280	124		16		16
64411	NEW NORFOLK	588	99	495								186			17	233	233		87		262
64800	WYNYARD	548	99	543								489				489	136				
64812	SORELL	644	99	542								204			19	255	255		96		287
65811	BEACONSFIELD	539	99	533								480				480	133				53

* large metropolitan component

Table 12. Estimated areas of pasture containing various species for all agricultural SLA's for Victoria. Areas estimated using freehold/leasehold land area, percentage of pastured area from ABS AgStats, and percentage of pastured area occupied by particular species from survey Form A.

SLA id	SLA_name	Area km ²	Past %	Sub clover	Balansa clover	Persian clover	All medics	Barrel medic	Strand medic	Burr medic	Serra- della	White clover	Lue- erne	Red clover	Phal- aris	Per rye- grass	Cocks- foot	Tall fescue	Unimp native	Fert native	Fert. Oswm
20040	Alberton (S)	1200	100	972	40		384					516	24		24	492	492	24	216		48
20080	Alexandra (S)	908	100	817									18			182			91	655	
20160	Arapiles (S)	1719	90	647									31		385	385	385		31	34	
20200	Ararat (C)	18																			
20240	Ararat (S)	3197	95	2303											415	551	124	15	342	397	
20280	Avoca (S)	846	96	432											41		16		196	241	
20320	Avon (S)	1111	100	533	50		333					144	56			144	167	22	244		22
20360	Bacchus Marsh (S)	354	91	323								16	16		65	32	32		32	100	
20400	Bairnsdale (C)	29	100	19								17	1			7	9		3	3	4
20441	Bairnsdale (S) - Pt A	340	98	217								201	17			84	100		33	33	50
20442	Bairnsdale (S) - Pt B	959	100	622								574	48			239	287		96	204	144
20520	Moorabool (S) - East	607	99	409								24	18		120	90	132				
20561	Ballarat (C) - Inner North	264	96	177									25		18	63	38				
20562	Ballarat (C) - North	257	98	118									25		18	63	38				
20602	Southern Rural (S) - East	629	96	604											181	60	30		30	129	
20642	Surf Coast (S) - Pt A	433	99	375								128	21		182	128	32		21	54	43
20680	Bass (S)	510	100	500			5					388		5		403	347		5	112	
20720	Beechworth (S)	423	100	288								30	4		25	21	42		63	144	63
28569	Lady Julia Percy & Towerhill	504	100	408								61	5		45	252		5			
20760	Belfast (S)	504	100	408								61	5		45	252		5			
20802	Greater Geelong (C) - Pt B	301	97	193								88			146	88	58			18	12
20840	Benalla (C)	16	98	15	0							0	0		2	0	1		1	3	
20880	Benalla (S)	1741	97	1513	22							17	17		219	17	118		151	432	
21000	Bet Bet (S)	670	92	424	41			31				61			61		61		123		
21040	Birchip (S)	1435	61				437	437		31			175							44	
21120	Bright (S)	154	100	92								60				76	29		31	605	
21200	Broadford (S)	340	100	289									0			68			51	161	
21320	Bulla (S)	413	98	386											203		41		41	81	20
21360	Buln Buln (S)	627	100	94								439				501	501			61	63
21442	Moorabool (S) - West	537	99	357								37	5		80	80	69				
21520	Camperdown (T)	15	100	12								12				14	0	0			
21560	Castlemaine (C)	18	100	9	0		0			0			0		3		3		7		
21640	Charlton (S)	1126	73	491	41		123	82		41			41						204		
21720	Chiltern (S)	419	99	272	9							37	21		50	21	50		41	93	41
21760	Cobram (S)	321	98	50			6	9				141				141			9	22	

Table 12 (cont). Estimated areas of pasture containing various species for all agricultural SLA's for Victoria. Areas estimated using freehold/leasehold land area, percentage of pastured area from ABS AgStats, and percentage of pastured area occupied by particular species from survey Form A.

SLA id	SLA_name	Area km ²	Past %	Sub clover	Balansa clover	Persian clover	All medic	Barrel medic	Strand medic	Burr medic	Serra-della	White clover	Luc-erne	Red clover	Phal-arid	Perry-grass	Cocks-foot	Tall fescue	Unimp native	Fert native	Fert. Osown
21840	Cohuna (S)	330	100	138	9	10						276	7			16			30		
21880	Colac (C)	11	100	8								4	0		2	5				3	
21920	Colac (S)	1639	99	1136								568	81		243	730				446	
22002	Greater Geelong (C) - Pt C	464	91	421								21	21		147		42		42	99	
22040	Cranbourne (C)	727	100	109								436			436	509	509		73	37	73
22080	Creswick (S)	475	96	375											78	146					
22200	Daylesford & Glenlyon (S)	311	99	269											9	117					
22240	Deakin (S)	892	99	150		26	26					336				336			44	88	
22320	Dimboola (S)	2448	62	682			682						45		30	30	30			116	
22360	Donald (S)	1309	66	415			415						43							37	
22440	Dundas (S)	2577	99	2019											256		26	26			
22480	Dunmunkle (S)	1508	70	348			348						32		105	105	105				
22560	East Loddon (S)	1145	92	517	11	11						127	11			11			454		
22600	Echuca (C)	25	100	16			0					12	0			3			2		
22640	Eltham (S)	241	100	193								144				168	168			27	24
22720	Euroa (S)	1344	98	1185									26			395			132	372	
22880	Frankston (C)	71	100	35								28			28	28	28		7	7	
23000	Gisborne (S)	195	100	166								10			58	19			39	54	19
23040	Glenelg (S)	2625	100	2465									52		131	262	52				
23080	Gordon (S)	2002	87	938			382					834	122			35			174		
23120	Goulburn (S)	902	96	737									43			303			43	96	
23162	Southem Rural (S) - West	873	98	604								17	9		43	69	51				
23240	Hampden (S)	2340	97	2028								570	23		228	1435	23	46	23		
23280	Hastings (S)	281	100	42								140			140	168	168		28	14	28
23360	Healesville (S)	243	100	158								146				158	158		24		12
23440	Heytesbury (S)	1396	100	851								935	7		28	977	14	70			
23460	Heywood (S)	2511	100	2280								100	50		175	927	50	50			
25880	Portland (C)																				
23480	Horsham (C)	23	92	9									0		0	0	0				
23521	Huntly - Inner	39	89	27	2		1			1			3		10	3	10		3		
23522	Gr. Bendigo (C) - Huntly Bal	670	91	362	28		25			25			61		61		61		123		
23560	Kaniva (S)	2332	88	491			491						102		205	205	205			52	
23600	Kara Kara (S)	2059	87	966	176		250	89		161			179		179		179		537		
23640	Karkarooc (S)	3087	69				1060	1060					212							251	
23760	Kerang (S)	3120	79	1036		296	74	74				1111	123			1111					
23840	Kilmore (S)	472	100	424									9			155			47	98	
23960	Korong (S)	2080	89	1187	185		167			167			93		371		371		556		

Table 12 (cont). Estimated areas of pasture containing various species for all agricultural SLA's for Victoria. Areas estimated using freehold/leasehold land area, percentage of pastured area from ABS AgStats, and percentage of pastured area occupied by particular species from survey Form A.

SLA id	SLA_name	Area km ²	Past %	Sub clover	Balansa clover	Persian clover	All medic	Barrel medic	Strand medic	Burr medic	Serra-della	White clover	Luc-erne	Red clover	Phal-arid	Perrye-grass	Cocks-foot	Tall fescue	Unimp native	Fert native	Fert. Osown
24000	Korumburra (S)	599	100	587			6					462			6	468	396		36	96	
24040	Kowree (S)	4281	95	1017										41		814	814			302	
24080	Kyabram (T)	26	100	4			0	0				10				10			1	3	
24120	Kyneton (S)	652	99	310	34			32		32					13	65	45	65	129		
24160	Southern Rural (S) - Central	973	96	930												279			93	186	
24200	Lexton (S)	735	99	552												109	145	4	73	93	
24240	Lillydale (S)	395	100	257								237				257	257		40		20
24280	Lowan (S)	1969	76	539				539						45		60	60	60			
24320	McIvor (S)	951	99	605	41			28		28				47		104		104	283		
24360	Maffra (S)	813	100	576				292				406		41	32	16	389	357	211		32
24400	Maldon (S)	540	95	348	5			5		5				5		51		51	153		
24480	Mansfield (S)	1237	100	989										25		284			185	950	
24522	Gr. Bendigo (C) - Marong Bal	1154	90	573	53			52		52				260		104	104		208		
24560	Maryborough (C)	17	99	7	0			0		0				2		2	0	2	4		
24640	Melton (S)	446	95	423												127			42	85	
24680	Metcalfe (S)	538	100	317	23			21		21						54	54		215		
24761	Mildura (S) - Pt A	335	86					115	115					14						92	
24762	Mildura (S) - Pt B	3902	79					1994	828					61					1166		
24800	Minhamite (S)	1290	100	1222								39				51	630	13			
24840	Mitroo (S)	249	100	249								197		2			199	174	2	50	
24880	Moe (C)	39	100	8								23					31	31	4		8
25040	Mortlake (S)	2108	98	1887								435		21		207	1286	83	21	21	
25081	Morwell (C) - Pt A	297	100	59								357					238	238	30		59
25082	Morwell (C) - Pt B	177	100	35								106					141	141	18		35
25120	Mount Rouse (S)	1376	98	1354												68	406	14			
25160	Myrtleford (S)	209	100	132								21		1		18	50	39	27	112	
25201	Narracan (S) - Pt A	228	100	178								132					178	178	46		46
25202	Narracan (S) - Pt B	493	100	385								286					385	385	99		99
25240	Nathalia (S)	868	94	163			16	16				261					261		123	113	
25280	Newham & Woodend (S)	211	98	103	2			2		2						21	29	21	41		
25320	Newstead (S)	310	98	151	4			3		3				15		45		45	121		
25440	Numurkah (S)	801	97	124			16	31				342					342		23	54	
25560	Omeo (S)	1314	100	723								460		66		197	197	66	263	1106	263
25600	Orbost (S)	933	100	513								746		47		140	466	93	93	914	47
25640	Otway (S)	738	100	74								626					626		37	92	37
25680	Oxley (S)	1264	100	960								227		13		215	404	177	152	463	
25760	Phillip Island (S)	97	100	95			2					81					79	75	0	16	
25800	Port Fairy (B)	23	100	20										0		2	8				
26040	Pyalong (S)	519	100	440													104		78	174	

Table 12 (cont). Estimated areas of pasture containing various species for all agricultural SLA's for Victoria. Areas estimated using freehold/leasehold land area, percentage of pastured area from ABS AgStats, and percentage of pastured area occupied by particular species from survey Form A.

SLA id	SLA_name	Area km ²	Past %	Sub clover	Balansa clover	Persian clover	All medics	Barrel medic	Strand medic	Burr medic	Serra- della	White clover	Luc- erne	Red clover	Phal- aris	Per ry- grass	Cocks- foot	Tall fescue	Unimp native	Fert native	Fert. Osown
26200	Ripon (S)	1408	97	1291											299	408	68	14	14	70	
26240	Rochester (S)	1832	95	1113			17					852	35			191			139		
26282	Rodney (S) - Pt B	820	99	130			16	33				390				390			33	50	
26320	Romsey (S)	607	99	539									12			180			60	149	
26360	Rosedale (S)	1578	100	1166			252					914	32		32	882	882		189		32
26400	Rutherglen (S)	504	98	430	5								5		30		5		64	49	
26520	Sale (C)	31	100	23			5					18	0		0	17	17		4		0
26640	Seymour (RC)	888	99	794									18			221			88	281	
26680	Shepparton (C)	26	100	6			0	0				7				7			2	4	
26721	Shepparton (S) - Pt A	209	86	41			4	5				47				47			11	25	
26722	Shepparton (S) - Pt B	667	95	146			13	19				164				164			38	89	
26760	Sherbrooke (S)	190	100	124								114				124	124		19		10
26840	South Gippsland (S)	816	100	808			8					702	8			702	620		16	162	
26960	Stawell (C)	23	83	4									0		4	4	4			2	
27000	Stawell (S)	2310	92	425									85		489	489	489			187	
27041	Gr. Bendigo (C) - S'saye Bal	373	100	179	14		11				11			4		37	37		112		
27042	Strathfieldsaye - Inner	45	100	21	3		1				1		0		4		4		13		
27120	Swan Hill (C)	23	5	0			0	0					0						0		
27160	Swan Hill (S)	5759	69	2191			558						119						558		
27200	Talbot & Clunes (S)	450	98	478											88	127					
27241	Tallangatta (S) - Pt A	393	99	289	10							47			39		59		39	105	39
27242	Tallangatta (S) - Pt B	995	100	845								149			99	149	149		50	524	99
27281	Tambo (S) - Pt A	202	100	91								61	10			40	20		61	20	51
27282	Tambo (S) - Pt B	495	100	124																	124
27320	Traralgon (C)																				
27361	Traralgon (S) - Pt A	214	100	197			36					113		13	4	109	96		28		4
27362	Traralgon (S) - Pt B	160	100	147			27					85		10	3	81	72		21		3
27400	Tullaroop (S)	538	91	215	6		5			5			49		49	24	49		122		
27440	Tungamah (S)	1095	89	745	10							20	10		39	20	10		118	98	
27521	Upper Yarra (S) - Pt A	695	100	589								104			69	104	104		35	357	69
27522	Upper Yarra (S) - Pt B																				
27480	Upper Murray (S)																				
27560	Violet Town (S)	850	98	747	9								8		83		25		83	177	
27600	Walpeup (S)	5537	82				2808	1902					317						906		
27640	Wangaratta (C)	27	99	22	0							0	0		4	0	2		5	4	
27680	Wangaratta (S)	773	96	606	8							4	7		112	7	45		134	115	
27720	Warrnon (S)	1912	99	1902											247	190	19	19			
27760	Waranga (S)	1353	94	811	73		63			63			63		63		63		380		

Table 12 (cont). Estimated areas of pasture containing various species for all agricultural SLA's for Victoria. Areas estimated using freehold/leasehold land area, percentage of pastured area from ABS AgStats, and percentage of pastured area occupied by particular species from survey Form A.

SLA id	SLA_name	Area km ²	Past %	Sub clover	Balansa clover	Persian clover	All medics	Barrel medic	Strand medic	Burr medic	Serra- della	White clover	Luc- erne	Red clover	Phal- aris	Perrye- grass	Cocks- foot	Tall fescue	Unimp native	Fert native	Fert. Osown
27800	Warracknabeal (S)	1772	56	649			649							30							
27840	Warragul (RC)	337	100	51								236				270	270			17	34
27880	Warrnambool (C)	35	100	29								10	0		3	21	1	1	0		
27920	Warrnambool (S)	1552	99	1282								448	15		124	911	62	62	8		
28000	Werribee (C)	571	96	492											109				109	124	55
28040	Whittlesea (C)	529	100	476												159			53	146	
28120	Winnumera (S)	2046	74	680			680						30		60	60	60				
28160	Surf Coast (S) - Pt B	550	98	457								54			161	134			27	88	27
28200	Wodonga (RC)	319	100	140	7							6							32	66	32
28240	Wonthaggi (B)	57	100	57								29				41	25		6	21	
28280	Woorayl (S)	1172	100	727		12						633	12			574	492		35	72	
28320	Wycheproof (S)	3633	63	69			1400	734					115						574		
28360	Yackandandah (S)	740	100	495								89			74	37	111		111	263	37
28440	Yarrawonga (S)	587	88	435	5							10	5		21	10	10		73	52	
28480	Yea (S)	1046	100	941									21			314			105	349	
28509	Yallourn Works Area	2	100	0								0				1	1		0		0

Table 13. Estimated areas of pasture containing various species for all agricultural SLA's for Western Australia. Areas estimated using freehold/leasehold land area, percentage of pastured area from ABS AgStats, and percentage of pastured area occupied by particular species from survey Form A.

SLA id	SLA_name	Area km ²	Past %	Sub clover	Balansa clover	Persian clover	All medic	Barrel medic	Strand medic	Burr medic	Serra-della	White clover	Luc-erne	Red clover	Phal-aris	Perrye-grass	Cocks-foot	Tall fescue	Unimp native	Fert native	Fert. Osown
50070	Albany (S)	3580	95	3101							136					68					
50280	Augusta-Margaret River (S)	993	100	993	2134											199					
50560	Beverley (S)	1644	84	1385																	
50630	Boddington (S)	1008	95	958																	
50770	Boyup Brook (S)	2127	95	2022	127																
50840	Bridgetown-Greenbushes (S)	691	98	679	38							3				20					
50910	Brookton (S)	1442	78	792																	
51050	Broomehill (S)	1118	85	937	47		9														
51120	Bruce Rock (S)	2581	64	1030			166	100		100											
51260	Busselton (S)	976	100	975	1372																
51400	Capel (S)	452	100	452	519																
51470	Camamah (S)	1941	75	802			117				15								365	101	
51610	Chapman Valley (S)	3042	63	995			287												479		
51680	Chittering (S)	1029	94	823							19										
51890	Collie (S)	288	100	287	1608																
52030	Coorow (S)	3003	82	1358			111				12								617	130	
52100	Corrigin (S)	2535	67	1607			778														
52240	Cranbrook (S)	2776	93	2573	145																
52310	Cuballing (S)	1050	81	561																	
52450	Cunderdin (S)	1763	59	1037			147														
52520	Dalwallinu (S)	5921	47	1937			526												277		
52590	Dandaragan (S)	4415	94	3439	0		0				41		0								
52660	Dardanup (S)	291	100	290	402							58				58					
52730	Denmark (S)	571	100	553							6	11				29					
52870	Donnybrook-Balingup (S)	639	100	637	1437																
52940	Dowerin (S)	1748	61	1028			225														
53010	Dumbleyung (S)	2388	70	1662	85		17														
53290	Esperance (S)	13377	82	10829	1815		4102	4102	4102	4102	6180		328		273	273	273	273			
53570	Gingin (S)	2117	99	1194			21				209		4								
53640	Gnowangerup (S)	3714	80	2939	163		30														
53710	Geomalling (S)	1729	68	1172																	
53850	Greenough (S)	1568	80	863			125												225		
53990	Harvey (S)	930	100	604	1060						260	19				260					

Table 13 (cont). Estimated areas of pasture containing various species for all agricultural SLA's for Western Australia. Areas estimated using freehold/leasehold land area, percentage of pastured area from ABS AgStats, and percentage of pastured area occupied by particular species from survey Form A.

SLA id	SLA_name	Area km ²	Past %	Sub clover	Balansa clover	Persian clover	All medics	Barrel medic	Strand medic	Burr medic	Serra-della	White clover	Luc-erne	Red clover	Phal-arid	Perrye-grass	Cocks-foot	Tall fescue	Unimp native	Fert native	Fert. Osown
54060	Irwin (S)	1372	88	973			96				12								180		
54130	Jerramungup (S)	4284	85	3326			183						146								
54340	Katanning (S)	1459	82	1191	60		12														
54410	Kellerberrin (S)	1806	58	670			230	115		115											
54480	Kent (S)	4203	78	2423			589														
54550	Kojonup (S)	2802	93	2607	130																
54620	Kondinin (S)	3879	65	1989			327														
54690	Koorda (S)	2420	57	111			1057	528		528											
54760	Kulin (S)	4313	71	2758			153														
54900	Lake Grace (S)	8098	74	4252			1138														
55180	Manjimup (S)	1078	100	1077	1346							22				194	215	194			
55460	Merredin (S)	3089	53	1172			314	132		132											
55530	Mingenew (S)	1815	69	539			125												439		
55600	Moora (S)	3417	74	1940			227				25		0								
55670	Morawa (S)	3070	58	932			108												896	97	
55880	Mount Marshall (S)	6512	60	1219			2164	433		433											
55950	Mukinbudin (S)	2605	41	627			351	64		64											
56020	Mullewa (S)	9441	47	1370			442												2209		
56230	Murray (S)	809	100	767	1423							40									
56300	Nannup (S)	425	100	424	555							8				76	85	76			
56370	Narembcen (S)	3607	64	742			139	70		70											
56510	Narrogin (S)	1563	84	1315																	
56720	Northam (S)	1259	83	1044																	
56790	Northampton (S)	8568	77	3955			527												1648		
56860	Nungarin (S)	1000	43	117			147	65		65											
57000	Perenjori (S)	7596	54	1912			285												1912		
57140	Pingelly (S)	1215	79	949																	
57210	Plantagenet (S)	3234	95	2861							62						62				
57350	Quairading (S)	1899	71	1289			787														
57420	Ravensthorpe (S)	4395	87	3783	615		917	917	917		2675		134		115	115	115	115			
57700	Serpentine-Jarrahdale (S)	437	100	428	111						13	9			22						
58050	Swan (S)	813	99	794	49						32	8			16						
58120	Tambellup (S)	1373	86	1182	59																
58190	Tanamin (S)	1044	58	582			24														
58260	Three Springs (S)	2360	79	1087			169				9								431	99	
58330	Toodyay (S)	1123	86	964																	
58400	Trayning (S)	1549	51	457			126	94		94											
58540	Victoria Plains (S)	2372	76	1576	2		72				5										
58610	Wagin (S)	1825	82	1505																	
58680	Wandering (S)	947	87	828																	
58820	Waroona (S)	390	100	312	638							78				78					

[illegible]

Table 14. Estimates of potential area (km²) of suitability for pasture species for each agricultural SLA in NSW. Estimates are based areas of freehold/leasehold land in modelled zones for each SLA. Potential areas are based on climatic suitability alone.

SLA_Id	1993/94 SLA_Name	F'ld-L'ld Area	Sub clover	Balansa clover	Persian clover	Barrel medic	Serradella	White clover	Lucerne	Red clover	Phalaris	Perennial ryegrass	Cocksfoot	Tall fescue
10050	Albury (C)	102	102				79		102		102	8	8	
10100	Armidale (C)	33						33	33	33	33	33	33	33
10250	Ballina (A)	449						449	4	449		449	4	4
10300	Balranald (A)	19535	607			607	607		487					
10350	Bankstown (C)		56		56		56	63	63	63	63		63	63
10400	Barraba (A)	2780	2731	733	2175		2731	1251	2737	870	2756	11	2426	1458
10450	Bathurst (C)	229	230	25	202		229		229	205	229		89	89
10550	Bega Valley (A)	2046	1640		1045		1636	2046	1785	2042	1815	248	1720	2046
10600	Bellingen (A)	743						743	58	626		696	99	99
10650	Berrigan (A)	1993	1993	1905	1905	1987	1993		1991					
10700	Bingara (A)	2574	2570	1333	2432		2570	601	2541	118	2570	1	2409	400
10800	Bland (A)	8171	8171	5100	5100	8025	8171		8171					
10851	Blayney (A) - Pt A	499	499				348	428	499	497	491	269	228	499
10852	Blayney (A) - Pt B	957	957				769	442	956	643	957	572	281	904
10900	Blue Mountains (C)	334						334	276	321	51	330	334	334
10950	Bogan (A)	13470	2066			2066	2066		2063					
11000	Bombala (A)	2673	2454	683	1132	27	2227	1163	2602	1851	2652	1802	2646	1991
11050	Boorowa (A)	2458	2458	24	548		2427	18	2447	501	2458	227		1417
11150	Bourke (A)	38057												
11200	Brewarrina (A)	17944												
11350	Byron (A)	501						501	7	310		349	7	7
11401	Cabonne (A) - Pt A	731	731		6		582	360	705	600	650	213	240	580
11402	Cabonne (A) - Pt B	498	498	0	110		498	109	498	384	498	31	166	303
11403	Cabonne (A) - Pt C	4124	4123	1542	3539		4107	1	4069	79	4124	53	23	138
11600	Carrathool (A)	17056	10978	235	235	10978	10978		10915					
11650	Casino (A)	86						86	86	86		86	7	
11700	Central Darling (A)	48667												
11720	Cessnock (C)	1031	410	93	410		410	1028	918	503	909	487	1032	870
11750	Cobar (A)	40964	5879			5880	5880		5802					
11800	Coffs Harbour (C)	525	0	0	0	0	0	524	108	467	0	486	119	119
11850	Conargo (A)	3549	3549	76	76	3549	3549		3549					
11950	Coolah (A)	4287	4287	3633	4257		4287	190	4252	412	4287		846	699
12000	Coolamon (A)	2332	2332	2332	2332	1775	2332		2332					
12050	Cooma-Monaro (A)	4071	3794	1233	1815	242	3380	1913	3945	1455	3953	1875	3575	2793
12100	Coonabarabran (A)	5881	5880	5698	5836	484	5881	27	5756	98	5730		91	60
12150	Coonamble (A)	8661	7795	1691	1710	7393	7794		7735	12	367			
12200	Cootamundra (A)	1451	1451	629	1176		1444		1451	5	1286	31	1	7
12250	Copmanhurst (A)	2199						2199	2095	2065	175	2199	2048	1167
12300	Corowa (A)	2096	2095	2096	2095	1302	2096		2095					
12350	Cowra (A)	2572	2571	514	1499		2476	87	2542	235	2572	289	24	514
12400	Crookwell (A)	3440	3440				3422	1850	3430	2817	3440	398	982	3029

Table 14 (cont). Estimates of potential area (km²) of suitability for pasture species for each agricultural SLA in NSW. Estimates are based areas of freehold/leasehold land in modelled zones for each SLA. Potential areas are based on climatic suitability alone.

SLA_id	1993/94 SLA_Name	F'd-L'd Area	Sub clover	Balansa clover	Persian clover	Barrel medic	Serradella	White clover	Lucerne	Red clover	Phalaris	Perennial ryegrass	Cocksfoot	Tall fescue
12450 Culcairn (A)		1539	1539	875	1239		1533		1539	0	314	6	6	6
12600 Dubbo (C)		2788	2788	2788	2788	2	2788		2769		887			
12650 Dumaresq (A)		3011	70				70	3011	2842	2868	2467	2939	2986	2986
12700 Dungog (A)		1697	16		16		16	1697	1668	1292	246	1470	1688	1661
12750 Eurobodalla (A)		876	837		481		837	858	708	877	571	9	140	876
12801 Evans (s) - Pt A		451	452		155		451	129	451	443	451	18	212	243
12802 Evans (A) - Pt B		3423	3413	74	576		3276	2063	3399	2833	3423	894	2132	2691
12900 Forbes (A)		4498	4498	3759	3900	2254	4498		4498		2734			
12950 Gilgandra (A)		4333	4333	3564	3606	1838	4333	0	4281	8	1443		0	0
13000 Glen Innes (A)		63					63	63	63	63	63	63	63	63
13050 Gloucester (A)		2070						2070	1957	2006	508	2062	2068	2068
13100 Gosford (C)		403	4		4		4	403	362	360	94	392	403	403
13150 Goulburn (C)			52	18	52		52	5	52	52	52		5	5
13200 Grafton (C)		77						77	77	26	47	77	77	77
13300 Greater Lithgow (C)		1648	1012		116		942	1501	1540	1398	1457	729	1642	1619
13350 Greater Taree (C)		2794						2794	2431	2794	76	2794	2518	2518
13400 Great Lakes (A)		2001						2001	1841	2000		1968	1951	1951
13450 Griffith (C)		1561	1561			1561	1561		1554					
13500 Gundagai (A)		2302	2303	93	762		1535	143	2281	189	2038	1000	530	479
13550 Gunnedah (A)		4590	4027	3969	4029		4029	11	4555	26	4029		217	48
13600 Gunning (A)		2115	2114		415		2115	512	2115	1555	2115	11	137	852
13650 Guyra (A)		3698	358		56		358	3698	3622	3446	3375	2953	3698	3649
13700 Harden (A)		1793	1793		1112		1763		1793	30	1793	136		156
13750 Hastings (A)		2031						2031	1236	2031		2031	1326	1326
13800 Hawkesbury (C)		592	245		245		245	591	520	163	503	266	591	580
13850 Hay (A)		10646	5677			5677	5677		5632					
13900 Holbrook (A)		2065	2065		13		869	41	1960	288	2012	1288	962	616
14050 Hume (A)		1866	1866	494	853		1596	4	1856	41	1152	278	187	106
14201 Inverell (A) - Pt A		6126	6105	2569	5782		6105	1736	6041	297	6126	82	6095	872
14202 Inverell (A) - Pt B		1521	971		442		971	1268	1494	964	1514	490	1515	1240
14250 Jerilderie (A)		3248	6496	1138	569	3388	6496		6496					
14300 Junee (A)		1939	1940	1463	1800		1921		1939	7	235	36	6	31
14350 Kempsey (A)		2027						2028	1766	2028		2028	1908	1909
14400 Kiama (A)		1652	374	5	247		374	1651	1203	1560	113	578	1277	1374
14550 Kyogle (A)		2429						2430	2026	2390	39	2418	1370	921
14600 Lachlan (A)		14132	14131	354	354	14101	14132		14121		6			
14650 Lake Macquarie (C)		456	0		0		0	456	426	421	15	313	456	456
14750 Leeton (A)		1123	1123	19	19	1123	1123		1123					
14850 Lismore (C)		1126						1126	771	1047		1059	716	260
14950 Lockhart (A)		2793	2793	2668	2760	1241	2793		2793		40			
15000 Maclean (A)		646						646	542	630		646	569	569

Table 14 (cont). Estimates of potential area (km²) of suitability for pasture species for each agricultural SLA in NSW. Estimates are based areas of freehold/leasehold land in modelled zones for each SLA. Potential areas are based on climatic suitability alone.

SLA_id	1993/94 SLA_Name	F'd-L'd Area	Sub clover	Balansa clover	Persian clover	Barrel medic	Serradella	White clover	Lucerne	Red clover	Phalaris	Perennial ryegrass	Cocksfoot	Tall fescue
15050	Maitland (C)	372	311	79	311		311	372	372	43	350	15	372	190
15100	Manilla (A)	2071	1955	909	1412		1956	744	2071	663	1975		1599	834
15250	Merriwa (A)	2817	2818	2132	2750		2817	363	2754	271	2817		1835	542
15300	Mores Plains (A)	16690	4478	4427	4477	3121	4477	0	5980	0	2892	0	453	8
15400	Mudgee (A)	4879	4881	1155	3452		4879	750	4809	1781	4879	13	2049	1938
15450	Mulwaree (A)	4549	4551	498	3399		4549	2390	4488	4501	4549	1	2530	2779
15500	Murray (A)	3527	3527	892	892	3527	3527		3477					
15550	Murumbidgee (A)	3359	3359			3359	3359		3359					
15600	Murrumbidgee (A)	2341	2124	582	1616		2125	1205	2331	798	2126	119	1946	1145
15650	Muswellbrook (A)	1750	1744	1196	1696		1744	365	1616	85	1750	247	1721	450
15700	Nambucca (A)	856						856	577	837		856	660	661
15750	Narrabri (A)	8939	8568	8425	8563	5465	8567	67	8327	62	2910		467	94
15800	Narrandera (A)	3935	3935	2185	2185	3928	3935		3929					
15850	Narramine (A)	4954	4954	2177	2177	3348	4954		4949		447			
16000	Nundle (A)	1317	870		289		870	1183	1284	914	884	387	1118	1153
16050	Nymboida (A)	2422						2422	2168	2328	221	2422	2256	1814
16100	Oberon (A)	1540	1317		16		729	1448	1468	997	1333	1114	1162	1537
16150	Orange (C)	266	266				195	185	266	258	233	135	108	266
16200	Parkes (A)	5511	5511	4306	4591	2081	5511		5469	6	2955			
16300	Parry (A)	4334	4147	1534	2710		4148	2015	4334	1684	4253	154	3260	2046
16400	Port Stephens (A)	582	79		79		79	582	520	406	129	35	582	553
16450	Queanbeyan (C)	51	51		24		51	2	50	51	51		2	5
16500	Quirindi (A)	2834	2786	1978	2567		2787	406	2826	461	2784	32	1062	651
16600	Richmond River (A)	1796						1796	1612	1736	89	1796	1239	417
16750	Rylstone (A)	2219	2219	185	1151		2212	1181	2103	1531	2219	244	2086	1879
16800	Scone (A)	3481	2576	805	2105		2576	2489	3425	1565	2979	801	3423	2301
16850	Severn (A)	3824	564		91		564	3822	3713	3737	3281	3280	3824	3781
16900	Shellharbour (A)	131	21		20		21	131	112	131		56	119	119
17000	Singleton (A)	2673	1771	1256	1768		1771	1691	2508	564	2406	1229	2673	1502
17050	Snowy River (A)	3612	3394	1394	1699	250	2314	1559	3398	594	3193	2518	3164	2111
17250	Tallaganda (A)	2386	2373	16	1633		2367	1601	2277	2351	2368	24	1449	1776
17350	Temora (A)	2684	2684	2682	2684	961	2684		2684		2			
17400	Tenterfield (A)	5427	936	159	681		936	5238	5204	4689	3948	4457	5278	4626
17450	Tumbarumba (A)	1615	1614					680	1504	691	1120	1614	1604	1068
17500	Tumut (A)	1564	1564				184	229	1489	473	1100	1501	1225	721
17551	Tweed (A) - Pt A	1564						115		92		106		
17552	Tweed (A) - Pt B	115						929	6	390		445	6	
17600	Ulmarra (A)	929						1038	960	867	91	1038	1036	1036
17650	Uralla (A)	1038	2312		342		2312	3009	3009	2498	3009	647	3008	2961
17700	Urana (A)	3009	3029	2148	2148	2960	3030		3016					
17500	Wagga Wagga (C)	3030	4650	2520	3155	985	4251		4648	32	1374	434	245	153

Table 14 (cont). Estimates of potential area (km²) of suitability for pasture species for each agricultural SLA in NSW. Estimates are based areas of freehold/leasehold land in modelled zones for each SLA. Potential areas are based on climatic suitability alone.

[illegible]

Table 15. Estimates of potential area (km²) of suitability for pasture species for each agricultural SLA in Queensland. Estimates are based areas of freehold/leasehold land in modelled zones for each SLA. Potential areas are based on climatic suitability alone.

SLA_Id	1993/94 SLA_Name	Fld-Ld Area	Sub clover	Balansa clover	Persian clover	Barrel medic	Serradella	White clover	Lucerne	Red clover	Phalaris	Perennial ryegrass	Cocksfoot	Tall fescue
30100	Warwick (S) - North	645	159	111	159		159	230	645	191	255	114	296	200
30200	Atherton (S)	396						70	115	55		67	5	5
30300	Balonne (S)	28290							3353					
30350	Banana (S)	14016						9	9053	9	9	9	9	9
30500	Bathinia (S)	29521						147	7164	145	140	147	147	127
30554	Beaudesert (S) Bal in BSD	324						324	324	324	204	324	324	10
30557	Beaudesert (S) - Pt B	2113						2103	1941	2090	1243	2100	1678	798
30600	Belyando (S)	27695							64					
30650	Bendmere (S)	3217							3152					
30700	Biggenden (S)	1148						211	1140	211	89	211	205	68
30800	Boonah (S)	1244						1176	1216	1176	832	1176	769	493
30850	Booringa (S)	23933	12	12	12		12	65	17558	60	72	60	72	40
30950	Bowen (S)	19583						132	788	105		130	29	0
31700	Broadsound (S)	16564						31	3290	31		31	8	
31850	Bungil (S)	11901	47	47	47		47	17	11837		50	29	50	
31981	Burnett (S) - Pt A	147						146	140	146		146	146	
32001	Caboolture (S) - Pt A	606						606	490	606		606	527	119
32031	Caboolture (S) - Pt B	350						350	218	349		350	225	30
32101	Calliope (S) - Pt A	393							380					
32104	Calliope (S) - Pt B	4983						470	4856	470	82	470	273	130
32131	Caloundra (C) - Pt A	139						139		139		139		
32134	Caloundra (C) - Pt B	655						655	96	611		642	108	8
32150	Cambooya (S)	587	122	85	122		122	328	587	308	328	76	329	328
32200	Cardwell (S)	1023						754	33	36		34	5	
32350	Chinchilla (S)	5391						86	5244		86	86	86	2
32400	Clifton (S)	815	94	50	94		94	144	815	115	153	43	153	151
32531	Cooloola (S) (excl. Gympie)	1453						1453	1315	1453		1453	1418	316
32550	Crow's Nest (S)	1517						1318	1513	1030	1289	1215	1303	984
32650	Dalby (T)	45							45					
32700	Dalrymple (S)	64223						210	775	63		70	27	
32800	Douglas (S)	751						210						
32850	Duaringa (S)	13795							1118					
32900	Eacham (S)	660						630		99		134		
32950	Eidsvold (S)	3812							3673					
33050	Esk (S)	3045						2257	2918	2169	1659	2258	1480	343
33151	Fitzroy (S) - Pt A	15							15					
33154	Fitzroy (S) - Pt B	5474							2910					
33250	Galton (S)	1316						674	1265	318	625	605	626	432
33300	Gayndah (S)	2502						85	2491	85	84	86	86	30

SLA_Id	1993/94 SLA_Name	F'd-L'd Area	Sub clover	Balansa clover	Persian clover	Barrel medic	Serradella	White clover	Lucerne	Red clover	Phalaris	Perennial ryegrass	Cocksfoot	Tall fescue
33350	Gladstone (C)	117							104					
33400	Warwick (S) - East	1481	535	226	535		535	1017	1459	918	1064	754	1304	1249
33554	Burnett (S) - Pt B	1474						682	1423	682		682	553	
33595	Gold Coast (C) - Pt B Bal	593						593	304	442		492	312	118
33700	Herberton (S)	7909						821	1712	700		718	433	186
33750	Hervey Bay (C)	1076						966	1011	966		966	966	240
33900	Inglewood (S)	4668	4606	3470	4606		4606	167	4543	241	4606	1395	4606	516
34000	Isis (S)	1114						235	1030	235		235	235	
34100	Jericho (S)	20193							343					
34150	Johnstone (S)	917						910						
34200	Jondaryan (S)	1783	62	62	62		62	123	1775	81	123	11	123	123
34250	Kilcoy (S)	758						759	683	758	234	758	753	281
34300	Kilkivan (S)	2660						1474	2615	1474	1234	1474	1470	435
34350	Kingaroy (S)	2129						612	2111	261	612	576	611	460
34400	Kolan (S)	3842						572	3721	572	285	572	349	128
34450	Laidley (S)	639						307	630	296	241	307	225	112
34550	Livingstone (S)	7392						431	4564	383		410		
34800	McKinlay (S)	37444												
34850	Mareeba (S)	43802						132	119	35		52	12	12
34901	Maroochy (S) - Pt A	201						201		190		201		
34904	Maroochy (S) - Pt B	655						655	60	637		655	61	0
34950	Maryborough (C)	862						861	304	860		860	355	116
35000	Millmerran (S)	3116	800	800	800		800	32	3048		800	399	800	25
35050	Mirani (S)	2152						597	954	431		469		
35100	Miniam Vale (S)	2887						1416	2730	1416		1416	224	36
35150	Monto (S)	3459						239	3363	239	185	239	195	117
35231	Ipswich (C) - Pt B	1156						698	1150	698	576	698	478	140
35350	Mount Morgan (S)	420							408					
35404	Cairns (C) - Pt B	552						428				0		
35450	Mundubbera (S)	3259						43	3146		43	43	43	7
35500	Murgon (S)	615						151	606	151	151	151	151	54
35550	Murilla (S)	5063							5002					
35600	Murweh (S)	39739						60	5634	60	60	60	60	60
35650	Nanango (S)	1450						1217	1388	825	1217	1214	1020	271
35700	Nebo (S)	9169						309	2688	296		296	22	
35751	Noosa (S) - Pt A	581						581	105	581		581	105	49
35850	Peak Downs (S)	7379							304					
35983	Pine Rivers (S) Bal	584						584	492	584		5		

SLA_Id	1993/94 SLA_Name	F'd-L'd Area	Sub clover	Balansa clover	Persian clover	Barrel medic	Serradella	White clover	Lucerne	Red clover	Phalaris	Perennial ryegrass	Cocksfoot	Tall fescue
33350	Gladstone (C)	117							104					
33400	Warwick (S) - East	1481	535	226	535		535	1017	1459	918	1064	754	1304	1249
33554	Burnett (S) - Pt B	1474						682	1423	682		682	553	
33595	Gold Coast (C) - Pt B Bal	593						593	304	442		492	312	118
33700	Herberton (S)	7909						821	1712	700		718	433	186
33750	Hervey Bay (C)	1076						966	1011	966		966	966	240
33900	Inglewood (S)	4668	4606	3470	4606		4606	167	4543	241	4606	1395	4606	516
34000	Isis (S)	1114						235	1030	235		235	235	
34100	Jericho (S)	20193							343					
34150	Johnstone (S)	917						910						
34200	Jondaryan (S)	1783	62	62	62		62	123	1775	81	123	11	123	123
34250	Kilcoy (S)	758						759	683	758	234	758	753	281
34300	Kilkivan (S)	2660						1474	2615	1474	1234	1474	1470	435
34350	Kingaroy (S)	2129						612	2111	261	612	576	611	460
34400	Kolan (S)	3842						572	3721	572	285	572	349	128
34450	Laidley (S)	639						307	630	296	241	307	225	112
34550	Livingstone (S)	7392						431	4564	383		410		
34800	McKinlay (S)	37444												
34850	Mareeba (S)	43802						132	119	35		52	12	12
34901	Maroochy (S) - Pt A	201						201		190		201		
34904	Maroochy (S) - Pt B	655						655	60	637		655	61	0
34950	Maryborough (C)	862						861	304	860		860	355	116
35000	Millmerran (S)	3116	800	800	800		800	32	3048		800	399	800	25
35050	Mirani (S)	2152						597	954	431		469		
35100	Miniam Vale (S)	2887						1416	2730	1416		1416	224	36
35150	Monto (S)	3459						239	3363	239	185	239	195	117
35231	Ipswich (C) - Pt B	1156						698	1150	698	576	698	478	140
35350	Mount Morgan (S)	420							408					
35404	Cairns (C) - Pt B	552						428				0		
35450	Mundubbera (S)	3259						43	3146		43	43	43	7
35500	Murgon (S)	615						151	606	151	151	151	151	54
35550	Murilla (S)	5063							5002					
35600	Murweh (S)	39739						60	5634	60	60	60	60	60
35650	Nanango (S)	1450						1217	1388	825	1217	1214	1020	271
35700	Nebo (S)	9169						309	2688	296		296	22	
35751	Noosa (S) - Pt A	581						581	105	581		581	105	49
35850	Peak Downs (S)	7379							304					
35983	Pine Rivers (S) Bal	584						584	492	584		584	504	137
36004	Mackay (C) - Pt B	2159						133	90	41		89		
36050	Pittsworth (S)	1013	88	88	88		88	76	1013	39	88		88	88
36150	Quilpie (S)	61620												

Table 15 (cont). Estimates of potential area (km²) of suitability for pasture species for each agricultural SLA in Queensland. Estimates are based areas of freehold/leasehold land in modelled zones for each SLA. Potential areas are based on climatic suitability alone.

SLA_Id	1993/94 SLA_Name	F'id-L'id Area	Sub clover	Balansa clover	Persian clover	Barrel medic	Serradella	White clover	Lucerne	Red clover	Phalaris	Perennial ryegrass	Cocksfoot	Tall fescue
36283	Redland (S) Bai	244						244		244		244	0	0
36300	Richmond (S)	24509												
36350	Rockhampton (C)	148						2	139	2		2	2	
36450	Rosalie (S)	2008	32	32	32		32	673	2004	462	673	452	669	511
36500	Warwick (S) - West	1745	766	392	766		766	443	1731	498	971	429	971	766
36550	Sarina (S)	1254						58	424	58		58	6	
36600	Stanthorpe (S)	2297	1664	86	1601		1664	1499	2249	1551	2297	563	2296	1882
36650	Tambo (S)	9381							6					
36700	Tara (S)	9658							9580					
36750	Taroom (S)	13865							13598					
36850	Tiaro (S)	1124						1124	1056	1124	57	1124	1124	46
36900	Toowoomba (C)	110	0	0	0		0	106	110	99	106	89	106	106
37100	Waggamba (S)	12310	2990	2990	2990	105	2990		9838		2990	34	2412	
37150	Wambo (S)	4660	27	27	28		27	191	4582	158	197	75	198	197
37200	Warroo (S)	12494							11517					
37262	Warwick (S) - Central	23	1	1	1		1		23		1	1	1	
37330	Whitsunday (S)	1722						65	254	45		49		
37450	Wondai (S)	2945						17	2914	16	17	17	9	
37500	Woocoo (S)	1470						964	1393	964	328	964	957	63

Table 16. Estimates of potential area (km²) of suitability for pasture species for each agricultural SLA in South Australia. Estimates are based areas of freehold/leasehold land in modelled zones for each SLA. Potential areas are based on climatic suitability alone.

SLA_Id	1993/94 SLA_Name	F'ld-L'ld Area	Sub clover	Balansa clover	Persian clover	Barrel medic	Serradella	White clover	Lucerne	Red clover	Phalaris	Perennial ryegrass	Cocksfoot	Tall fescue
40140	Angaston (DC)	212	212	174	198	16	208		212	20	140		4	
40210	Bamera (DC)	274												
40280	Barossa (DC)	315	314	129	150	57	188		289	134	172		81	
40350	Beachport (DC)	1231	1231				886	963	1206	1231	1232		213	32
40510	Blyth-Snowtown (DC)	1694	1694	920	920	1521	1694		1694		1			
40630	Browns Well (DC)	1748	1339			1339	1339		1009					
40770	Burra Burra (DC)	2145	1393	1104	1104	1096	1394		1234		38			
40840	Bute (DC)	950	950	134	134	932	950		949		6			
40980	Carrieton (DC)	1879	294			294	294		2					
41040	Central Yorke Peninsula (DC)	2523	2523	942	942	2523	2523		2482					
41120	Clare (DC)	597	597	459	578	54	597		597		72			
41190	Cleve (DC)	3570	3564	273	273	3564	3564		3532					
41400	Coonalpyn Downs (DC)	3369	3369	3369	3369	1969	3369		3342					
41480	Crystal Brook-Redhill (DC)	781	781	319	319	746	781		781					
41540	Dudley (DC)	453	453	350	441	25	453		386	103	271			
41750	Elliston (DC)	5851	5850	7	7	5843	5846		3292					
41890	Eudunda (DC)	724	640	438	438	542	640		578		127			
41960	Franklin Harbor (DC)	926	926	16	16	926	926		919					
42310	Gumeracha (DC)	304	304		3		95		293	202	304		153	12
42380	Hallett (DC)	2257	1255	804	804	1219	1256		1086		17			
42520	Hawker (DC)	1859	76			76	76							
42740	Jamestown (DC)	1209	1210	1108	1123	1039	1209		1209		15			
42940	Kanyaka-Quom (DC)	2011	455	4	4	455	455		21					
43010	Kapunda (DC)	570	570	565	570	296	570		570		102			
43080	Karoonda-East Murray (DC)	3880	3547	167	167	3547	3547		3418					
43220	Kimba (DC)	3293	2323			2323	2323		661					
43290	Kingscote (DC)	2792	2795	1347	2438	195	2792	265	2683	1446	1240			
43360	Lacepede (DC)	3052	3052	2131	3052		3052		3005	920	1512			
43430	Lameroo (DC)	2256	2255	1326	1326	2256	2256		2246					
43570	Le Hunte (DC)	4733	4309			4309	4309							
43640	Light (DC)	653	653	647	649	503	653		653		2			
43710	Lower Eyre Peninsula (DC)	3720	3719	2924	2937	2087	3723		3642	12	313			
43780	Loxton (DC)	2809	52			52	52		31					
43850	Lucindale (DC)	2308	2310	142	1470		2308	23	2308	2167	2290			
43920	Mallala (DC)	895	893	224	224	892	892		884					
43990	Mannum (DC)	669	632	68	68	632	632		608					

Table 16 (cont). Estimates of potential area (km²) of suitability for pasture species for each agricultural SLA in South Australia. Estimates are based areas of freehold/leasehold land in modelled zones for each SLA. Potential areas are based on climatic suitability alone.

SLA_Id	1993/94 SLA_Name	F'ld-L'id Area	Sub clover	Balansa clover	Persian clover	Barrel medic	Sernadella	White clover	Lucerne	Red clover	Phalaris	Perennial ryegrass	Cocksfoot	Tall fescue
48190	Wakefield Plains (DC)	1626	1626	489	489	1578	1626		1614					
48400	Warooka (DC)	1344	1343	1235	1235	1325	1344		1318					
48610	Willunga (DC)	265	265	60	109	0	187		264	205	212			29
48750	Yankalilla (DC)	722	723	93	158	22	600	380	692	629	656			21
48820	Yorke town (DC)	773	773	684	685	773	773		739					
49389	Unincorp. Whyalla	11182	359			359	359		86					
49459	Unincorp. Pirie	34122	99			99	99		99					
49529	Unincorp. Flinders Ranges	57826	534			534	534		0					

Table 17. Estimates of potential area (km²) of suitability for pasture species for each agricultural LGA in Tasmania. Estimates are based areas of freehold/leasehold land in modelled zones for each LGA. Potential areas are based on climatic suitability alone.

BDY_ID	LGANAME	F'id-L'id Area	Sub clover	Balansa clover	Persian clover	Barrel medic	Serradella	White clover	Lucerne	Red clover	Phalaris	Perennial ryegrass	Cocksfoot	Tall fescue
60200	CAMPBELL TOWN	1257	1236	502	819		955	340	1212	589	1256	1235	1257	1257
60400	BRUNY	230	136				38	201	176	230	204	230	230	230
60410	BRIGHTON	454	436	302	388		415	51	448	129	455	352	455	455
60600	BOTHWELL	1792	1462	363	647		1116	804	1754	374	1694	1729	1793	1793
60611	BURNIE	538	223					538	313	535		535	320	320
60811	ULVERSTONE	340	258					340	273	339	19	339	289	289
60900	DELORAIN	791	745					791	737	769	234	791	776	776
61100	ESPERANCE	171	75					171	134	167	96	171	167	167
61200	EVANDALE	819	814	49	234		479	402	815	764	777	819	819	819
61210	CIRCULAR HEAD	1340	1230					1340	1120	1340	18	1339	1296	1296
61300	FINGAL	1036	872	180	302		521	624	838	814	903	969	1035	1035
61410	CLARENCE	241	240	49	166		240	6	213	191	240	240	240	240
61610	DEVONPORT	120	120					120	117	120		120	80	120
61900	GREEN PONDS	430	415	321	358		398	34	430	70	424	310	429	429
62000	HAMILTON	1591	1120	273	420		642	999	1500	638	1273	1585	1581	1581
62010	FLINDERS	707	700				390	699	590	707	660	486	707	707
62211	GEORGE TOWN	453	453				20	453	394	453	446	454	344	344
62410	GLAMORGAN	681	671	12	309		622	185	595	659	681	552	681	681
62900	LONGFORD	883	880	6	210		475	452	861	874	831	883	844	844
63010	HUON	404	261					404	360	395	296	404	405	405
63100	OATLANDS	1450	1408	616	902		1350	198	1430	718	1447	1188	1450	1450
63200	PENGUIN	226	159					226	183	226	1	226	197	197
63210	KENTISH	563	431					562	426	491	50	509	456	456
63400	PORTLAND	320	225				12	320	213	306	183	320	254	254
63410	KING ISLAND	983	981					981	931	981	522	981	979	979
63600	RICHMOND	531	517	245	381		488	50	516	268	530	491	531	531
63700	RINGAROOMA	720	579		14		209	640	581	686	416	674	661	661
63800	ROSS	956	935	486	616		787	220	901	374	956	739	957	957
63811	LATROBE	335	335				1	335	303	335	330	335	154	335
64000	SCOTTSDALE	746	743	1	59		170	642	688	744	633	741	746	746
64013	LAUNCESTON	1115	979				60	1063	1020	1072		1115	1055	1078
64200	SPRING BAY	764	699		125		554	338	688	761	765	694	765	765
64211	WESTBURY	768	765				30	745	745	768		768	612	770
64400	TASMAN	314	190				53	292	268	313	291	313	314	314
64411	NEW NORFOLK	588	438	51	157		303	334	542	459	497	580	580	580
64800	WYNYARD	548	350					548	415	548		548	432	432
64812	SORELL	644	558	56	130		411	387	593	587	643	643	644	644
65811	BEACONSFIELD	539	538				23	537	516	539	495	539	333	333

Table 18. Estimates of potential area (km²) of suitability for pasture species for each agricultural SLA in Victoria. Estimates are based areas of freehold/leasehold land in modelled zones for each SLA. Potential areas are based on climatic suitability alone.

SLA_Id	1993/94 SLA_Name	F'ld-L'ld Area	Sub clover	Balansa clover	Persian clover	Barrel medic	Serradella	White clover	Lucerne	Red clover	Phalaris	Perennial ryegrass	Cocksfoot	Tall fescue
20040	Alberton (S)	1200	1161	44	315		659	708	1098	1157	1108	1098	1189	1157
20080	Alexandra (S)	908	906					534	852	274	777	908	823	894
20160	Arapiles (S)	1719	1719	1571	1663	458	1690	10	1675	54	1114	10	20	10
20200	Ararat (C)	18	18	11	18		18		18	7	18			18
20240	Ararat (S)	3197	3197	1803	2651		2959	277	3158	1229	3188	719	404	2037
20280	Avoca (S)	846	846	567	664		760	104	801	263	847	129	124	336
20320	Avon (S)	1111	1111	316	668		1020	272	1056	795	1111	1081	1111	820
20360	Bacchus Marsh (S)	354	354	309	327	75	346	8	339	44	353	95	279	193
20400	Bairnsdale (C)	29	29				29		29	29	29	29	29	29
20441	Bairnsdale (S) - Pt A	340	340	22	106		340		316	318	340	309	340	330
20442	Bairnsdale (S) - Pt B	959	959	7	205		820	267	936	952	959	957	958	959
20520	Moorabool (S) - East	607	607	21	208		437	199	593	585	606	606	607	607
20561	Ballarat (C) - Inner North	264	264				143	178	257	264		264	264	264
20562	Ballarat (C) - North	257	257		12		190	111	256	257	257	257	257	257
20602	Southern Rural (S) - East	629	629	396	537	13	629		629	233	629	322	598	490
20642	Surf Coast (S) - Pt A	433	433	200	393		433		416	233	433	237	383	397
20680	Bass (S)	510	510					510	498	510	376	510	331	510
20720	Beechworth (S)	423	424				13	3	376	51	415	395	362	95
20760	Belfast (S)	504	1008				29	1008	980	1008	1008	1008	12	1008
20802	Greater Geelong (C) - Pt B	301	301	125	295		301		293	175		18	93	194
20840	Benalla (C)	16	17				16		16		16			
20880	Benalla (S)	1741	1740	290	569		981	73	1710	54	1738	778	604	143
21000	Bet Bet (S)	670	670	663	667	513	670		627	7	596	3		13
21040	Birchip (S)	1435	1435	1435	1435	1435	1435		1435					
21120	Bright (S)	154	151					8	109	23	29	154	140	32
21200	Broadford (S)	340	339		34		107	218	322	216	329	317	233	340
21320	Bulla (S)	413	413	155	295		404	23	413	258	413	233	354	399
21360	Buln Buln (S)	627	462					627	591	624	93	627	623	623
21442	Moorabool (S) - West	537	537		14		159	390	533	510	527	537	537	537
21520	Camperdown (T)	15	15					15	15	15	15	15	15	15
21560	Castlemaine (C)	18	18	8	18		18		18	1	18	1		18
21640	Charlton (S)	1126	1126	1126	1126	1064	1126		1126		141			
21720	Chiltem (S)	419	419	20	218		307		405	9	320	72	77	33
21760	Cobram (S)	321	321	321	321	321	321		321					
21840	Cohuna (S)	330	330	147	147	330	330		319					
21880	Colac (C)	11	11				4	8	11	11	11	11	11	11
21920	Colac (S)	1639	1639	613	909		1137	567	1582	1026	1612	1219	1636	1639
22002	Greater Geelong (C) - Pt C	464	464	438	452	205	464	6	461	26		53	217	96

Table 18 (cont). Estimates of potential area (km²) of suitability for pasture species for each agricultural SLA in Victoria. Estimates are based areas of freehold/leasehold land in modelled zones for each SLA. Potential areas are based on climatic suitability alone.

SLA_id	1993/94 SLA_Name	F'd-L'd Area	Sub clover	Balansa clover	Persian clover	Barrel medic	Serradella	White clover	Lucerne	Red clover	Phalaris	Perennial ryegrass	Cocksfoot	Tall fescue
22040	Cranbourne (C)	727	727				24	727	721	727	720	727	610	727
22080	Creswick (S)	475	475	65	121		234	255	459	383	469	432	444	475
22200	Daylesford & Glenlyon (S)	311	311	21	51		97	231	269	242	284	278	266	311
22240	Deakin (S)	892	891	892	891	892	892		878					
22320	Dimboola (S)	2448	2449	2448	2448	2447	2448		2387		2			
22360	Donald (S)	1309	1309	1309	1309	1309	1309		1294		5			
22440	Dundas (S)	2577	2577		607		2169	713	2513	2552	2577	455	311	1414
22480	Dunmunkle (S)	1508	1508	1508	1508	1508	1508		1508		30			
22560	East Loddon (S)	1145	1145	1145	1145	1145	1145		1145					
22600	Echuca (C)	25	25	25	25	25	25		25					
22640	Eltham (S)	241	237				22	237	237	241	209	241	213	241
22720	Euroa (S)	1344	1343	513	704		849	318	1327	397	1328	506	456	467
22800	Flinders (S)	323	323				136	311	289	323	323	281	229	323
22880	Frankston (C)	71	71				45	71	70	70	71	56	71	71
23000	Gisborne (S)	195	195		3		24	172	172	180	193	195	195	195
23040	Glenelg (S)	2625	2624	47	401		1731	1270	2468	2578	2625	7	1039	377
23080	Gordon (S)	2002	2002	2002	2002	2002	2002		2002					
23120	Goulburn (S)	902	902	685	734		780	40	885	97	902	137	91	139
23134	Marong - Inner	167	167	159	166	43	167	0	150	0	166	0	0	9
23152	Corio - Inner	161	161	161	161	81	161		158		161		36	
23156	South Barwon - Inner	128	128	122	128		128		128	6	128	12	67	64
23162	Southern Rural (S) - West	873	873	106	417		807	213	834	767	873	873	874	873
23240	Hampden (S)	2340	2340	719	1596		2001	428	2305	1621	2340	2216	1598	2340
23280	Hastings (S)	281	281					281	250	281	281	281	245	281
23360	Healesville (S)	243	227					199	209	242	108	243	210	237
23440	Heytesbury (S)	1396	1396				41	1380	1360	1396	1349	1396	1396	1396
23460	Heywood (S)	2511	5021		3		297	5010	4621	5022	5022	2832	4465	4968
23521	Huntly - Inner	39	39	39	39	29	39		32		39			
23522	Gr. Bendigo (C) - Huntly Bal	670	671	670	670	646	670		653					
23560	Kaniva (S)	2332	2332	2332	2332	2269	2332		2298					
23600	Kara Kara (S)	2059	2059	1973	2035	1410	2056	3	2010	74	1323	3	3	24
23640	Karkaroc (S)	3087	3086	2917	2917	3087	3087		3055					
23760	Kerang (S)	3120	3120	1402	1402	3120	3120		3109					
23840	Kilmore (S)	472	472		44		287	286	467	426	471	463	369	472
23960	Korong (S)	2080	2080	2065	2077	1825	2080		2017	16	978	2		4
24000	Korumburra (S)	599	594					599	600	599	190	600	555	599
24040	Kowree (S)	4281	4281	3650	4264	91	4279		4174	631	3498		6	
24080	Kyabram (T)	26	26	26	26	26	26		26					
24120	Kyneton (S)	652	652		5		59	619	648	598	563	646	622	652

Table 18 (cont). Estimates of potential area (km²) of suitability for pasture species for each agricultural SLA in Victoria. Estimates are based areas of freehold/leasehold land in modelled zones for each SLA. Potential areas are based on climatic suitability alone.

SLA_Id	1993/94 SLA_Name	F'ld-L'ld Area	Sub clover	Batansa clover	Persian clover	Barrel medic	Serradella	White clover	Lucerne	Red clover	Phalaris	Perennial ryegrass	Cocksfoot	Tall fescue
24160	Southern Rural (S) - Central	973	973	793	894		967	21	973	179		530	973	973
24200	Lexton (S)	735	735	16	240		587	221	709	665	735	631	471	735
24240	Lillydale (S)	395	372					395	395	395	185	395	317	395
24280	Lowan (S)	1969	1969	1969	1969	1966	1969		1933					
24320	McIvor (S)	951	951	661	865	2	907	44	902	106	951	65	44	272
24360	Maffra (S)	813	804	6	276		619	219	762	804	793	812	813	807
24400	Maldon (S)	540	541	301	441	124	526	39	540	223	540	169	45	341
24480	Mansfield (S)	1237	1237				12	965	1173	674	980	1237	1238	1201
24522	Gr. Bendigo (C) - Marong Bal	1154	1153	1132	1154	952	1154		1150	10		2		45
24560	Maryborough (C)	17	16	17	17		17		14		17			3
24640	Melton (S)	446	446	395	405	14	442	10	445	51	446	67	192	196
24680	Metcalf (S)	538	539	92	225		419	180	522	373	538	329	211	485
24720	Mildura (C)	29												
24761	Mildura (S) - Pt A	335												
24762	Mildura (S) - Pt B	3902	287			287	287		3					
24800	Minhamite (S)	1290	1289				303	1275	1283	1290	1290	1206	353	1290
24840	Mirboo (S)	249	243					249	249	249	17	249	249	249
24880	Moe (C)	39	38					39	36	39	38	39	14	39
25040	Mortlake (S)	2108	2108	1007	1468		1902	325	2108	1101	2108	882	173	2048
25081	Morwell (C) - Pt A	297	270					297	281	297	234	298	222	297
25082	Morwell (C) - Pt B	177	130					177	146	177	43	176	175	177
25120	Mount Rouse (S)	1376	1376	147	431		1349	128	1375	1225	1373	548	141	1326
25160	Myrtleford (S)	209	209					2	173	14	166	209	209	51
25201	Narracan (S) - Pt A	228	223					228	221	228	201	228	173	228
25202	Narracan (S) - Pt B	493	420					493	465	493	239	493	493	493
25240	Nathalia (S)	868	868	868	867	868	868		842					
25280	Newham & Woodend (S)	211	211					211	201	167	209	211	211	211
25320	Newstead (S)	310	310	225	272		308	5	295	66	310	74	62	257
25440	Numurkah (S)	801	801	801	801	801	801		801					
25560	Omoo (S)	1314	1267	62	209		525	939	1206	977	1267	1314	1314	1253
25600	Orbest (S)	933	927				307	931	762	920	894	838	774	933
25640	Otway (S)	738	622					737	484	729	285	738	621	602
25680	Oxley (S)	1264	1265				224	34	1194	62	1193	1085	896	161
25720	Pakenham (S)	710	653					710	697	710	383	710	641	709
25760	Phillip Island (S)	97	97					97	80	97	97	97	97	97
25800	Port Fairy (B)	23	23					23	18	22	23	23	23	23
26040	Pyalong (S)	519	519	35	262		422	107	516	228	519	207	122	477
26200	Ripon (S)	1408	1408	315	787		1325	166	1395	1092	1408	1336	1036	1408
26240	Rochester (S)	1832	1832	1832	1832	1832	1832		1822					

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26281	Rodney (S) - Pt A	133	133	133	133	109	133		133		129			
26282	Rodney (S) - Pt B	820	820	820	820	589	820		810		355			
26320	Romsey (S)	607	607	0	35		237	418	604	582	607	602	607	607
26360	Rosedale (S)	1578	1577	374	883		1275	388	1496	1204	1563	1535	1579	1210
26400	Rutherglen (S)	504	504	488	504		504		503		15			
26520	Sale (C)	31	31	31	31		31		31		31	30	31	
26640	Seymour (RC)	888	887	295	502		669	139	880	204	886	271	194	466
26680	Shepparton (C)	26	26	26	26	26	26				26			
26721	Shepparton (S) - Pt A	209	209	209	209	138	209		209		208			
26722	Shepparton (S) - Pt B	667	667	655	661	270	667		664		519			
26760	Sherbrooke (S)	190	137					190	190	190	23	190	180	190
26840	South Gippsland (S)	816	789					816	768	816	100	816	774	816
26960	Stawell (C)	23	23	15	23		23		23	0	23			0
27000	Stawell (S)	2310	2310	1880	2143	677	2271	13	2285	278	2148	15	37	198
27041	Gr. Bendigo (C) - S'saye Bal	373	372	281	312	0	344	39	346	82		54	45	105
27042	Strathfieldsaye - Inner	45	44	39	44		45		35		2	45	1	5
27120	Swan Hill (C)	23	23			23	23		23					
27160	Swan Hill (S)	5759	5657			5657	5657		5535					
27200	Talbot & Clunes (S)	450	449	298	408		431	25	441	144	450	188	155	443
27241	Tallangatta (S) - Pt A	393	393				41	7	348	35	379	362	325	82
27242	Tallangatta (S) - Pt B	995	995				31	55	819	219	708	994	920	353
27281	Tambo (S) - Pt A	202	202				202	109	194	202	202	104	202	202
27282	Tambo (S) - Pt B	495	483				198	413	420	470	494	475	495	495
27320	Traralgon (C)	21	42					42	42	42	42	42	42	42
27361	Traralgon (S) - Pt A	214	427				104	396	409	427	425	427	427	427
27362	Traralgon (S) - Pt B	160	112					160	156	160	77	160	148	160
27400	Tullaroop (S)	538	538	538	538	152	538		511		538			73
27440	Tungamah (S)	1095	1095	1095	1095	669	1095		1095		623			
27480	Upper Murray (S)	695	695					172	626	112	559	695	695	222
27521	Upper Yarra (S) - Pt A	254	178					254	219	242		254	236	236
27522	Upper Yarra (S) - Pt B	10	2					10	8	10		10	8	8
27560	Violet Town (S)	850	850	382	595		689	50	836	80	850	172	133	114
27600	Walpeup (S)	5537	5538	175	175	5537	5537		5272					
27640	Wangaratta (C)	27	27		11		27		27		27			
27680	Wangaratta (S)	773	773	255	467		749		741	0	700	19	8	4
27720	Wannon (S)	1912	1912	256	1004		1881	128	1906	1656	1912		212	38
27760	Waranga (S)	1353	1353	1341	1347	685	1353		1313	6	746			6
27800	Warracknabeal (S)	1772	1772	1772	1771	1772	1772		1772					
27840	Warragul (RC)	337	305					337	337	337	32	337	337	337
27880	Warrambbool (C)	35	35					35	29	35	35	35	3	35

Table 18 (cont). Estimates of potential area (km²) of suitability for pasture species for each agricultural SLA in Victoria. Estimates are based areas of freehold/leasehold land in modelled zones for each SLA. Potential areas are based on climatic suitability alone.

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27920	Warmambool (S)	1552	1554		84		551	1185	1535	1553	1553	1441	745	1553
28000	Werribee (C)	571	571	571	571	76	571		548		571	3	98	18
28040	Whittlesea (C)	529	529		37		330	290	527	529	483	503	522	529
28120	Wimmera (S)	2046	2046	1987	2013	1750	2021	10	2020	32	452	7	13	10
28160	Surf Coast (S) - Pt B	550	551	239	388		491	92	536	311	550	338	550	542
28200	Wodonga (RC)	319	319		8		183	5	315	10	313	97	90	30
28240	Wonthaggi (B)	57	57					57	51	57	57	57	14	57
28280	Woorayl (S)	1172	1151					1172	1121	1172	718	1172	1053	1172
28320	Wycheproof (S)	3633	3633	2193	2193	3633	3633		3629					
28360	Yackandandah (S)	740	740				6	41	677	87	658	736	676	127
28440	Yarrawonga (S)	587	587	587	587	248	587		569		116			
28480	Yea (S)	1046	1035		36		160	671	1010	581	798	992	831	1046
28509	Yallourn Works Area	2	2					2	2	1	2	1	1	2
28529	French Island	82	82					82	72	82	82	82	76	82

Table 19. Estimates of potential area (km²) of suitability for pasture species for each agricultural SLA in Western Australia. Estimates are based areas of freehold/leasehold land in modelled zones for each SLA. Potential areas are based on climatic suitability alone.

SLA_Id	1993/94 SLA_Name	F'ld-L'ld Area	Sub clover	Balansa clover	Persian clover	Barrel medic	Serradella	White clover	Lucerne	Red clover	Phalaris	Perennial ryegrass	Cocksfoot	Tall fescue
50070	Albany (S)	3580	7160	2611	1826	232	4697	2759	6895	4549	6953		2023	
50140	Albany (T)	32	65			232		65	56	65	65		65	
50210	Armadale (C)	163	163		42		115		147		76		33	
50280	Augusta-Margaret River (S)	993	993					233	900	992			981	
50560	Beverley (S)	1644	1644	396	434	1229	1644		514					
50630	Boddington (S)	1008	1007	40	545		1008		978		224			
50770	Boyup Brook (S)	2127	2127	182	999		2126		2030		2082			
50840	Bridgetown-Greenbushes (S)	691	691				200		638				383	
50910	Brookton (S)	1442	1442	398	410	1044	1442		947					
51050	Broomehill (S)	1118	1119	1118	1118	790	1118		1118		77			
51120	Bruce Rock (S)	2581	2580			2581	2581							
51260	Busselton (S)	976	976				665	4	948	931	976		86	
51400	Capel (S)	452	452				452		430	374	416			
51470	Camamah (S)	1941	1941	510	510	1941	1941							
51610	Chapman Valley (S)	3042	2461			2765	2460							
51680	Chittering (S)	1029	1029	734	1029	38	1029							
51890	Collie (S)	288	288				109		238		288		126	
52030	Coorow (S)	3003	3003	991	991	3003	3003							
52100	Corrigin (S)	2535	2535			2535	2535		34					
52240	Cranbrook (S)	2776	2775	1329	2009	340	2601		2753	7	2746		12	
52310	Cuballing (S)	1050	1051	526	526	735	1050		1027					
52450	Cunderdin (S)	1763	1763			1763	1763							
52520	Dalwallinu (S)	5921	5462			5921	5462							
52590	Dandaragan (S)	4415	4416	4219	4219	3749	4415							
52660	Dardanup (S)	291	291				187		257	105	291		76	
52730	Denmark (S)	571	571					357	506	571	571	42	569	206
52870	Donnybrook-Balingup (S)	639	639				147		524		639		315	
52940	Dowerin (S)	1748	1748			1748	1748							
53010	Dumbleyung (S)	2388	2388	29	29	2388	2388		2371					
53290	Esperance (S)	13377	13348	7641	8119	7507	13349		12806	1283	1544			
53570	Gingin (S)	2117	2118	2089	2117	20	2117							
53640	Gnowangerup (S)	3714	3714	3432	3433	3691	3714		3691		135			
53710	Goomalling (S)	1729	1729			1729	1729							
53850	Greenough (S)	1568	1567			1568	1568							
53990	Harvey (S)	930	930				724		868	298	760		181	
54060	Irwin (S)	1372	1372	26	26	1372	1372							
54130	Jerramungup (S)	4284	4284	3571	3797	3044	4284		4122	227	43			
54340	Katanning (S)	1459	1459	1308	1308	1452	1459		1454					

Table 19 (cont). Estimates of potential area (km²) of suitability for pasture species for each agricultural SLA in Western Australia. Estimates are based areas of freehold/leasehold land in modelled zones for each SLA. Potential areas are based on climatic suitability alone.

SLA_Id	1993/94 SLA_Name	F'ld-L'ld Area	Sub clover	Balansa clover	Persian clover	Barrel medic	Serradella	White clover	Lucerne	Red clover	Phalaris	Perennial ryegrass	Cocksfoot	Tall fescue
54410	Kellerberrin (S)	1806	1807			1806	1753							
54480	Kent (S)	4203	4203	539	539	4203	4203		4150					
54550	Kojonup (S)	2802	2801	2260	2704	295	2802		2802		1723			
54620	Kondinin (S)	3879	3879			3879	3879							
54690	Koorda (S)	2420	2420			2420	2420							
54760	Kulin (S)	4313	4313			4313	4313		1940					
54900	Lake Grace (S)	8098	8097			8098	8098		7793					
55180	Manjimup (S)	1078	1078		0		87	14	834	491	1078		941	155
55460	Merredin (S)	3089	3089			3089	2821							
55530	Mingenew (S)	1815	1815			1815	1815							
55600	Mooru (S)	3417	3417	155	154	3417	3417							
55670	Morawa (S)	3070	3070			3070	3070							
55880	Mount Marshall (S)	6512	3768			5197	3325							
55950	Mukinbudin (S)	2605	794			2603	178							
56020	Mullewa (S)	9441	4027			4882	4027							
56230	Murray (S)	809	809		2		723		793		665		56	
56300	Nannup (S)	425	425					52	340	274	425		425	
56370	Narembene (S)	3607	3608			3607	3598							
56510	Narrogin (S)	1563	1563	1160	1160	920	1563		1563					
56720	Northam (S)	1259	1259	316	493	812	1259							
56790	Northampton (S)	8568	5676			6365	5675							
56860	Nungarin (S)	1000	1000			1000	560							
57000	Perenjori (S)	7596	5286			6617	5287							
57140	Pingelly (S)	1215	1215	368	368	972	1215		1108					
57210	Plantagenet (S)	3234	3234	853	1164	99	1940	111	3138	2077	3234		684	
57350	Quairading (S)	1899	1899			1899	1899							
57420	Ravensthorpe (S)	4395	4396	1594	1594	3637	4395		4092					
57490	Rockingham (C)	232	232	27	199		232		227					
57700	Serpentine-Jarrahdale (S)	437	437		8		401		430		267		27	
57770	Shark Bay (S)	17793	451			3599	451							
58050	Swan (S)	813	813		620		813		264		72			
58120	Tambellup (S)	1373	1373	1373	1373	1110	1373		1373		823			
58190	Tammin (S)	1044	1044			1044	1044							
58260	Three Springs (S)	2360	2360	167	167	2360	2360							
58330	Toodyay (S)	1123	1122	721	819	620	1123							
58400	Trayning (S)	1549	1549			1549	1432							
58540	Victoria Plains (S)	2372	2372	914	914	2344	2372							
58610	Wagin (S)	1825	1825	1084	1084	1756	1825		1822					
58680	Wandering (S)	947	948	807	946		947		922					
58750	Wanneroo (C)	424	424	144	424		424		348					

Table 19 (cont). Estimates of potential area (km²) of suitability for pasture species for each agricultural SLA in Western Australia. Estimates are based areas of freehold/leasehold land in modelled zones for each SLA. Potential areas are based on climatic suitability alone.

SLA_Id	1993/94 SLA_Name	F'id-L'id Area	Sub clover	Balansa clover	Persian clover	Barrel medic	Serradella	White clover	Lucerne	Red clover	Phalaris	Perennial ryegrass	Cocksfoot	Tall fescue
58890	West Arthur (S)	2487	2487	1432	1999	272	2487		2458		331			
59030	Westonia (S)	2436	1594			2218	845							
59100	Wickepin (S)	1935	1935	7	7	1935	1935		1921					
59170	Williams (S)	1788	1789	1255	1716		1788		1777		12			
59310	Wongan-Ballidu (S)	3147	3147			3147	3147							
59380	Woodanilling (S)	1075	1076	1043	1043	1009	1075		1075					
59450	Wyalkatchem (S)	1390	1391			1390	1390							
59590	Yalgoo (S)	25245	473			2002	473							
59660	Yilgarn (S)	12288	5662			5759	3028							
59730	York (S)	1484	1484	495	497	999	1484		26					

Table 20a. Estimated total area of pasture containing particular species together with area of native pasture types for each State . Estimates for Queensland are less reliable due to the incomplete state of the Form B data.

State	Sub clover	Balansa clover	Persian clover	All medics	Barrel medic	Strand medic	Burr medic	Serra- della	White clover	Lucerne	Red clover	Phalaris	Per. ryegrass	Cocks- foot	Tall fescue	Unimp native	Fert. native	Fert-OS native
NSW	105693	4012	679	146932	14686	165	62706	2366	42174	31715	5830	31541	14603	18488	10828	320314	22007	33982
QLD	17	0	167	2317	2317	0	0	0	539	1415	40	0	29	0	10	63301	500	0
SA	23157	5083	1117	44589	34021	11024	22215	28	1347	5826	0	8224	3717	6228	1000	7062	953	604
VIC	78995	929	466	14924	5322	0	651	0	19889	3771	79	10890	28761	13556	404	12997	14152	2056
WA	125912	15988	0	21122	7244	5019	6327	9592	498	632	0	696	1530	658	388	9678	427	0
TAS	23363	0	0	0	0	0	0	0	16342	0	0	381	16626	8531	47	1981	0	6313

Table 20b. Estimated potential area of adaptation for major pastures species for each State.

State	Sub clover	Balansa clover	Persian clover	Barrel medic	Serra- della	White clover	Lucerne	Red clover	Phalaris	Per. ryegrass	Cocks- foot	Tall fescue
NSW	292168	106855	149840	125435	282543	100675	339967	99620	169035	71843	121490	103397
QLD	11946	8420	11946	105	11945	19261	116075	17563	18977	17960	21793	8689
SA	103624	41843	48388	71859	99429	4639	85404	14212	18201	7	2911	1276
VIC	142433	64662	78123	55011	108684	32268	138601	51970	81369	51064	48251	56606
WA	193266	46386	54464	155626	180261	2183	83620	9950	23279	42	5935	361
TAS	23177	3512	6237	0	10762	17372	23839	20333	18266	24947	24868	25270

Table 21. Surveyed estimates and AgStats derived calculations of stocking rates (SR) for the Severn SLA/LGA

Pasture Type	Pasture code	% LGA Area	Survey SR dse/ha	Range	Land area from TM image (ha)	Calculated DSE from AgStats using survey SR proportion
Lucerne	2.10	5	7	5 - 15	11375	3
Red clover	2.30	3	7	5 - 15	6825	3
Phalaris-white	3.10	5	7	5 - 10	11375	3
Phalaris-sub	3.20	15	7	5 - 15	34125	3
Phalaris-fescue-sub	3.21	20	5	3.5 - 7	45500	2.1
Fescue-white	3.30	5	7	5 - 15	11375	3
Italian ryegrass	4.10	2	15	12 - 20	4550	6.3
Unimp. native	5.10	10	2.5	1 - 5	22750	1.3
Fert. native	5.30	10	6	5 - 8.5	22750	3
Fert/oversown native	5.50	25	6.5	5 - 8.5	56875	3.3
Total					227500	2.77

7. CONCLUSIONS.

The major outcome from this project is a digital resource of information describing the composition and condition of pastures in the temperate zone of Australia in 1994. The resource is stored in a database structure which should facilitate interrogation and analysis. The data are georeferenced to areas on a map which can be related to agricultural statistics and other geographic data. This hard copy report provides a reference set of maps of distribution and other characteristics for the main pasture species, and estimates of actual and potential areas of use. The digital resource is distributed to each State and to the National Resource Information Centre as the main repository.

The survey database should be used with caution; users should remain aware of the nature of the data involved. It is important that analysis of the survey data is based on a sound understanding of the database structure to avoid averaging or summing data fields over inappropriate combinations of the original pasture types. The database will be useful in its own right as a basis for economic analyses, and as a basis for mapping the distribution of plants or geographical trends in management issues addressed by the questions.

We have sought to provide an overview of the project and the data resource to make it accessible to potential users. The database contains a large amount of information which will only fully be revealed as users make specific queries in the context of their own unique problems. We have made choices in relation to the pasture types used as examples which will not suit all readers. However, we hope that most readers will be able to use the examples provided to see how information on the species or pasture type of their choice could be obtained or presented.

8. PUBLICATIONS AND REPORTS

Reports

Hill, Michael J. (1994). Final report: "Potential adaptation zones for temperate pasture species as constrained by climate: A GIS-based logical modelling approach".

Petersen, Christine, Wood, Melissa and Shelley, Paul. (1995). Final report: "Determination of industry benefits from pasture improvement - database development report".

Bootle, B. (1995). Final report: "An economic assessment of the value of the NPICC pasture species database".

Public Interest

Dick, A. (1996). Mapping Australian pastures. *Rural Research* 172: 24-28.

Conference Papers

Pearson, Craig J., Hill, Michael J. and Archer, Ken A. (1994). Research management: Combining diverse methods to estimate benefits and identify priorities for agricultural research. In: *Systems-oriented Research in Agricultural and Rural Development, Proceedings of 13th International Symposium, Montpellier*, p 264-9.

Archer, K. (1995). The new South Wales Pasture Base. *Proc. 10th Annual Conference, NSW Grassland Society* p 10-13.

Journal Articles

Hill, Michael J. (1996). Potential adaptation zones for temperate pasture species as constrained by climate: A GIS-based modelling approach. *Australian Journal of Agricultural Research* 47: 1095-1117.

Pearson, C. J., Brown, R., Collins, W. J., Archer, K. A., Wood, M. S., Petersen, C. and Bootle, B. (1997). An Australian temperate pastures database. *Australian Journal of Agricultural Research* (in press).

9. ACKNOWLEDGMENTS

This project was a collaborative effort spanning institutional and geographic boundaries. The final report is an accumulation of the contributions of all of the following individuals and their Institutions.

The project was initiated and carried out under the auspices of the National Pasture Improvement Coordinating Committee.

Professor Craig Pearson was instrumental in the development of the original idea for the project and was responsible for the execution of the initial phase which concluded in December 1995. He was assisted in this by Dr Bill Collins and Dr Rob Brown.

The State agricultural agencies each provided substantial resources for the execution of the survey and their contributions were organised through the following individuals:

Dr Bill Collins - WA; Mr Kevin Lowe - Queensland Department of Primary Industries; Dr Ken Archer - NSW Agriculture who assisted in the design of the survey form; Mr Ken Bishop - Victorian Department of Natural Resources and Environment; Mr Barrie Rowe - Tasmania Department of Primary Industry and Fisheries; Mr Robin Thompson - Tasmania who provided updated survey data; Mr Andrew Lake - South Australian Research and Development Institute; and Mr Jake Howie - South Australian Research and Development Institute.

CSIRO Division of Animal Production provided the modelling and co-ordinated the compilation of this final report.

The National Resource Information Centre (NRIC) provided relational database and GIS facilities for the survey data administered by Dr Graeme Yapp and Mr Paul Shelley and executed by Ms Christine Petersen and Ms Melissa Wood.

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The project was administered for the MRC by Ms Gabrielle Kay.

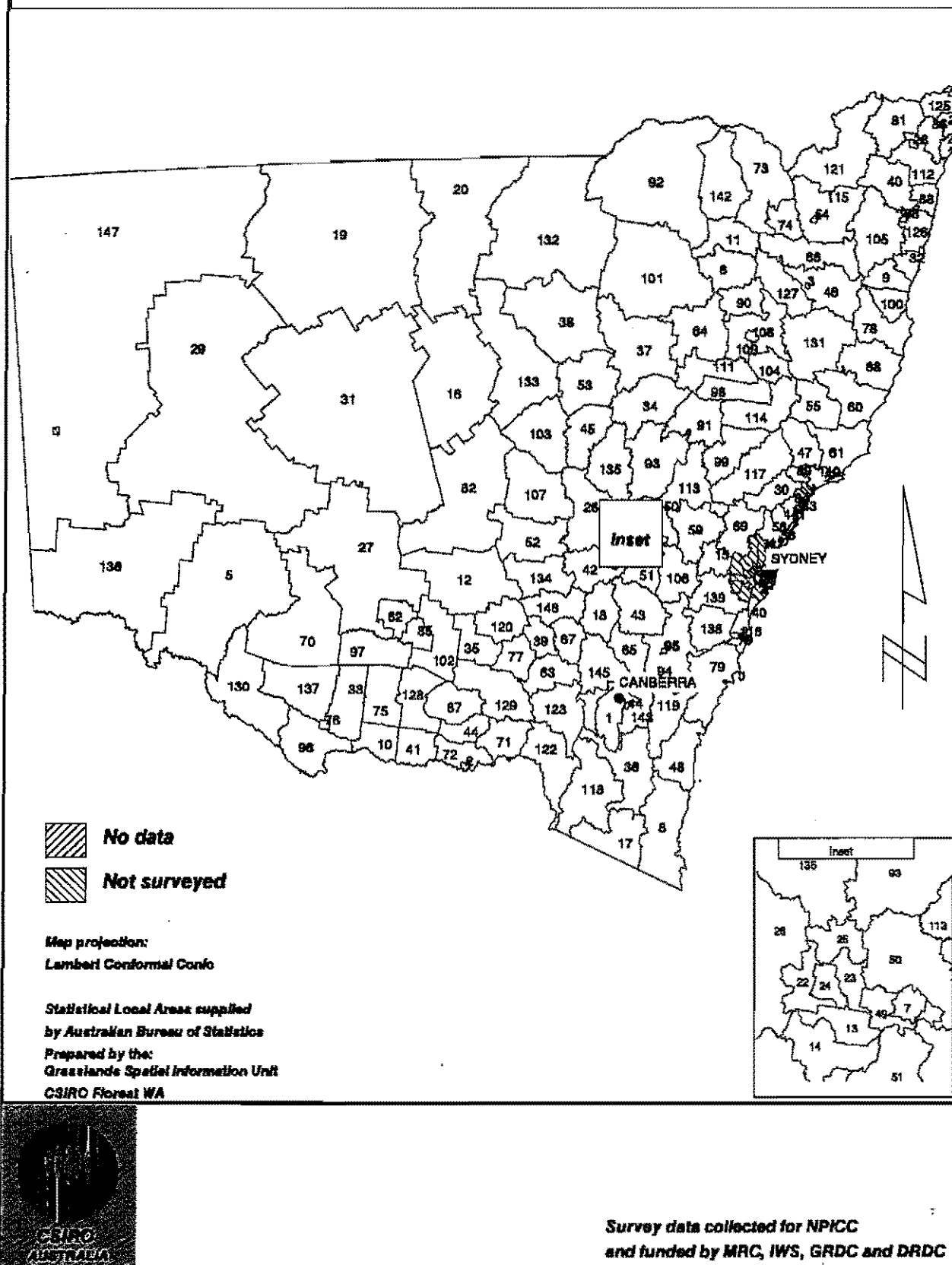
10. REFERENCES.

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- Hill, M. J., Vickery, P. J., Furnival, E. P. and Donald, G. E. (1996). Use of satellite remote sensing to estimate pasture composition in the temperate high rainfall zone (HRZ) of eastern Australia. Final report to the meat Research Corporation, February 1996.
- Pearson, C. J., Brown, R., Collins, W. J., Archer, K. A., Wood, M. S., Petersen, C. and Bootle, B. (1997). An Australian temperate pastures database. *Australian Journal of Agricultural Research* (in press).
- Pearson, Craig J., Hill, Michael J. and Archer, Ken A. (1994). Research management: Combining diverse methods to estimate benefits and identify priorities for agricultural research. In: 'Systems-oriented Research in Agricultural and Rural Development, Proceedings of the 13th International Symposium, Montpellier.' Vol 1, pp 264-269.

11. MAPS

Map 1a. Statistical Local Area boundaries (1993/94) for NSW used for mapping in this report.

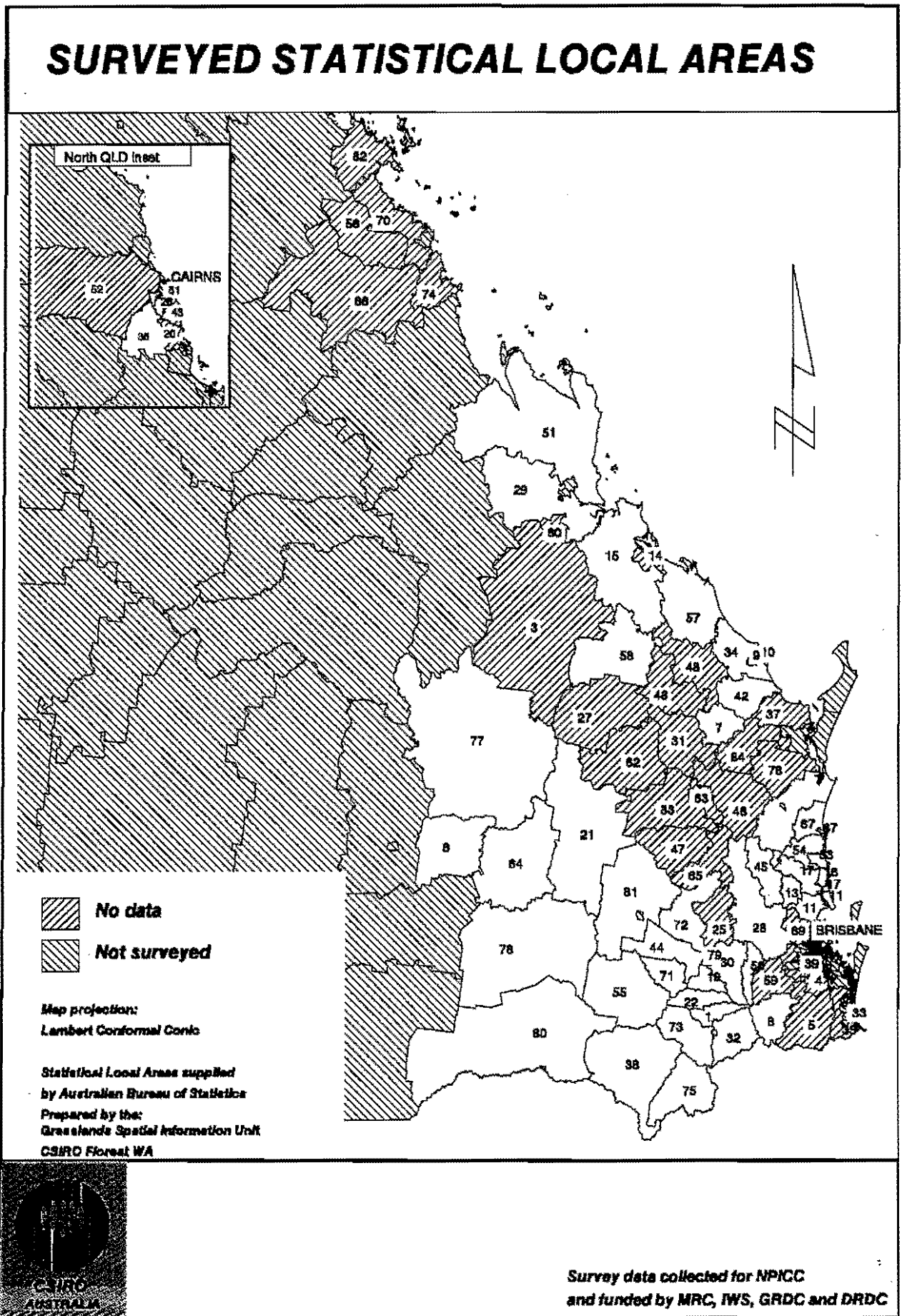
SURVEYED STATISTICAL LOCAL AREAS



NSW Statistical Local Areas

1	10000	ACT	67	13700	Harden (A)	133	17950	Warren (A)
2	10050	Albury (C)	68	13750	Hastings (A)	134	18100	Weddin (A)
3	10100	Armidale (C)	69	13800	Hawkesbury (C)	135	18150	Wellington (A)
4	10250	Ballina (A)	70	13850	Hay (A)	136	18200	Wentworth (A)
5	10300	Balranald (A)	71	13900	Holbrook (A)	137	18300	Windouran (A)
6	10400	Barraba (A)	72	14050	Hume (A)	138	18350	Wingecambee (A)
7	10450	Bathurst (C)	73	14201	Inverell (A) - Pt A	139	18400	Wollondilly (A)
8	10550	Bega Valley (A)	74	14202	Inverell (A) - Pt B	140	18450	Wollongong (C)
9	10600	Bellingen (A)	75	14250	Jenilderie (A)	141	18550	Wyong (A)
10	10650	Berrigan (A)	76	14250	Deniliquin (A)	142	18600	Yallaroi (A)
11	10700	Bingara (A)	77	14300	Junee (A)	143	18650	Queanbeyan (C)
12	10800	Bland (A)	78	14350	Kempsey (A)	144	18650	Yarrowlumia (A)
13	10851	Blayney (A) - Pt A	79	14400	Kiama (A)	145	18700	Yass (A)
14	10852	Blayney (A) - Pt B	80	14400	Kiama (A)	146	18750	Young (A)
15	10900	Blue Mountains (C)	81	14550	Kyogle (A)	147	18809	Unincorp. Far West
16	10950	Bogan (A)	82	14600	Lachlan (A)			
17	11000	Bombala (A)	83	14650	Lake Macquarie (C)			
18	11050	Boorowa (A)	84	14650	Lake Macquarie (C)			
19	11150	Bourke (A)	85	14750	Leeton (A)			
20	11200	Brewarrina (A)	86	14850	Lismore (C)			
21	11350	Byron (A)	87	14950	Lockhart (A)			
22	11401	Cabonne (A) - Pt A	88	15000	Macleay (A)			
23	11401	Cabonne (A) - Pt A	89	15050	Maitland (C)			
24	11401	Orange (C)	90	15100	Manilla (A)			
25	11402	Cabonne (A) - Pt B	91	15250	Merriwa (A)			
26	11403	Cabonne (A) - Pt C	92	15300	Moree Plains (A)			
27	11600	Carrathool (A)	93	15400	Mudgee (A)			
28	11650	Casino (A)	94	15450	Mulwaree (A)			
29	11700	Central Darling (A)	95	15450	Goulburn (C)			
30	11720	Cessnock (C)	96	15500	Murray (A)			
31	11750	Cobar (A)	97	15550	Murrumbidgee (A)			
32	11800	Coffs Harbour (C)	98	15600	Murrumbidgee (A)			
33	11850	Conargo (A)	99	15650	Muswellbrook (A)			
34	11950	Coolah (A)	100	15700	Nambucca (A)			
35	12000	Coolamon (A)	101	15750	Narrabri (A)			
36	12050	Cooma-Monaro (A)	102	15800	Narrandera (A)			
37	12100	Coonabarabran (A)	103	15850	Narromine (A)			
38	12150	Coonamble (A)	104	16000	Nundle (A)			
39	12200	Cootamundra (A)	105	16050	Nymboida (A)			
40	12250	Copmanhurst (A)	106	16100	Oberon (A)			
41	12300	Corowa (A)	107	16200	Parkes (A)			
42	12350	Cowra (A)	108	16300	Parry (A)			
43	12400	Crookwell (A)	109	16300	Parry (A)			
44	12450	Culcairn (A)	110	16400	Port Stephens (A)			
45	12600	Dubbo (C)	111	16500	Quirindi (A)			
46	12650	Dumaresq (A)	112	16600	Richmond River (A)			
47	12700	Dungog (A)	113	16750	Rylstone (A)			
48	12750	Eurobodalla (A)	114	16800	Scone (A)			
49	12801	Evans (s) - Pt A	115	16850	Severn (A)			
50	12802	Evans (A) - Pt B	116	16900	Shellharbour (A)			
51	12802	Evans (A) - Pt B	117	17000	Singleton (A)			
52	12900	Forbes (A)	118	17050	Snowy River (A)			
53	12950	Gilgandra (A)	119	17250	Tallaganda (A)			
54	13000	Glen Innes (A)	120	17350	Temora (A)			
55	13050	Gloucester (A)	121	17400	Tenterfield (A)			
56	13100	Gosford (C)	122	17450	Tumbarumba (A)			
57	13100	Gosford (C)	123	17500	Tumut (A)			
58	13200	Grafton (C)	124	17551	Tweed (A) - Pt A			
59	13300	Greater Lithgow (C)	125	17552	Tweed (A) - Pt B			
60	13350	Greater Taree (C)	126	17600	Ulmara (A)			
61	13400	Great Lakes (A)	127	17650	Uralla (A)			
62	13450	Griffith (C)	128	17700	Urana (A)			
63	13500	Gundagai (A)	129	17750	Wagga Wagga (C)			
64	13550	Gunnedah (A)	130	17800	Wakool (A)			
65	13600	Gunning (A)	131	17850	Walcha (A)			
66	13650	Guyra (A)	132	17900	Walgett (A)			

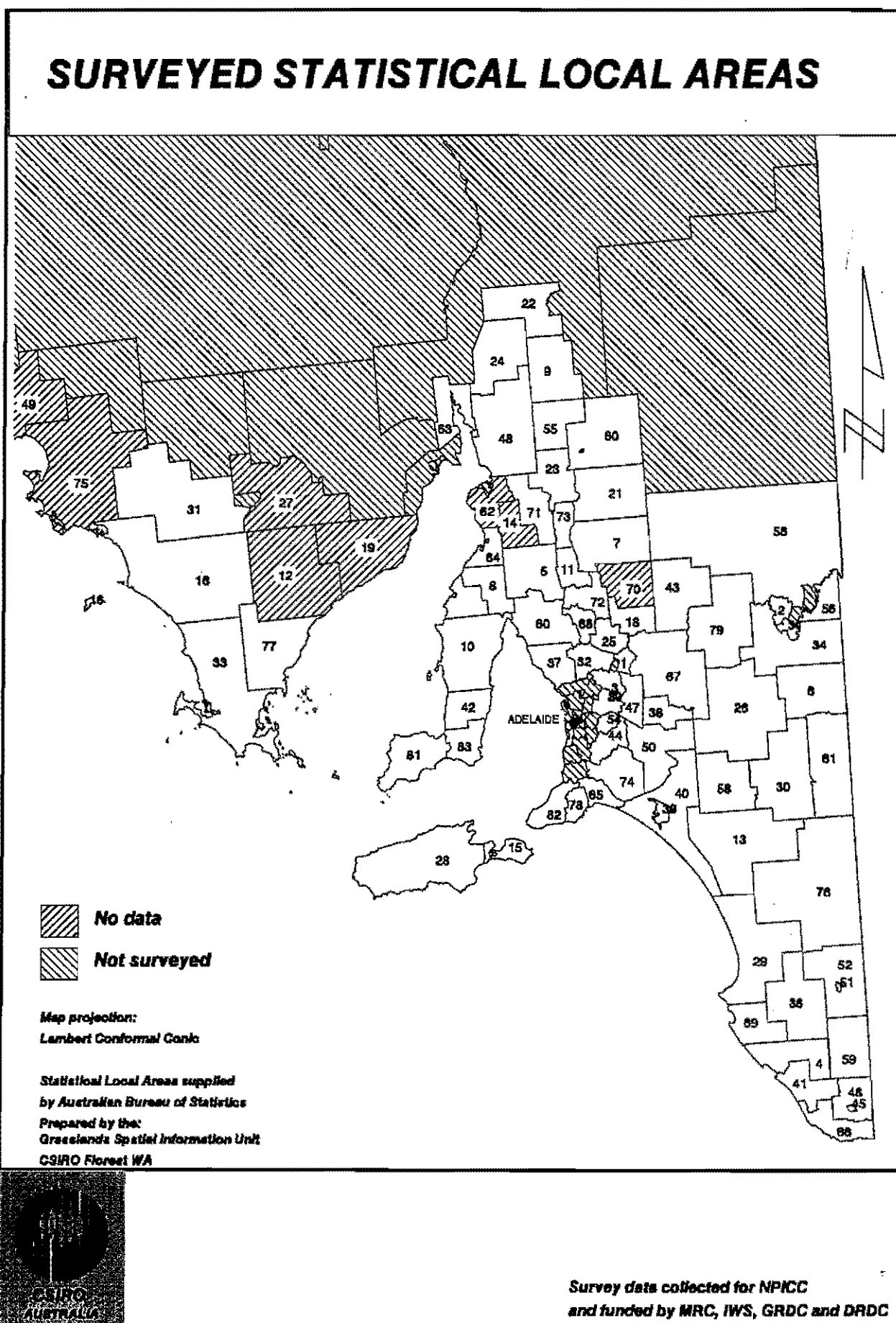
Map 1b. Statistical Local Area boundaries (1993/94) for Queensland used for mapping in this report.



Queensland Statistical Local Areas

1	30100	Warwick (S) - North	67	35751	Noosa (S) - Pt A
2	30200	Atherton (S)	68	35751	Noosa (S) - Pt A
3	30350	Banana (S)	69	35983	Pine Rivers (S) Bal
4	30554	Beaudesert (S) Bal in BSD	70	36004	Mackay (C) - Pt B
5	30557	Beaudesert (S) - Pt B	71	36050	Pittsworth (S)
6	30650	Bendemeere (S)	72	36450	Rosalie (S)
7	30700	Biggenden (S)	73	36500	Warwick (S) - West
8	30800	Boonah (S)	74	36550	Sarina (S)
9	31810	Bundaberg (C)	75	36600	Stanthorpe (S)
10	31981	Burnett (S) - Pt A	76	36700	Tara (S)
11	32001	Caboolture (S) - Pt A	77	36750	Taroom (S)
12	32001	Caboolture (S) - Pt A	78	36850	Tiaro (S)
13	32031	Caboolture (S) - Pt B	79	36900	Toowoomba (C)
14	32101	Calliope (S) - Pt A	80	37100	Waggamba (S)
15	32104	Calliope (S) - Pt B	81	37150	Wambo (S)
16	32131	Caloundra (C) - Pt A	82	37330	Whitsunday (S)
17	32134	Caloundra (C) - Pt B	83	37450	Wondai (S)
18	32134	Caloundra (C) - Pt B	84	37500	Woolcoo (S)
19	32150	Cambooya (S)			
20	32200	Cardwell (S)			
21	32350	Chinchilla (S)			
22	32400	Clifton (S)			
23	32531	Cooloolo (S) (excl. Gympie)			
24	32531	Cooloolo (S) (excl. Gympie)			
25	32550	Crow's Nest (S)			
26	32900	Eacham (S)			
27	32950	Eidsvold (S)			
28	33050	Esk (S)			
29	33154	Fitzroy (S) - Pt B			
30	33250	Gatton (S)			
31	33300	Gayndah (S)			
32	33400	Warwick (S) - East			
33	33548	Kerrydale-Stephens			
34	33554	Burnett (S) - Pt B			
35	33595	Gold Coast (C) - Pt B Bal			
36	33700	Herberton (S)			
37	33750	Hervey Bay (C)			
38	33900	Inglewood (S)			
39	33964	Camira			
40	33975	Ipswich (C) Bal in BSD - Nth			
41	33978	Ipswich (C) Bal in BSD - Sth			
42	34000	Isis (S)			
43	34150	Johnstone (S)			
44	34200	Jondaryan (S)			
45	34250	Kilcoy (S)			
46	34300	Kilkivan (S)			
47	34350	Kingaroy (S)			
48	34400	Kolan (S)			
49	34400	Kolan (S)			
50	34450	Laidley (S)			
51	34550	Livingstone (S)			
52	34850	Mareeba (S)			
53	34901	Maroochy (S) - Pt A			
54	34904	Maroochy (S) - Pt B			
55	35000	Millmerran (S)			
56	35050	Mirani (S)			
57	35100	Miriam Vale (S)			
58	35150	Monto (S)			
59	35231	Ipswich (C) - Pt B			
60	35350	Mount Morgan (S)			
61	35404	Cairns (C) - Pt B			
62	35450	Mundubbera (S)			
63	35500	Murgon (S)			
64	35550	Murilla (S)			
65	35650	Nanango (S)			
66	35700	Nebo (S)			

Map 1c. Statistical Local Area boundaries (1993/94) for South Australia used for mapping in this report.

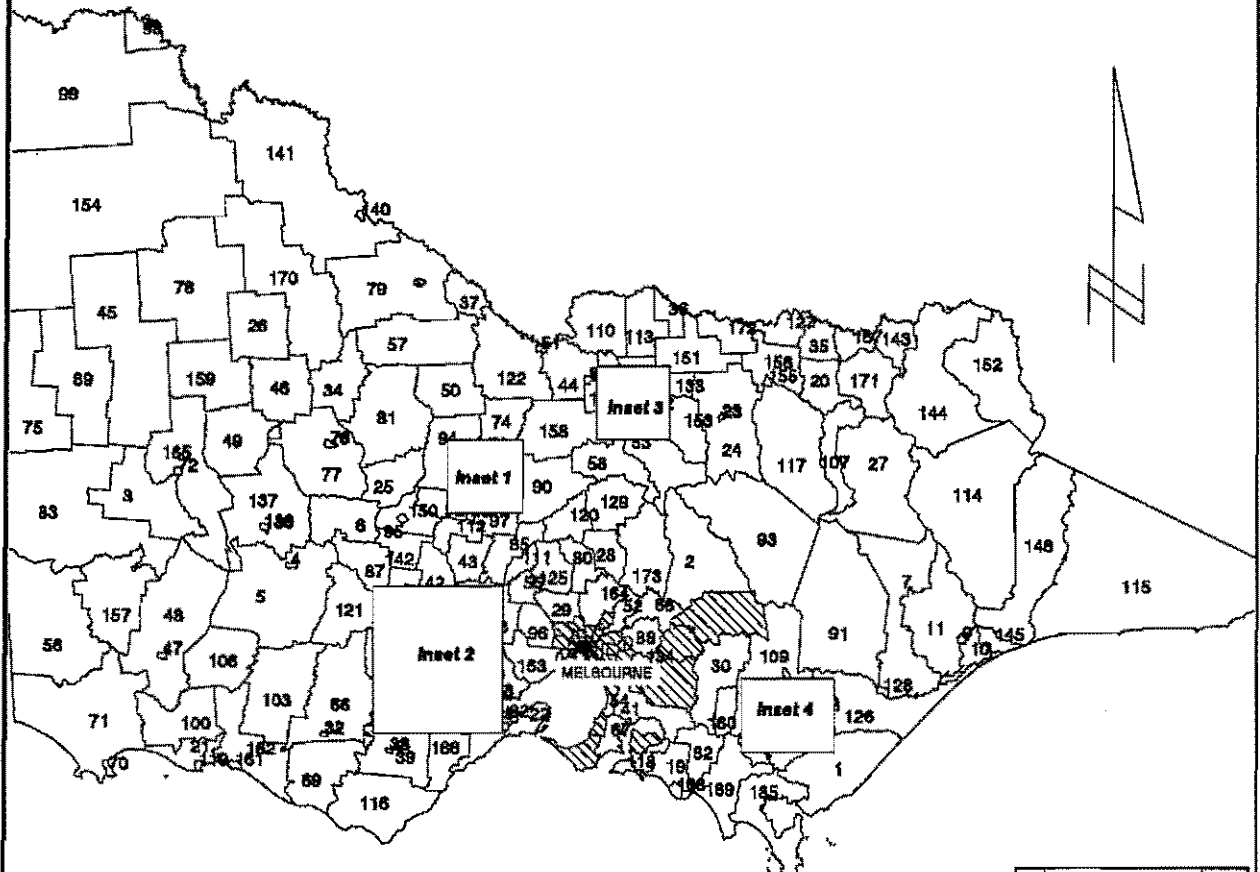


South Australian Statistical Local Areas

1	40140	Angaston (DC)	67	46730	Ridley-Truro (DC)
2	40210	Bannerra (DC)	68	46790	Riverton (DC)
3	40280	Barossa (DC)	69	46860	Robe (DC)
4	40350	Beachport (DC)	70	46930	Robertstown (DC)
5	40510	Blyth-Snowtown (DC)	71	46950	Rocky River (DC)
6	40630	Browns Well (DC)	72	47000	Saddleworth & Auburn (DC)
7	40770	Burra Burra (DC)	73	47280	Spalding (DC)
8	40840	Bute (DC)	74	47420	Strathalbyn (DC)
9	40980	Carrieton (DC)	75	47490	Streaky Bay (DC)
10	41040	Central Yorke Peninsula (DC)	76	47630	Tatiara (DC)
11	41120	Clare (DC)	77	47910	Tumby Bay (DC)
12	41190	Cleve (DC)	78	48050	Victor Harbor (DC)
13	41400	Coonalpyn Downs (DC)	79	48120	Waikerie (DC)
14	41480	Crystal Brook-Redhill (DC)	80	48190	Wakefield Plains (DC)
15	41540	Dudley (DC)	81	48400	Warooka (DC)
16	41750	Elliston (DC)	82	48750	Yankalilla (DC)
17	41750	Elliston (DC)	83	48820	Yorketown (DC)
18	41890	Eudunda (DC)			
19	41960	Franklin Harbor (DC)			
20	42310	Gumeracha (DC)			
21	42380	Hallett (DC)			
22	42520	Hawker (DC)			
23	42740	Jamestown (DC)			
24	42940	Kanyaka-Quorn (DC)			
25	43010	Kaponda (DC)			
26	43080	Karoonda-East Murray (DC)			
27	43220	Kimba (DC)			
28	43290	Kingscote (DC)			
29	43360	Lacepede (DC)			
30	43430	Lameroo (DC)			
31	43570	Le Hunte (DC)			
32	43640	Light (DC)			
33	43710	Lower Eyre Peninsula (DC)			
34	43780	Loxton (DC)			
35	43780	Loxton (DC)			
36	43850	Lucindale (DC)			
37	43920	Mallala (DC)			
38	43990	Mannum (DC)			
39	44130	Meningie (DC)			
40	44130	Meningie (DC)			
41	44200	Millicent (DC)			
42	44270	Minlaton (DC)			
43	44480	Morgan (DC)			
44	44550	Mount Barker (DC)			
45	44620	Mount Gambier (C)			
46	44690	Mount Gambier (DC)			
47	44760	Mount Pleasant (DC)			
48	44830	Mount Remarkable (DC)			
49	44970	Ceduna (DC)			
50	45040	Murray Bridge (RC)			
51	45180	Naracoorte (DC)			
52	45180	Naracoorte (DC)			
53	45280	Northern Yorke Peninsula (DC)			
54	45320	Onkaparinga (DC)			
55	45390	Orroroo (DC)			
56	45460	Paringa (DC)			
57	45460	Paringa (DC)			
58	45600	Peake (DC)			
59	45670	Penola (DC)			
60	45810	Peterborough (DC)			
61	45880	Pinnaroo (DC)			
62	45950	Pirie (DC)			
63	46090	Pt. Augusta (C)			
64	46160	Pt. Broughton (DC)			
65	46230	Port Elliot & Goolwa (DC)			
66	46370	Port MacDonnell (DC)			

Map 1d. Statistical Local Area boundaries (1993/94) for Victoria used for mapping in this report.

SURVEYED STATISTICAL LOCAL AREAS



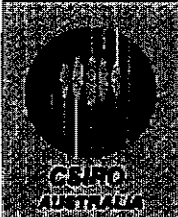
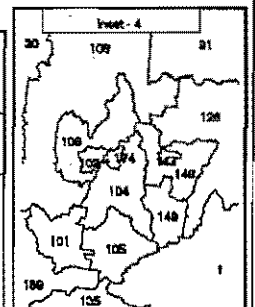
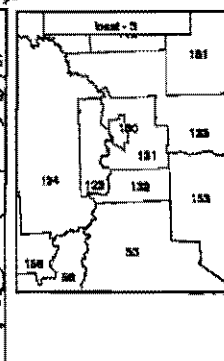
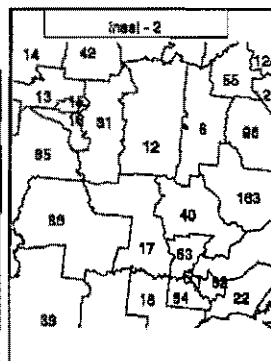
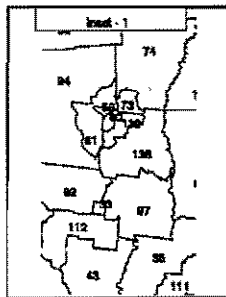
 No data

 Not surveyed

Map projection:
Lambert Conformal Conic

Statistical Local Areas supplied
by Australian Bureau of Statistics

Prepared by the:
Geospatial Spatial Information Unit
CSIRO Floreat WA



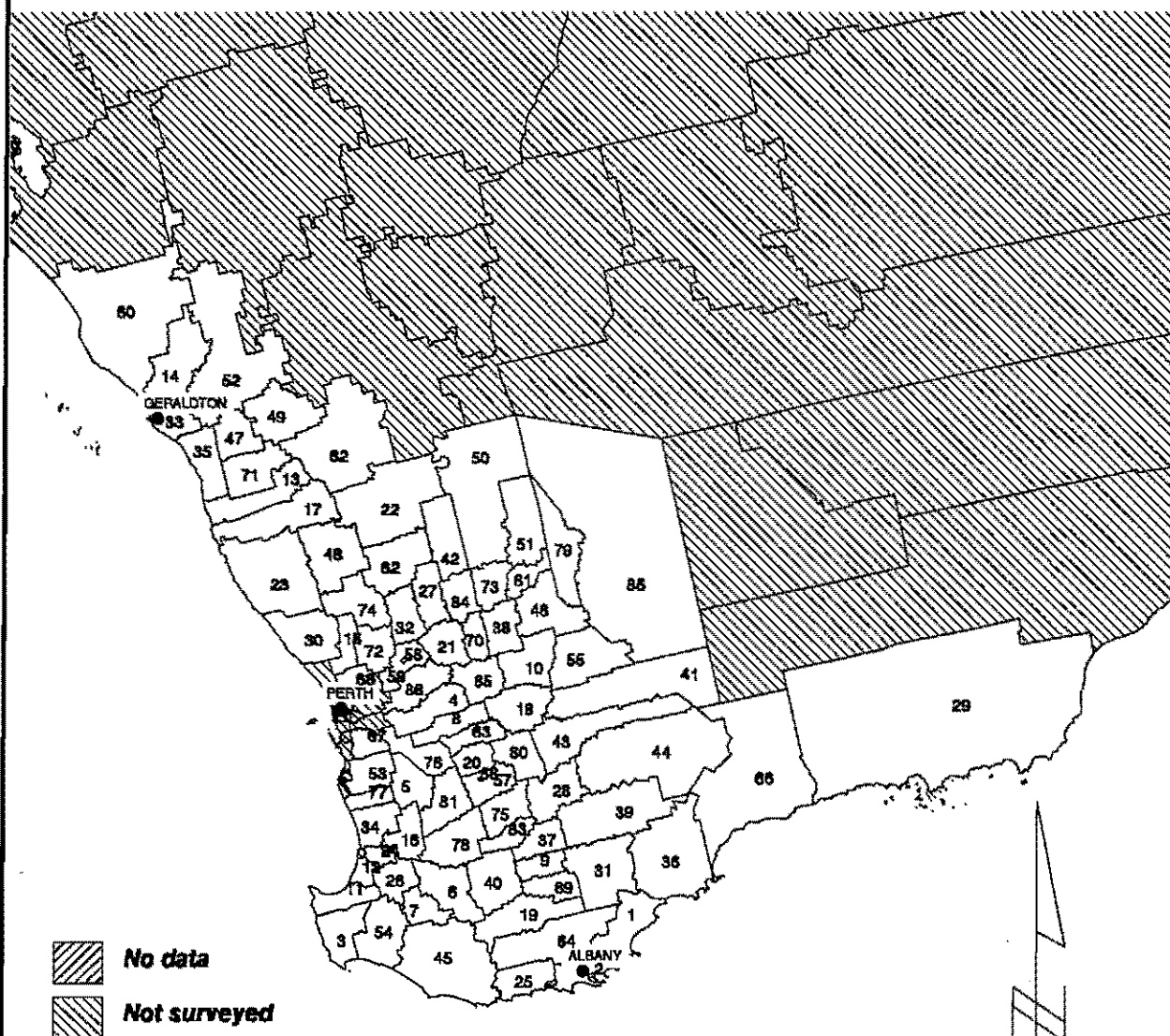
Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC

Victorian Statistical Local Areas

1	20040	Alberton (S)	67	23280	Hastings (S)	133	26722	Shepparton (S) - Pt B
2	20080	Alexandra (S)	68	23360	Healesville (S)	134	26760	Sherbrooke (S)
3	20160	Arapiles (S)	69	23440	Heytesbury (S)	135	26840	South Gippsland (S)
4	20200	Anarat (C)	70	23460	Heywood (S)	136	26960	Stawell (C)
5	20240	Ararat (S)	71	23460	Portland (C)	137	27000	Stawell (S)
6	20280	Avoca (S)	72	23480	Horsham (C)	138	27041	Gr. Bendigo (C) - S'saye Bal
7	20320	Avon (S)	73	23521	Huntly - Inner	139	27042	Struthfieldsaye - Inner
8	20360	Bacchus Marsh (S)	74	23522	Gr. Bendigo (C) - Huntly Bal	140	27120	Swan Hill (C)
9	20400	Bairnsdale (C)	75	23560	Kaniva (S)	141	27160	Swan Hill (S)
10	20441	Bairnsdale (S) - Pt A	76	23600	Kara Kara (S)	142	27200	Talbot & Clunes (S)
11	20442	Bairnsdale (S) - Pt B	77	23600	Kara Kara (S)	143	27241	Tallangatta (S) - Pt A
12	20520	Moorabool (S) - East	78	23640	Karkaroc (S)	144	27242	Tallangatta (S) - Pt B
13	20561	Ballarat (C) - Inner North	79	23760	Kerang (S)	145	27281	Tambo (S) - Pt A
14	20562	Ballarat (C) - North	80	23840	Kilmore (S)	146	27282	Tambo (S) - Pt B
15	20571	Ballarat (C) - Central	81	23960	Korong (S)	147	27361	Traralgon (S) - Pt A
16	20574	Ballarat (C) - South	82	24000	Korumburra (S)	148	27361	Traralgon (C)
17	20602	Southern Rural (S) - East	83	24040	Kowree (S)	149	27362	Traralgon (S) - Pt B
18	20642	Surf Coast (S) - Pt A	84	24080	Kyabram (T)	150	27400	Tullaroop (S)
19	20680	Bass (S)	85	24120	Kyneton (S)	151	27440	Tungamah (S)
20	20720	Beechworth (S)	86	24160	Southern Rural (S) - Central	152	27480	Upper Murray (S)
21	20760	Belfast (S)	87	24200	Lexton (S)	153	27560	Violet Town (S)
22	20802	Greater Geelong (C) - Pt B	88	24240	Lillydale (S)	154	27600	Walpeup (S)
23	20840	Benalla (C)	89	24280	Lowan (S)	155	27640	Wangaratta (C)
24	20880	Benalla (S)	90	24320	Mclvor (S)	156	27680	Wangaratta (S)
25	21000	Bet Bet (S)	91	24360	Maffra (S)	157	27720	Wannon (S)
26	21040	Birchip (S)	92	24400	Maldon (S)	158	27760	Waranga (S)
27	21120	Bright (S)	93	24480	Mansfield (S)	159	27800	Warracknabeal (S)
28	21200	Broadford (S)	94	24522	Gr. Bendigo (C) - Marong Bal	160	27840	Warragul (RC)
29	21320	Bulla (S)	95	24560	Maryborough (C)	161	27880	Warrnambool (C)
30	21360	Buln Buln (S)	96	24640	Melton (S)	162	27920	Warrnambool (S)
31	21442	Moorabool (S) - West	97	24680	Metcalfe (S)	163	28000	Werrimbee (C)
32	21520	Camperdown (T)	98	24761	Mildura (S) - Pt A	164	28040	Whittlesea (C)
33	21560	Castlemaine (C)	99	24762	Mildura (S) - Pt B	165	28120	Wimmera (S)
34	21640	Charlton (S)	100	24800	Minhamite (S)	166	28160	Surf Coast (S) - Pt B
35	21720	Chiltern (S)	101	24840	Mirboo (S)	167	28200	Wodonga (RC)
36	21760	Cobram (S)	102	24880	Moe (C)	168	28240	Wonthaggi (B)
37	21840	Cohuna (S)	103	25040	Mortlake (S)	169	28280	Woorayl (S)
38	21880	Colac (C)	104	25081	Morwell (C) - Pt A	170	28320	Wycheproof (S)
39	21920	Colac (S)	105	25082	Morwell (C) - Pt B	171	28360	Yackandandah (S)
40	22002	Greater Geelong (C) - Pt C	106	25120	Mount Rouse (S)	172	28440	Yarrawonga (S)
41	22040	Cranbourne (C)	107	25160	Myrtleford (S)	173	28480	Yea (S)
42	22080	Creswick (S)	108	25201	Narracan (S) - Pt A	174	28509	Yallourn Works Area
43	22200	Daylesford & Glenlyon (S)	109	25202	Narracan (S) - Pt B			
44	22240	Deakin (S)	110	25240	Nathalia (S)			
45	22320	Dimboola (S)	111	25280	Newham & Woodend (S)			
46	22360	Donald (S)	112	25320	Newstead (S)			
47	22440	Dundas (S)	113	25440	Numurkah (S)			
48	22440	Dundas (S)	114	25560	Omeo (S)			
49	22480	Dunmunkle (S)	115	25600	Orbost (S)			
50	22560	East Loddon (S)	116	25640	Otway (S)			
51	22600	Echuca (C)	117	25680	Oxley (S)			
52	22640	Eltham (S)	118	25760	Phillip Island (S)			
53	22720	Euroa (S)	119	25800	Port Fairy (B)			
54	22880	Frankston (C)	120	26040	Pyalong (S)			
55	23000	Gisborne (S)	121	26200	Ripon (S)			
56	23040	Glenelg (S)	122	26240	Rochester (S)			
57	23080	Gordon (S)	123	26281	Rodney (S) - Pt A			
58	23120	Goulburn (S)	124	26282	Rodney (S) - Pt B			
59	23131	Eaglehawk	125	26320	Romsey (S)			
60	23132	Gr. Bendigo (C) - Central	126	26360	Rosedale (S)			
61	23134	Marong - Inner	127	26400	Rutherglen (S)			
62	23151	Bellarine - Inner	128	26520	Sale (C)			
63	23152	Corio - Inner	129	26640	Seymour (RC)			
64	23156	South Barwon - Inner	130	26680	Shepparton (C)			
65	23162	Southern Rural (S) - West	131	26721	Shepparton (S) - Pt A			
66	23240	Hampden (S)	132	26722	Shepparton (S) - Pt B			

Map 1e. Statistical Local Area boundaries (1993/94) for Western Australia used for mapping in this report.

SURVEYED STATISTICAL LOCAL AREAS



 **No data**
 **Not surveyed**

Map projection:
 Lambert Conformal Conic

Statistical Local Areas supplied
 by Australian Bureau of Statistics

Prepared by the:
 Grasslands Spatial Information Unit
 CSIRO Forest WA



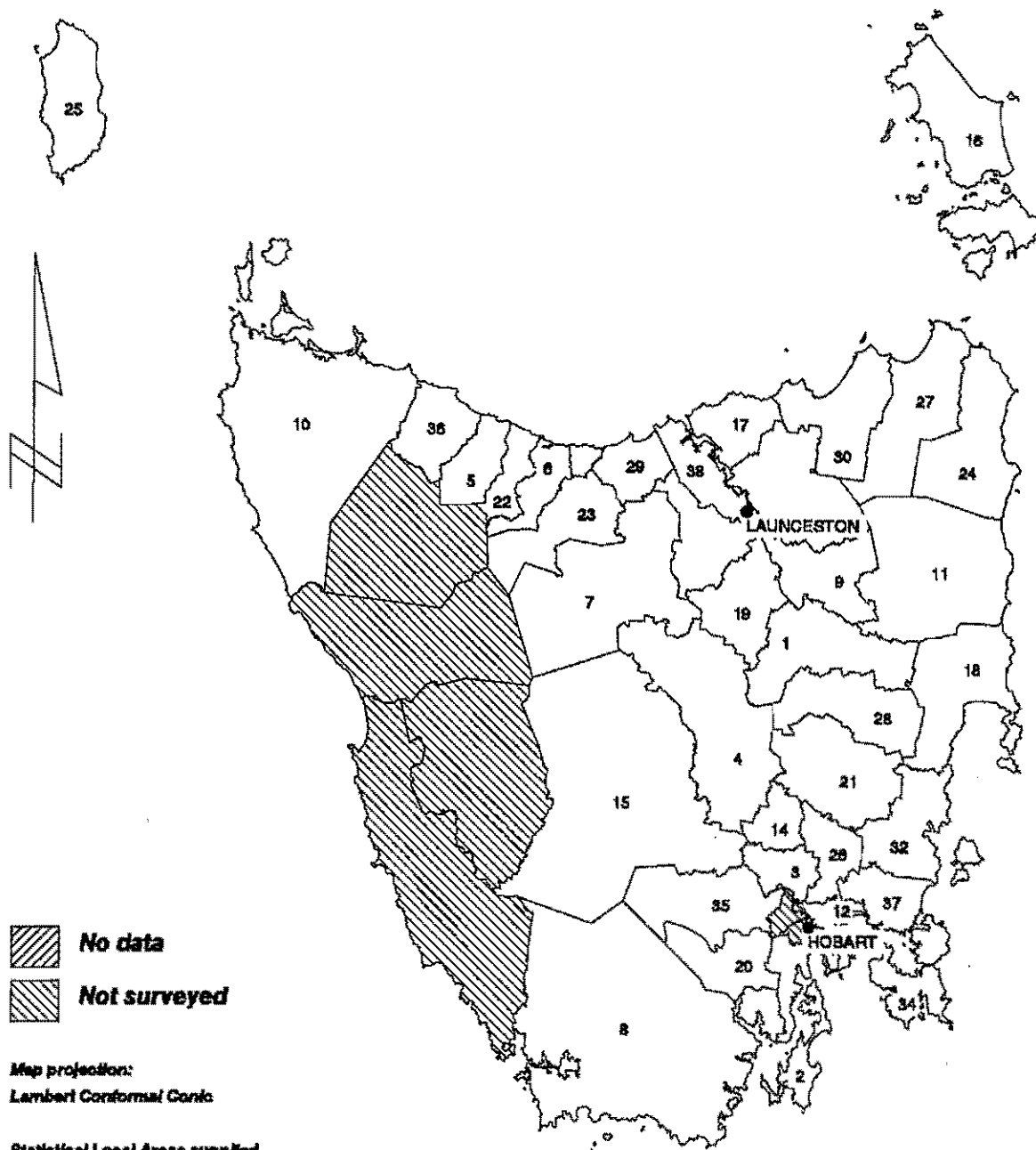
Survey data collected for NPICCC
 and funded by MRC, IWS, GRDC and DRDC

Western Australian Statistical Local Areas

1	50140	Albany (S)	67	57700	Serpentine-Jarrahdale (S)
2	50140	Albany (T)	68	58050	Swan (S)
3	50280	Augusta-Margaret River (S)	69	58120	Tambellup (S)
4	50560	Beverley (S)	70	58190	Tammin (S)
5	50630	Boddington (S)	71	58260	Three Springs (S)
6	50770	Boyup Brook (S)	72	58330	Toodyay (S)
7	50840	Bridgetown-Greenbushes (S)	73	58400	Trayning (S)
8	50910	Brookton (S)	74	58540	Victoria Plains (S)
9	51050	Broomehill (S)	75	58610	Wagin (S)
10	51120	Bruce Rock (S)	76	58680	Wandering (S)
11	51260	Busselton (S)	77	58820	Waroon (S)
12	51400	Capel (S)	78	58890	West Arthur (S)
13	51470	Carnamah (S)	79	59030	Westonia (S)
14	51610	Chapman Valley (S)	80	59100	Wickepin (S)
15	51680	Chittering (S)	81	59170	Williams (S)
16	51890	Collie (S)	82	59310	Wongan-Ballidu (S)
17	52030	Coorow (S)	83	59380	Woodanilling (S)
18	52100	Corrigin (S)	84	59450	Wyalkatchem (S)
19	52240	Cranbrook (S)	85	59660	Yilgam (S)
20	52310	Cuballing (S)	86	59730	York (S)
21	52450	Cunderdin (S)			
22	52520	Dalwallinu (S)			
23	52590	Dandaragan (S)			
24	52660	Dardanup (S)			
25	52730	Denmark (S)			
26	52870	Donnybrook-Balingup (S)			
27	52940	Dowerin (S)			
28	53010	Dumbleyung (S)			
29	53290	Esperance (S)			
30	53570	Gingin (S)			
31	53640	Gnowangerup (S)			
32	53710	Goomalling (S)			
33	53850	Greenough (S)			
34	53990	Harvey (S)			
35	54060	Irwin (S)			
36	54130	Jerramungup (S)			
37	54340	Katanning (S)			
38	54410	Kellerberrin (S)			
39	54480	Kent (S)			
40	54550	Kojonup (S)			
41	54620	Kondinin (S)			
42	54690	Koorda (S)			
43	54760	Kulin (S)			
44	54900	Lake Grace (S)			
45	55180	Manjimup (S)			
46	55460	Merredin (S)			
47	55530	Mingenew (S)			
48	55600	Moora (S)			
49	55670	Morawa (S)			
50	55880	Mount Marshall (S)			
51	55950	Mukinbudin (S)			
52	56020	Mullewa (S)			
53	56230	Murray (S)			
54	56300	Nannup (S)			
55	56370	Narembeen (S)			
56	56510	Narrogin (S)			
57	56510	Narrogin (S)			
58	56720	Northam (S)			
59	56720	Northam (S)			
60	56790	Northampton (S)			
61	56860	Nungarin (S)			
62	57000	Perenjori (S)			
63	57140	Pingelly (S)			
64	57210	Plantagenet (S)			
65	57350	Quairading (S)			
66	57420	Ravensthorpe (S)			

Map 1f. Local Government Area boundaries (1993) for Tasmania used for mapping in this report.

SURVEYED LOCAL GOVERNMENT AREAS



 **No data**
 **Not surveyed**

Map projection:
 Lambert Conformal Conic

Statistical Local Areas supplied
 by Australian Bureau of Statistics
 Prepared by the:
 Grasslands Spatial Information Unit
 CSIRO Forest WA

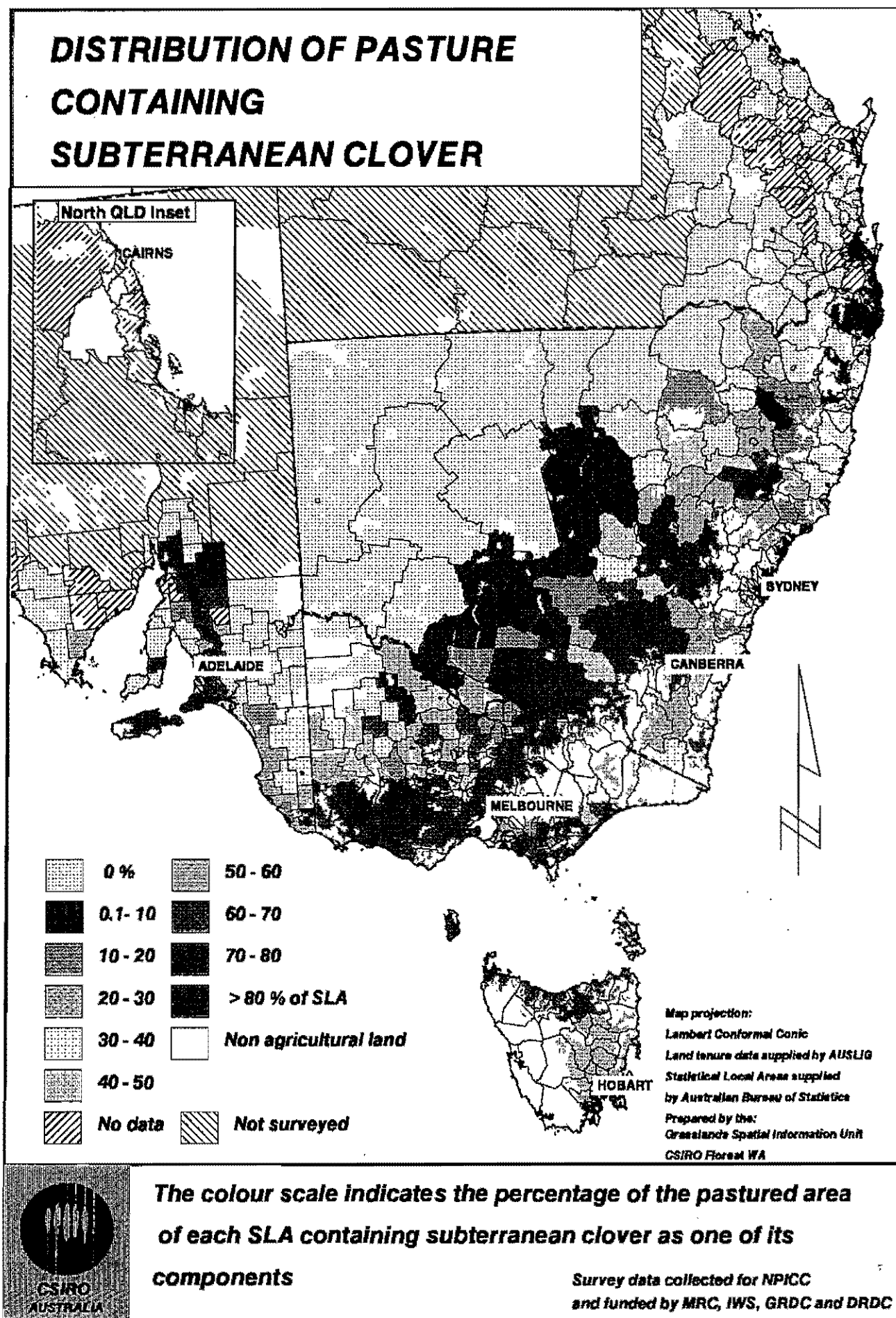


Survey data collected for NPICC
 and funded by MRC, IWS, GRDC and DRDC

Tasmanian Local Government Areas

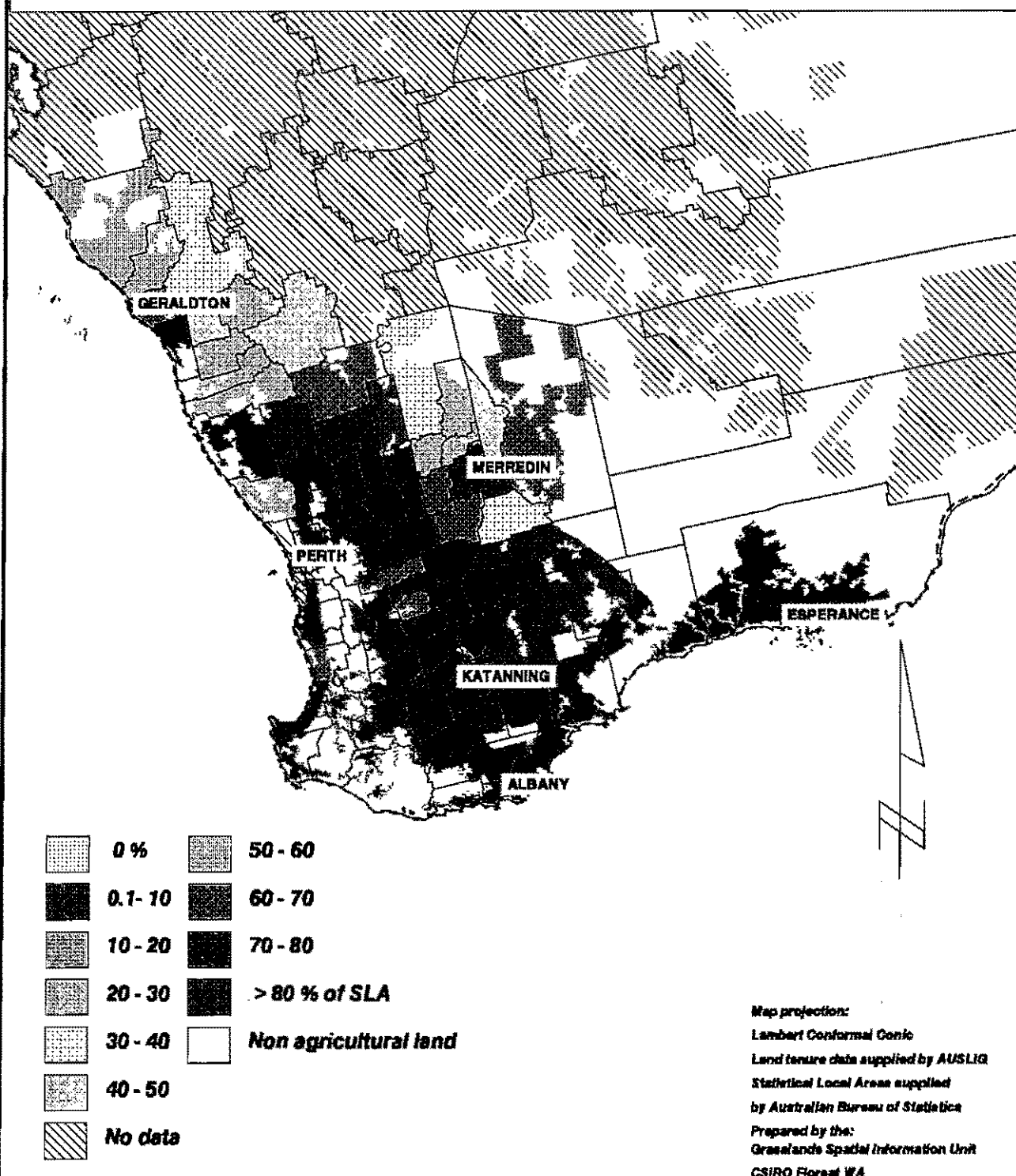
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- 2 60400 BRUNY
- 3 60410 BRIGHTON
- 4 60600 BOTHWELL
- 5 60611 BURNIE
- 6 60811 ULVERSTONE
- 7 60900 DELORAINÉ
- 8 61100 ESPERANCE
- 9 61200 EVANDALE
- 10 61210 CIRCULAR HEAD
- 11 61300 FINGAL
- 12 61410 CLARENCE
- 13 61600 DEVONPORT
- 14 61900 GREEN PONDS
- 15 62000 HAMILTON
- 16 62010 FLINDERS
- 17 62211 GEORGE TOWN
- 18 62410 GLAMORGAN
- 19 62900 LONGFORD
- 20 63010 HUON
- 21 63100 OATLANDS
- 22 63200 PENQUIN
- 23 63210 KENTISH
- 24 63400 PORTLAND
- 25 63410 KING ISLAND
- 26 63600 RICHMOND
- 27 63700 RINGAROOMA
- 28 63800 ROSS
- 29 63811 LATROBE
- 30 64000 SCOTTSDALE
- 31 64013 LAUNCESTON
- 32 64200 SPRING BAY
- 33 64211 WESTBURY
- 34 64400 TASMAN
- 35 64411 NEW NORFOLK
- 36 64800 WYNYARD
- 37 64812 SORELL
- 38 65811 BEACONSFIELD

Map 2a. Distribution of pasture containing subterranean clover in SE Australia.



Map 2b. Distribution of pasture containing subterranean clover in Western Australia.

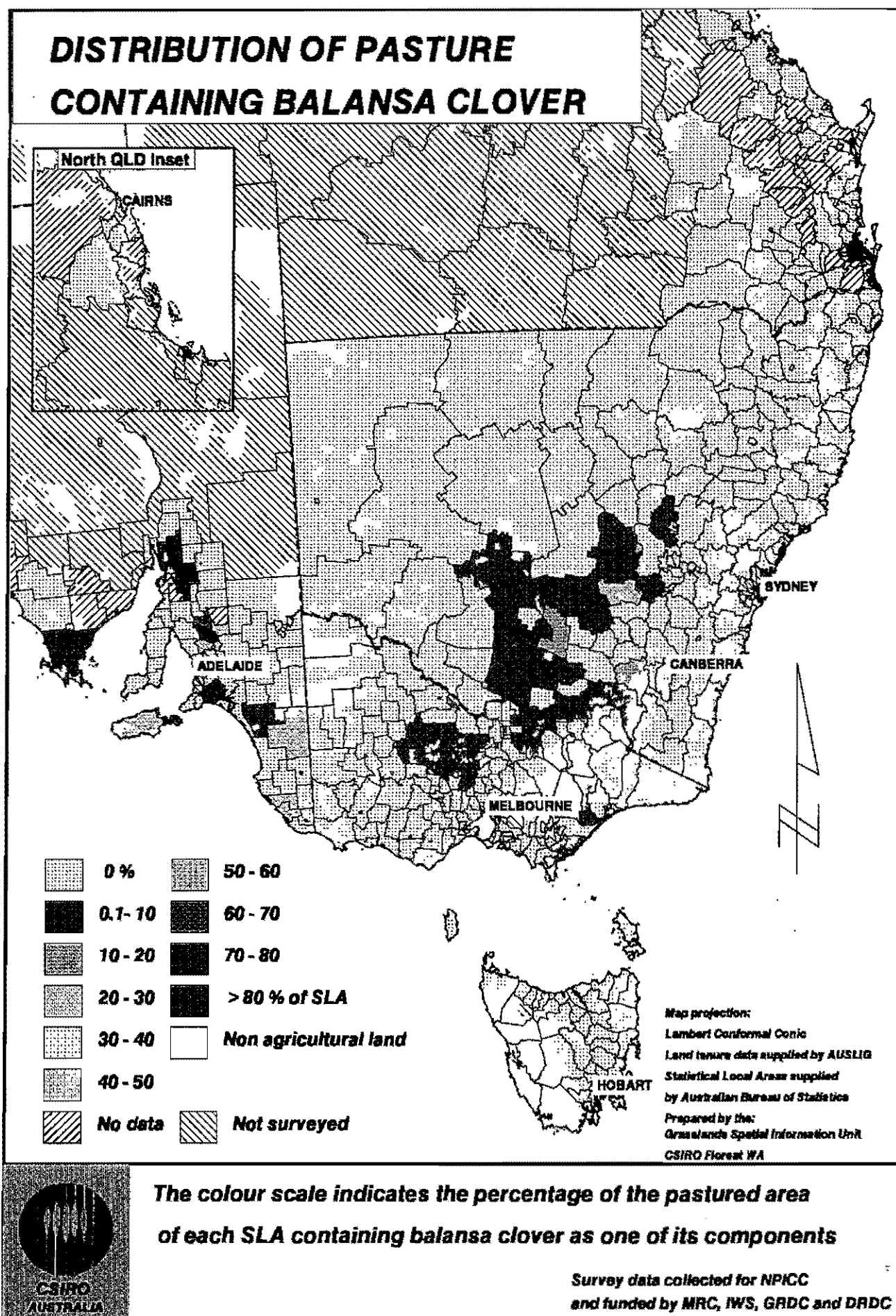
DISTRIBUTION OF PASTURE CONTAINING SUBTERRANEAN CLOVER



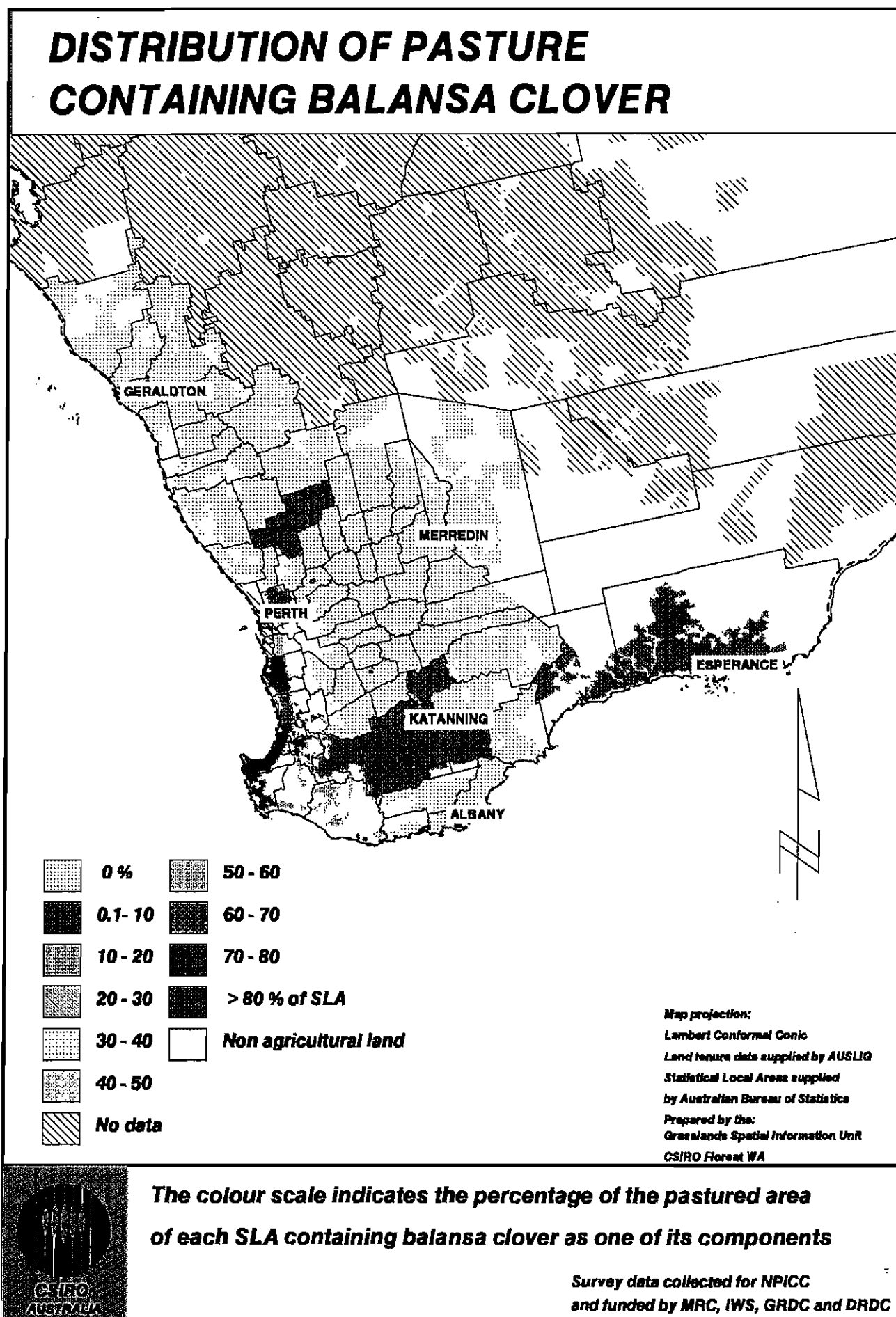
The colour scale indicates the percentage of the pastured area of each SLA containing subterranean clover as one of its components

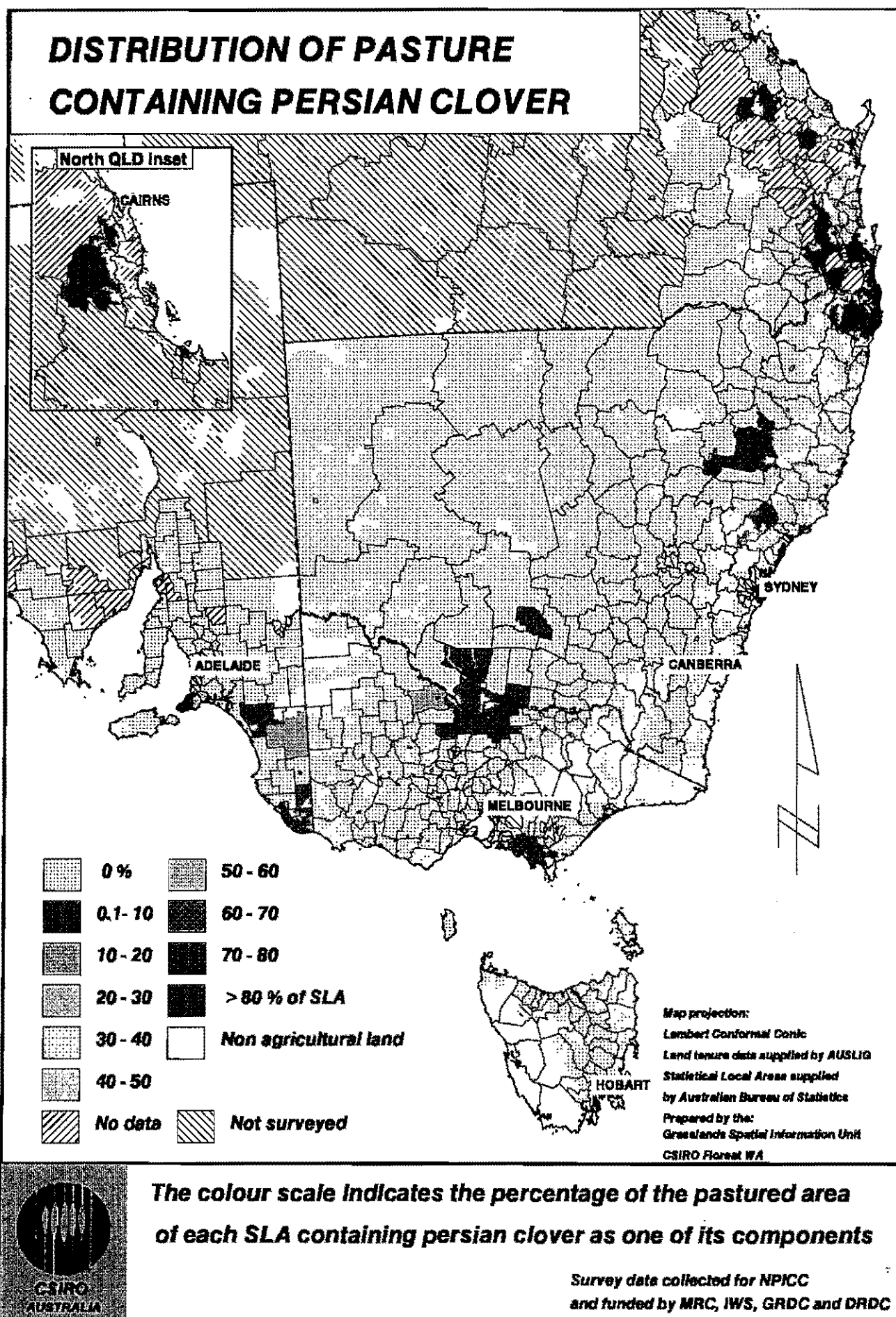
Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC

Map 3a. Distribution of pasture containing balansa clover
in SE Australia.

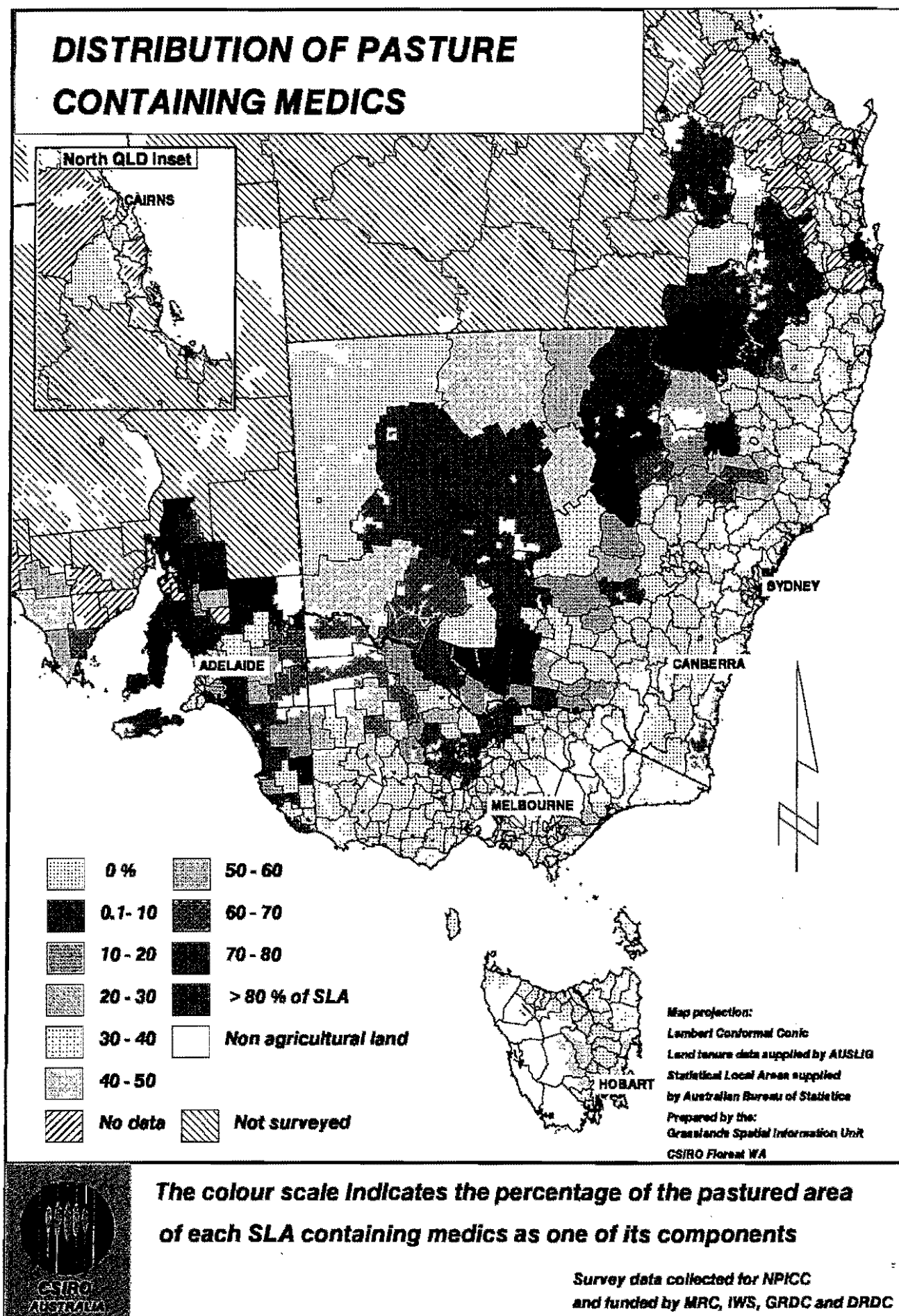


Map 3b. Distribution of pasture containing balansa clover
in Western Australia.

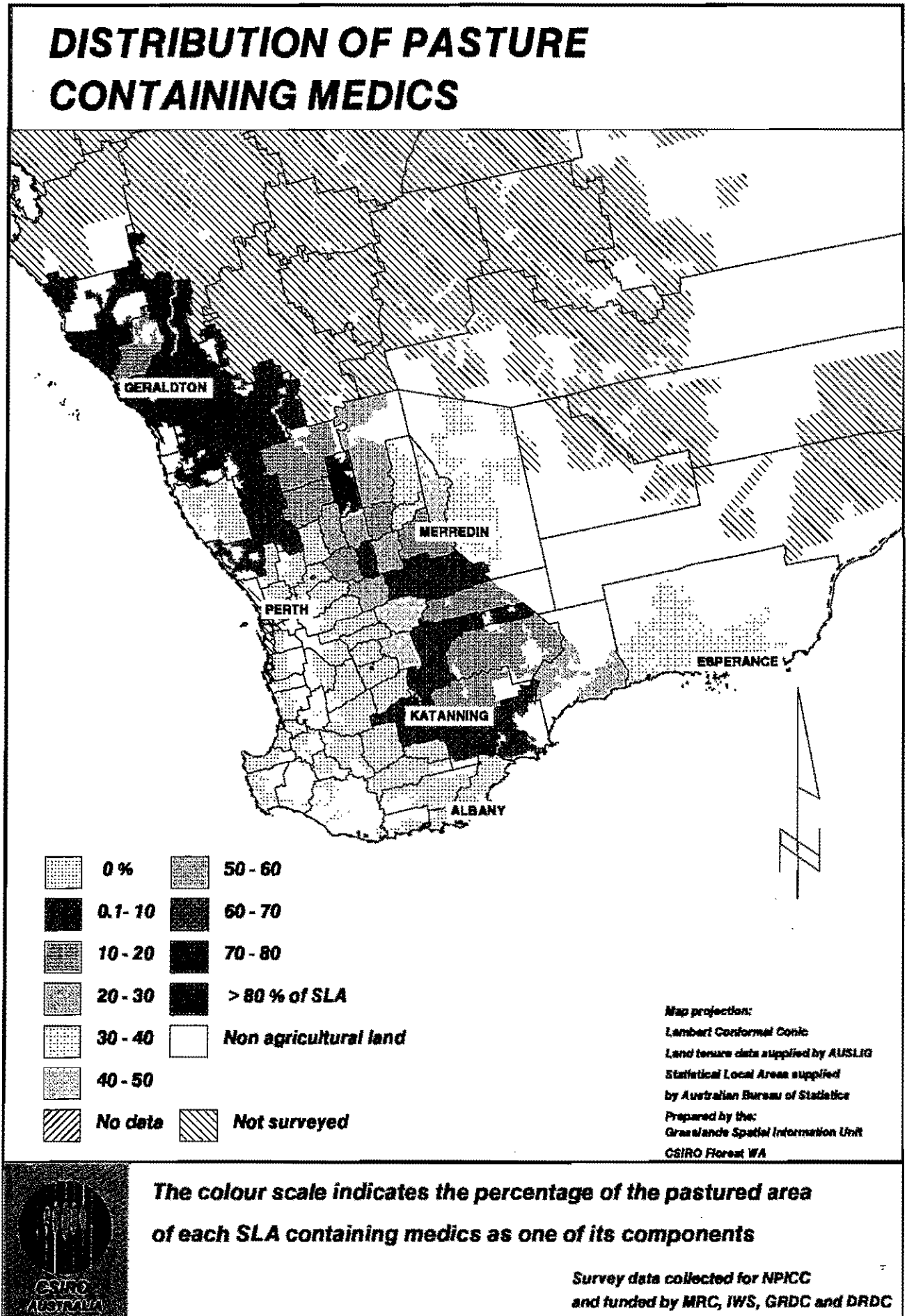




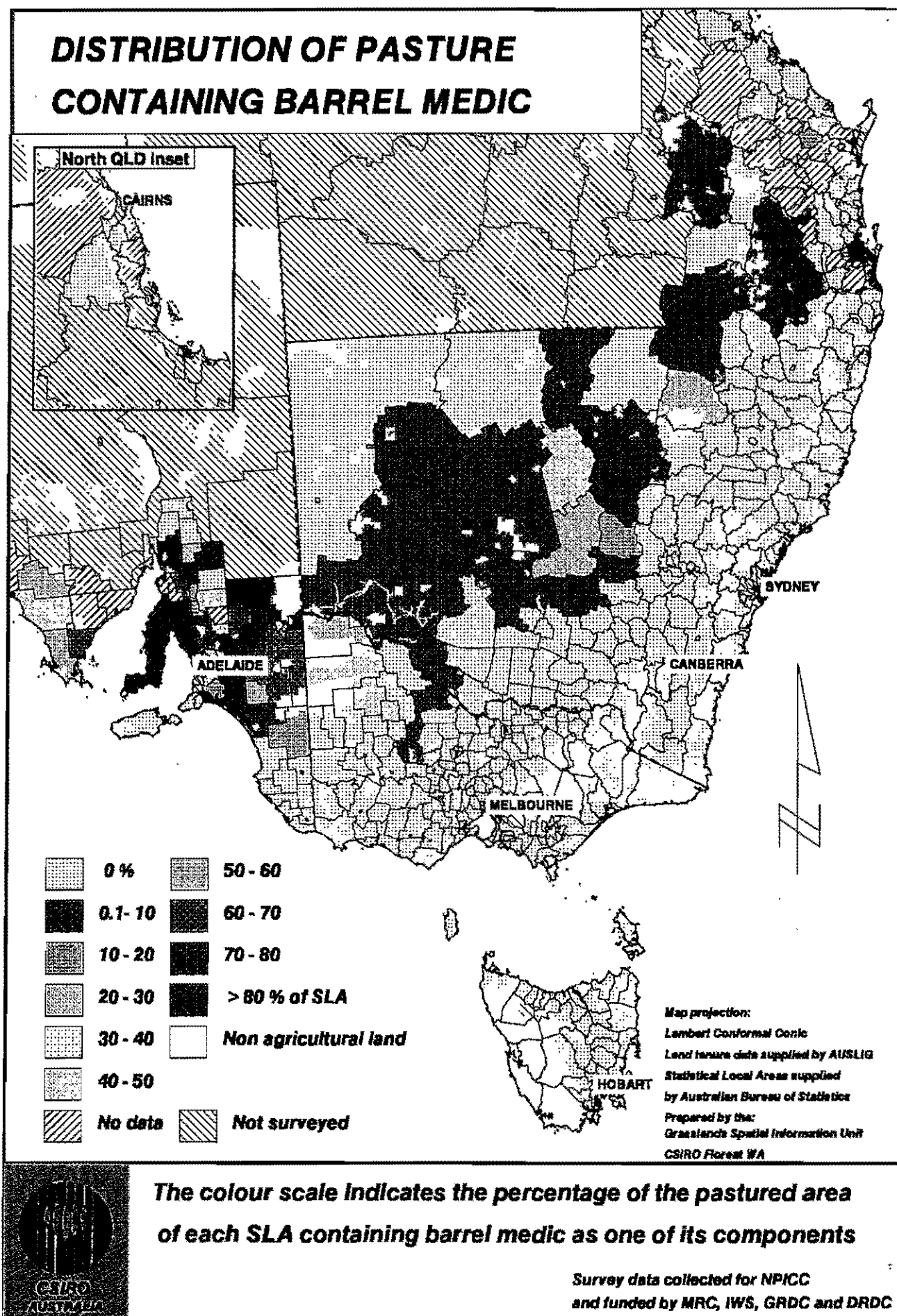
Map 5a. Distribution of pasture containing medic in SE Australia.



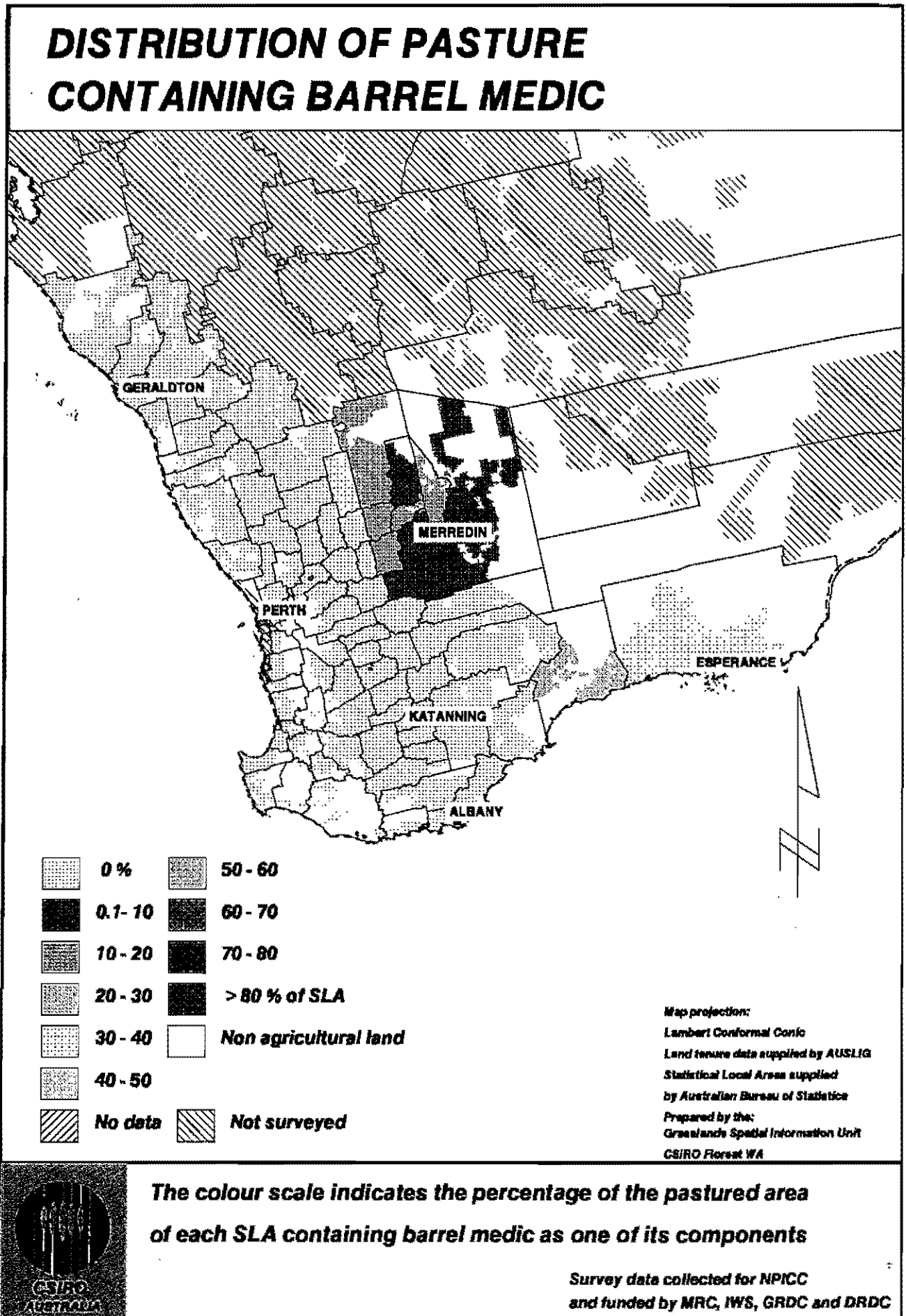
Map 5b. Distribution of pasture containing medics in Western Australia.

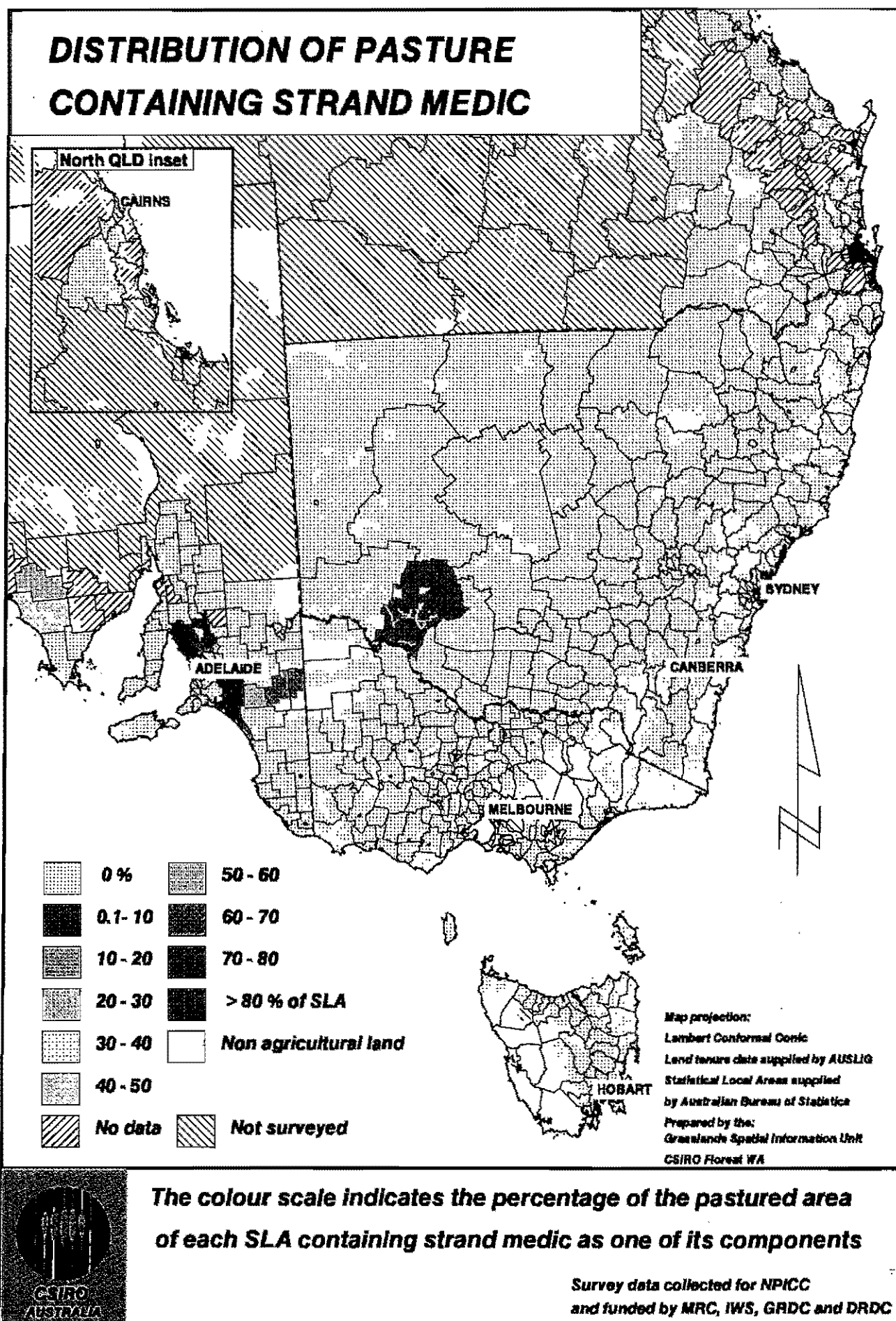


Map 6a. Distribution of pasture containing barrel medic in SE Australia.

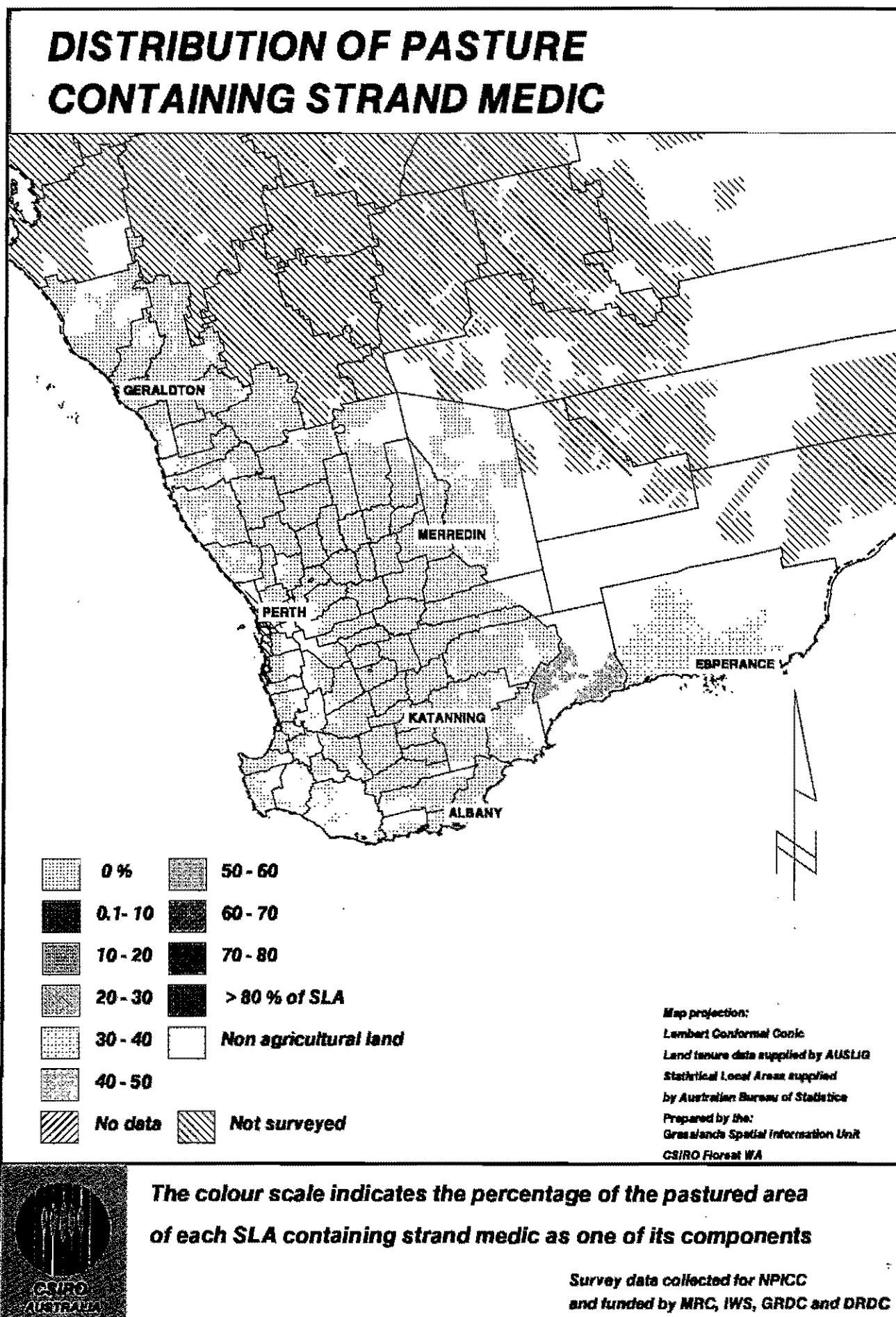


Map 6b. Distribution of pasture containing barrel medic in Western Australia.

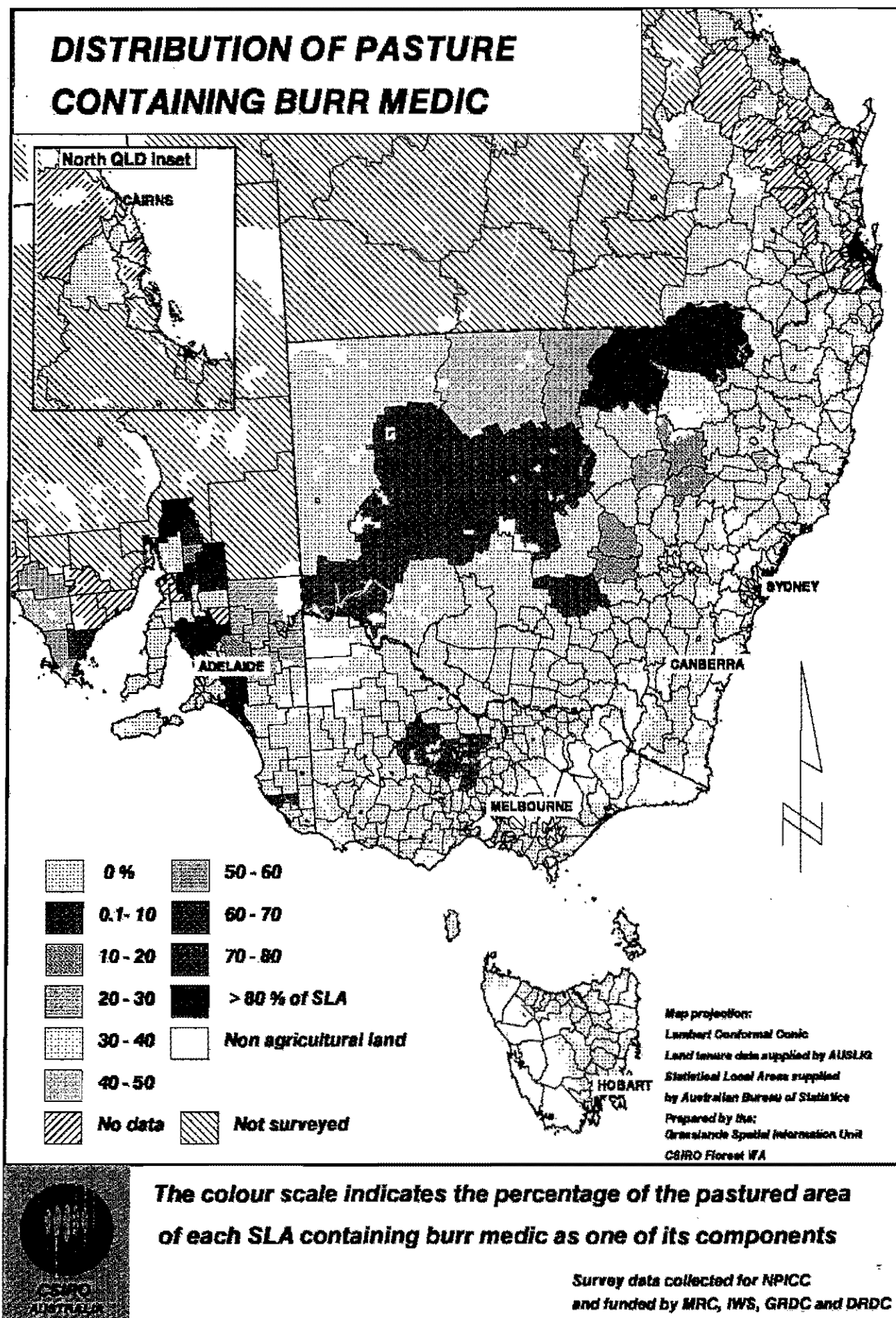




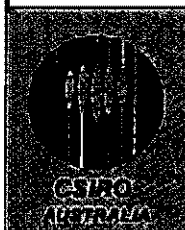
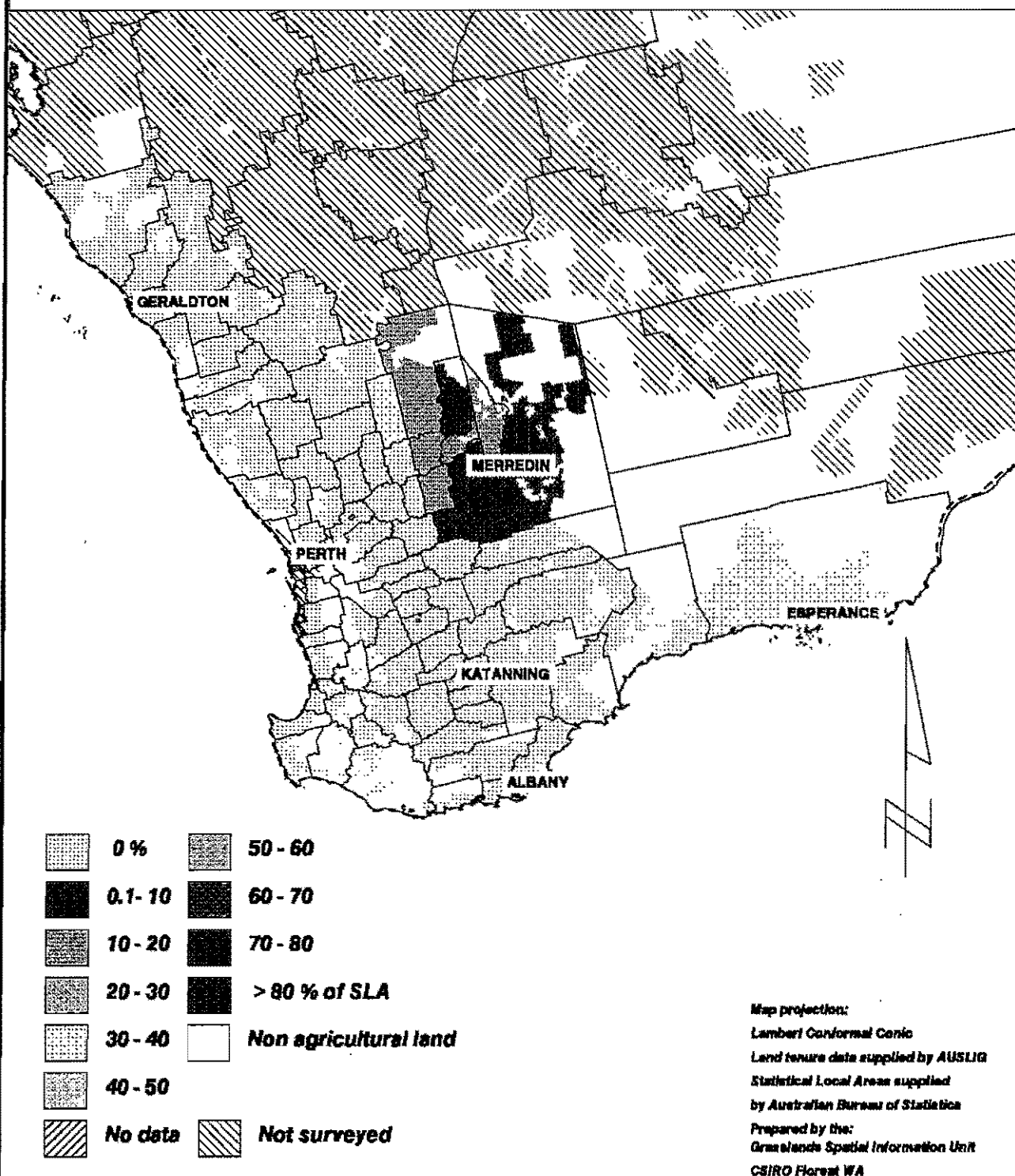
Map 7b. Distribution of pasture containing strand medic in Western Australia.



Map 8a. Distribution of pasture containing burr medic in SE Australia.



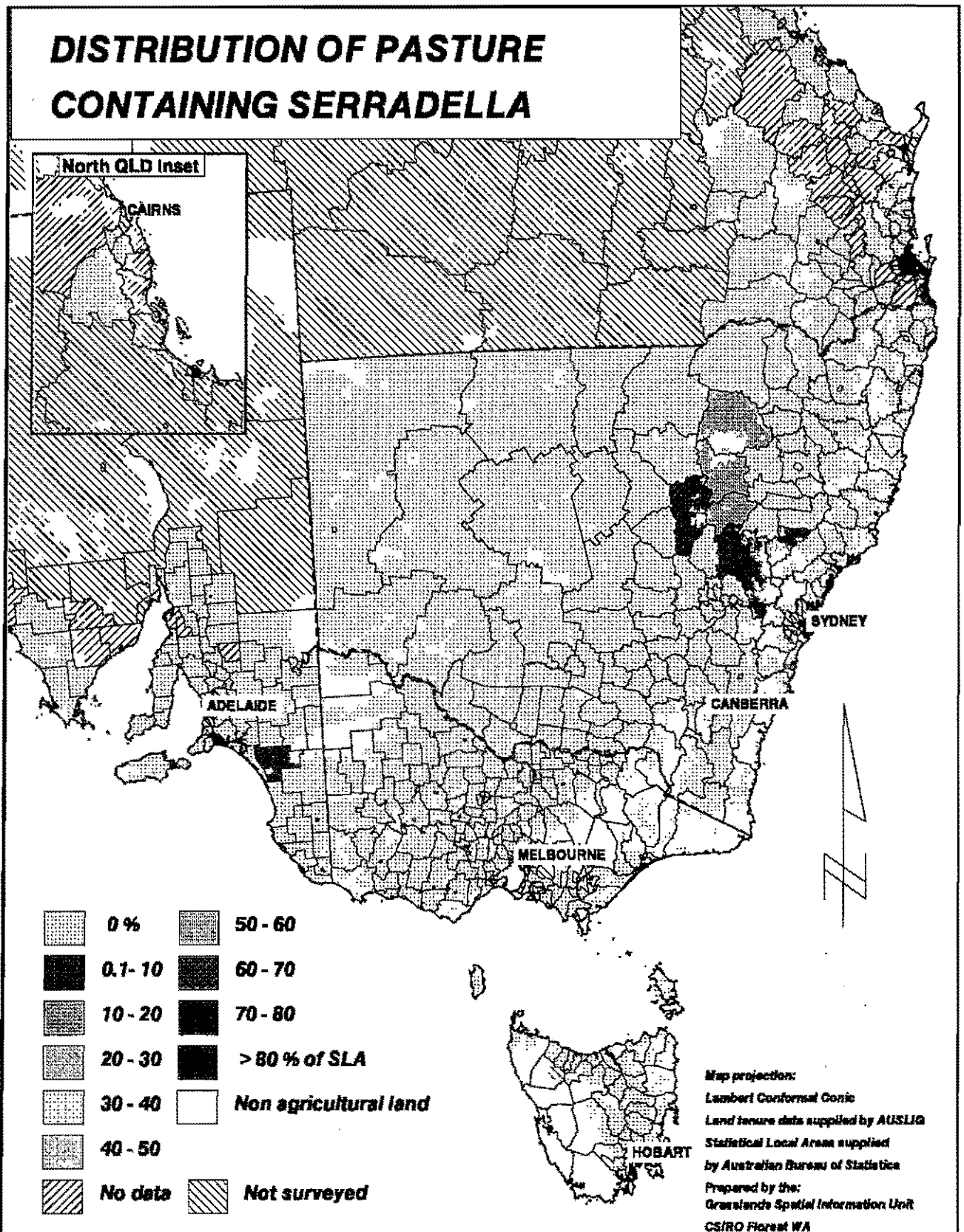
DISTRIBUTION OF PASTURE CONTAINING BURR MEDIC



The colour scale indicates the percentage of the pastured area of each SLA containing burr medic as one of its components

Survey data collected for NPICC
 and funded by MRC, IWS, GRDC and DRDC

Map 9a. Distribution of pasture containing yellow serradella in SE Australia.

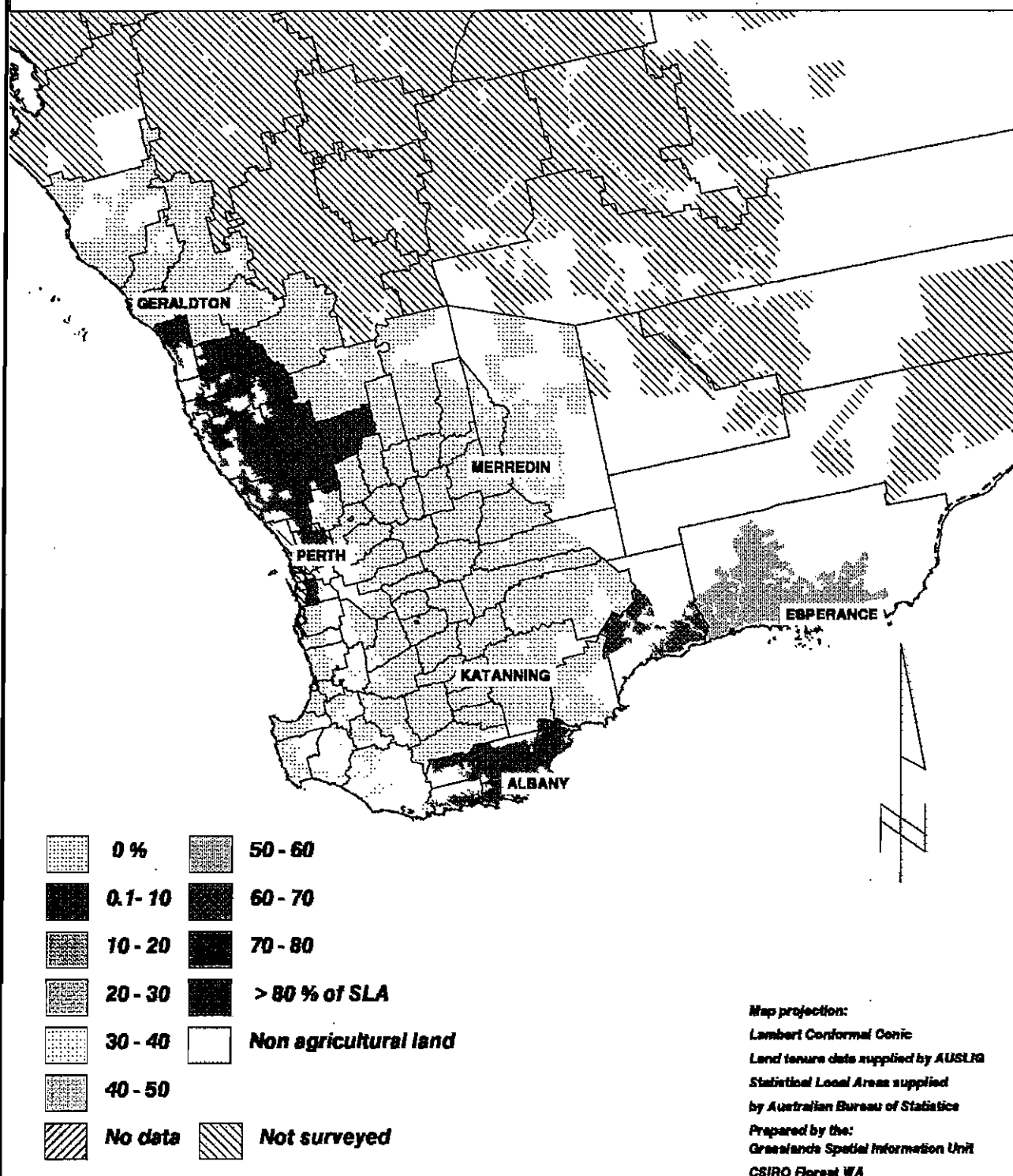


**The colour scale indicates the percentage of the pastured area
of each SLA containing serradella as one of its components**

Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC

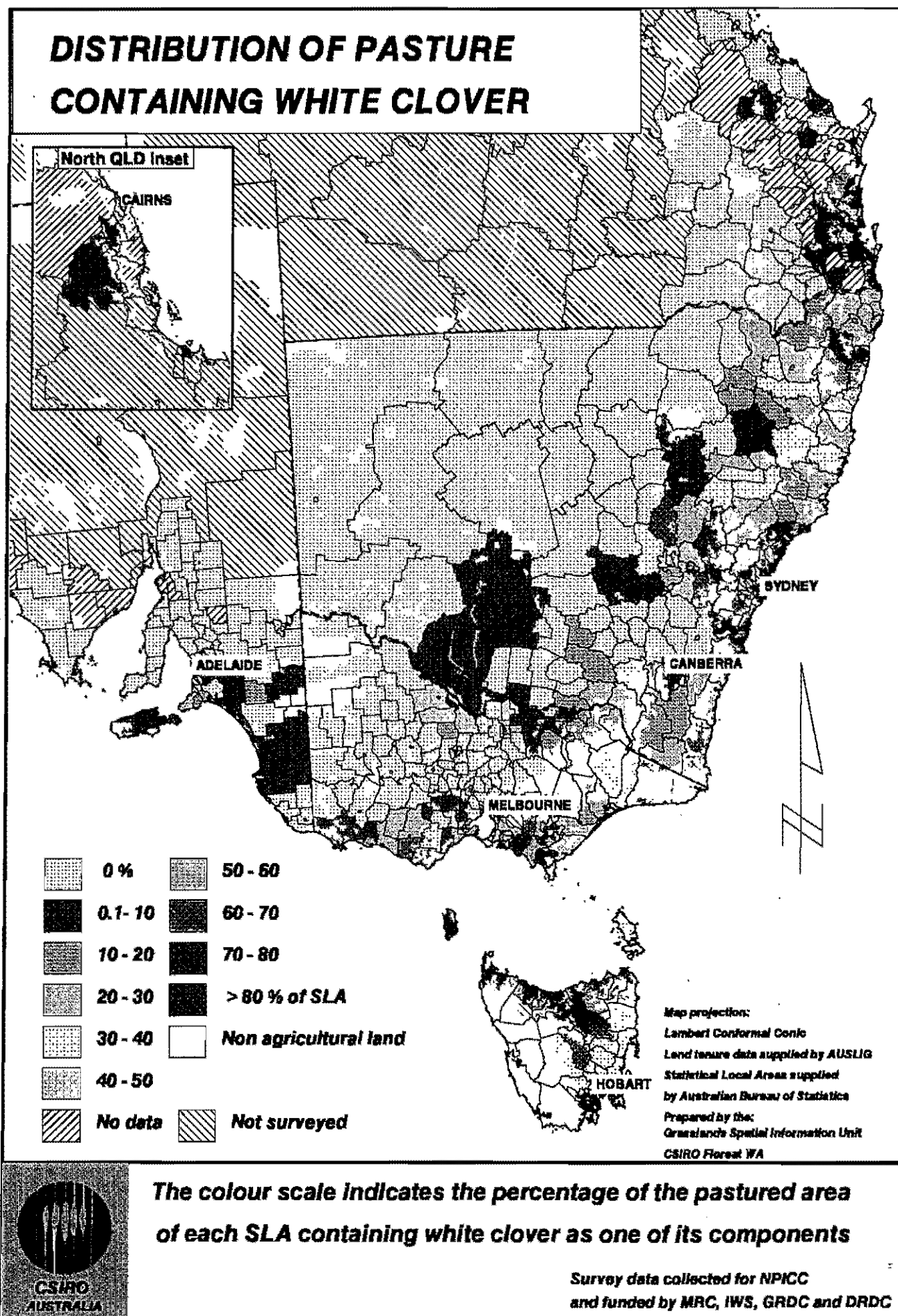
Map 9b. Distribution of pasture containing yellow serradella in Western Australia.

DISTRIBUTION OF PASTURE CONTAINING SERRADELLA



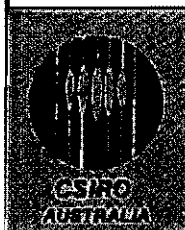
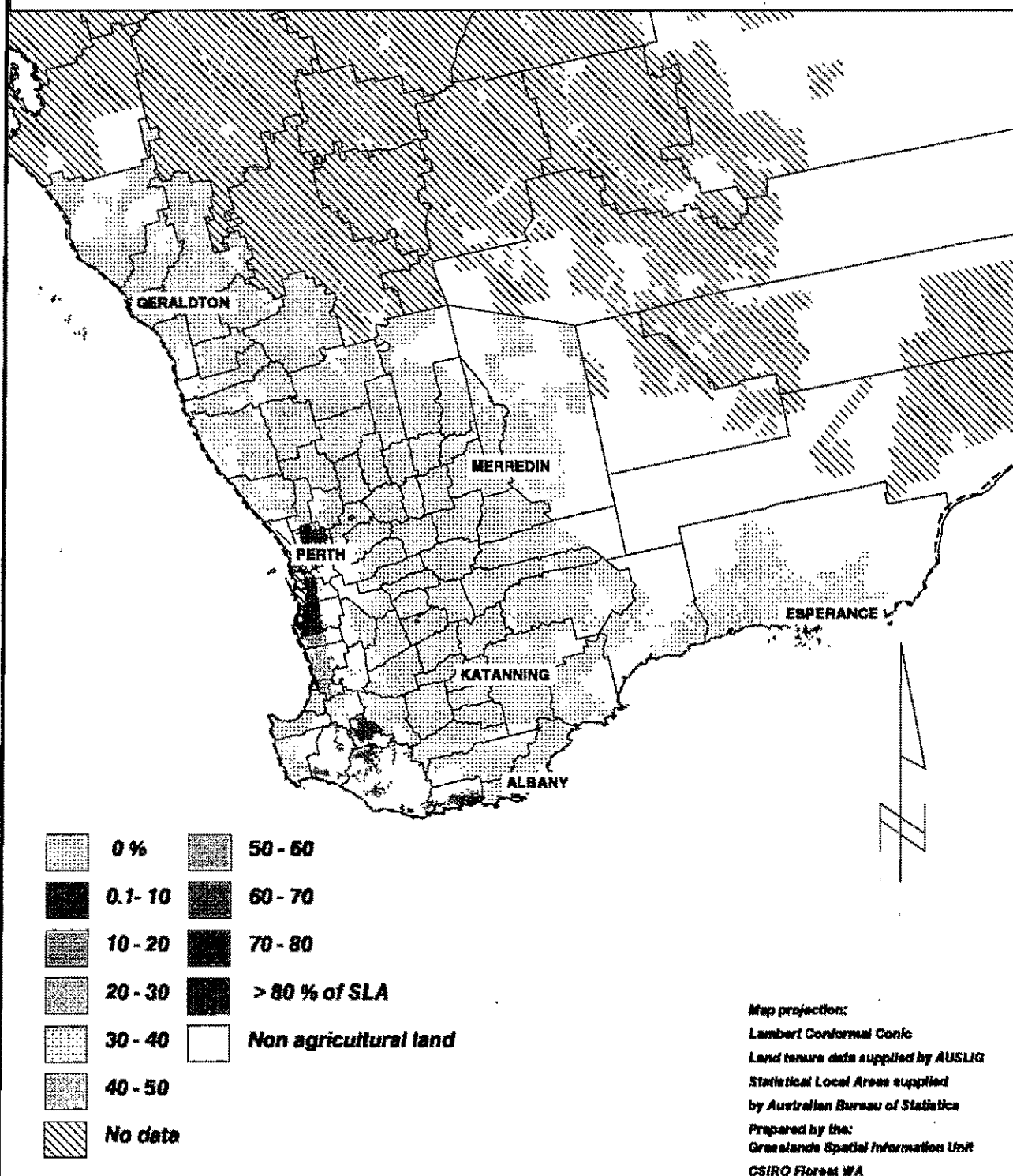
The colour scale indicates the percentage of the pastured area of each SLA containing serradella as one of its components

**Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC**



Map 10b. Distribution of pasture containing white clover in Western Australia.

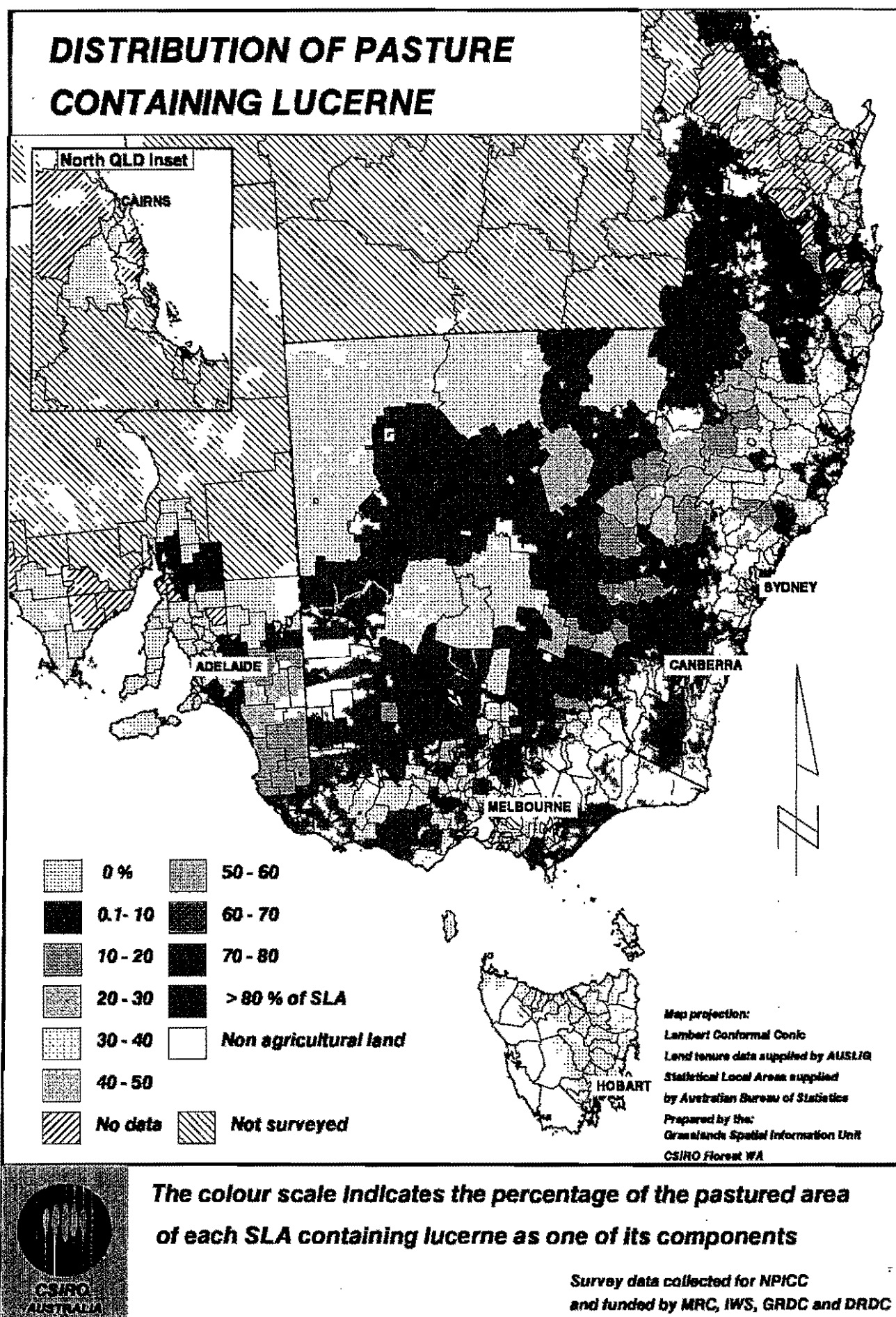
DISTRIBUTION OF PASTURE CONTAINING WHITE CLOVER



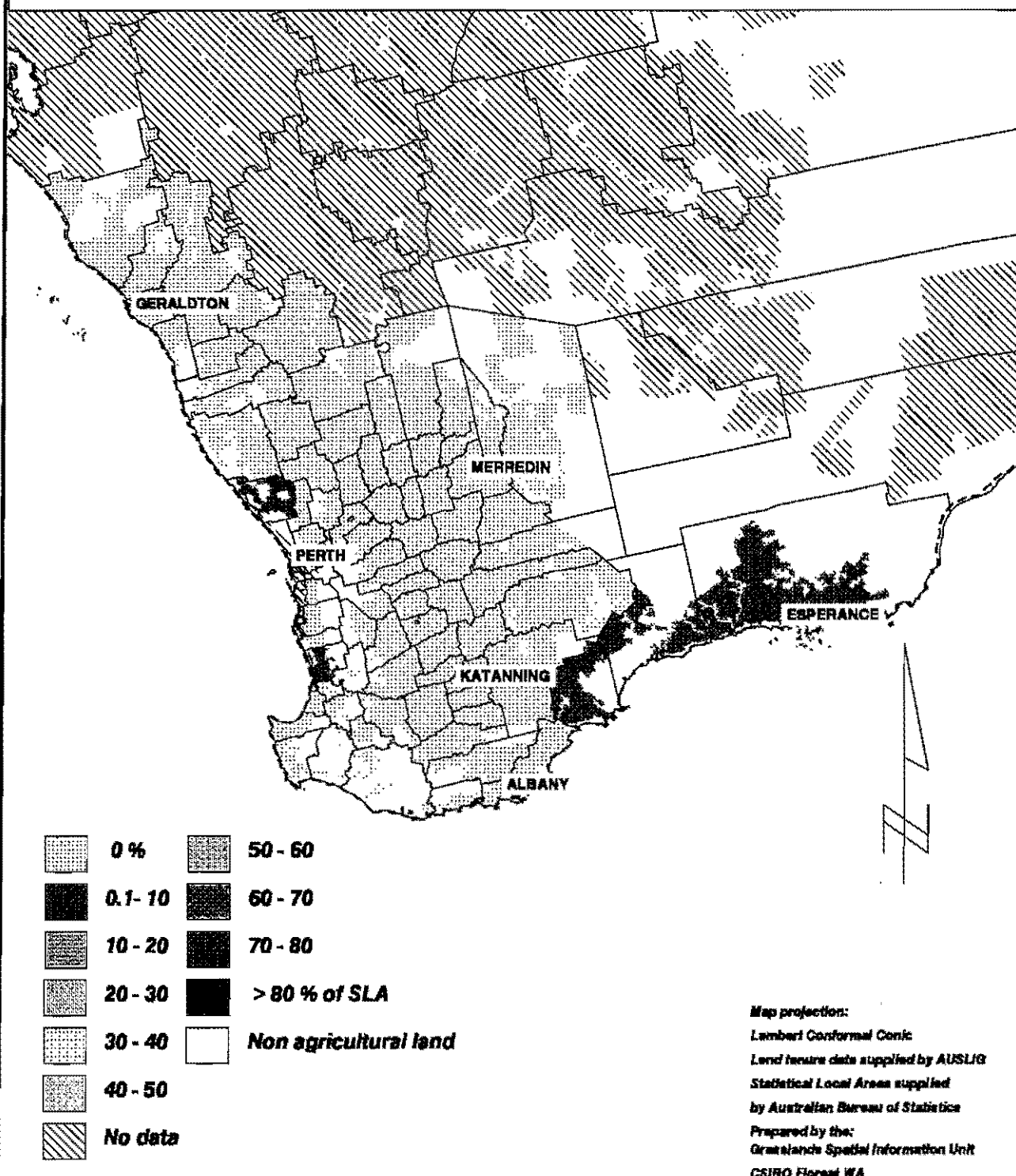
The colour scale indicates the percentage of the pastured area of each SLA containing white clover as one of its components

Survey data collected for NPICC and funded by MRC, IWS, GRDC and DRDC

Map 11a. Distribution of pasture containing lucerne in SE Australia.



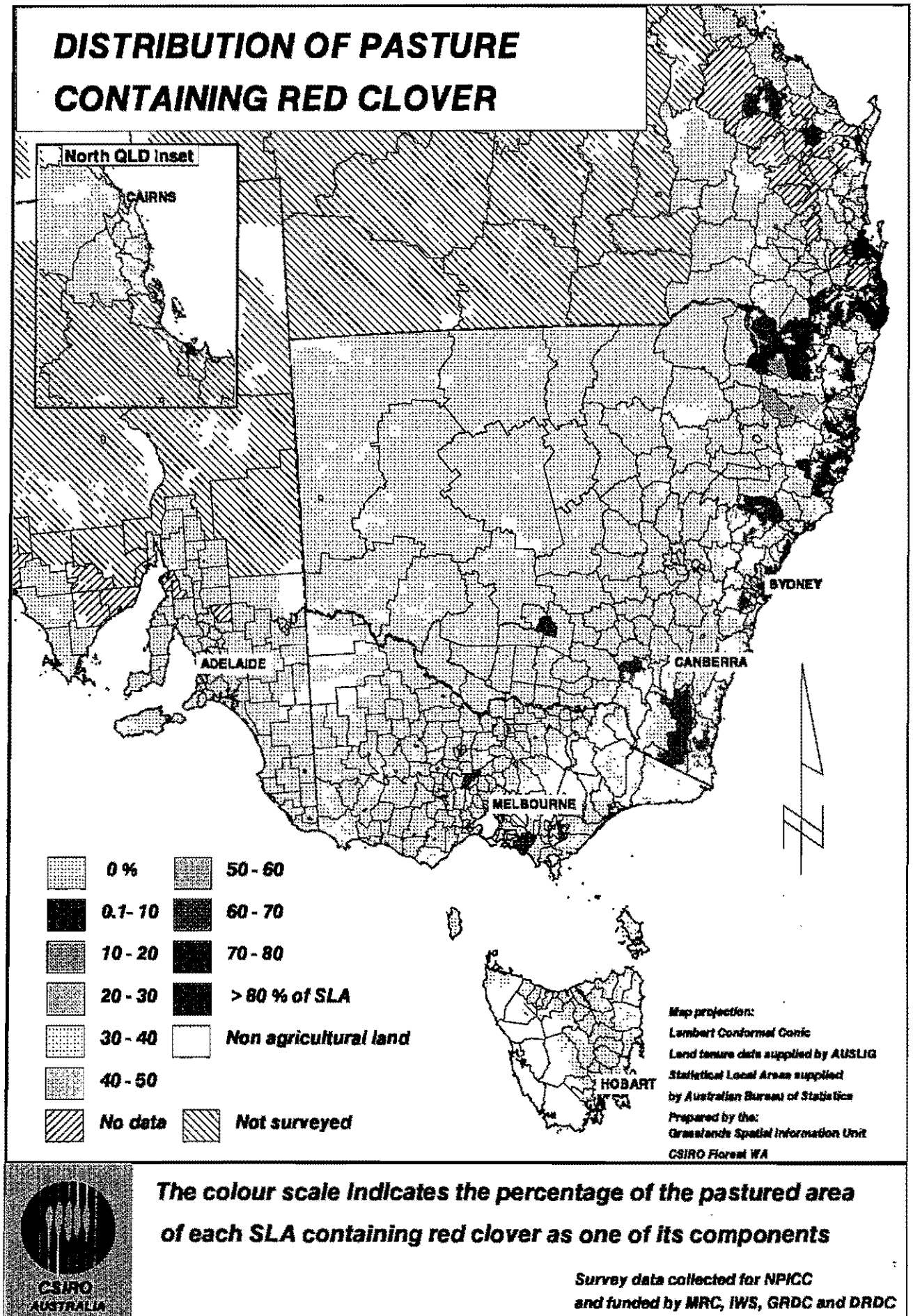
DISTRIBUTION OF PASTURE CONTAINING LUCERNE



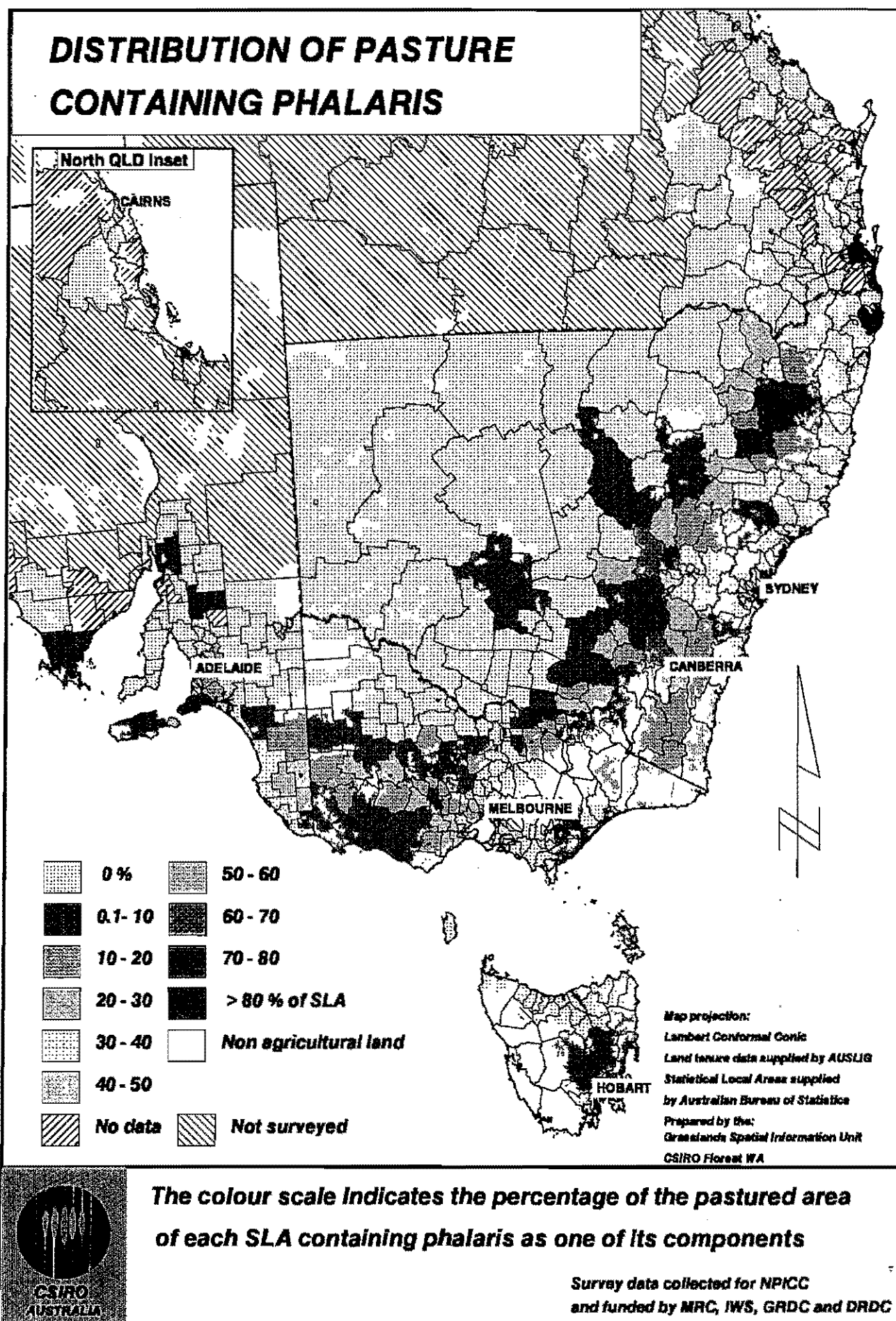
The colour scale indicates the percentage of the pastured area of each SLA containing lucerne as one of its components

Survey data collected for NPICC and funded by MRC, IWS, GRDC and DRDC

Map 12a. Distribution of pasture containing red clover in SE Australia.

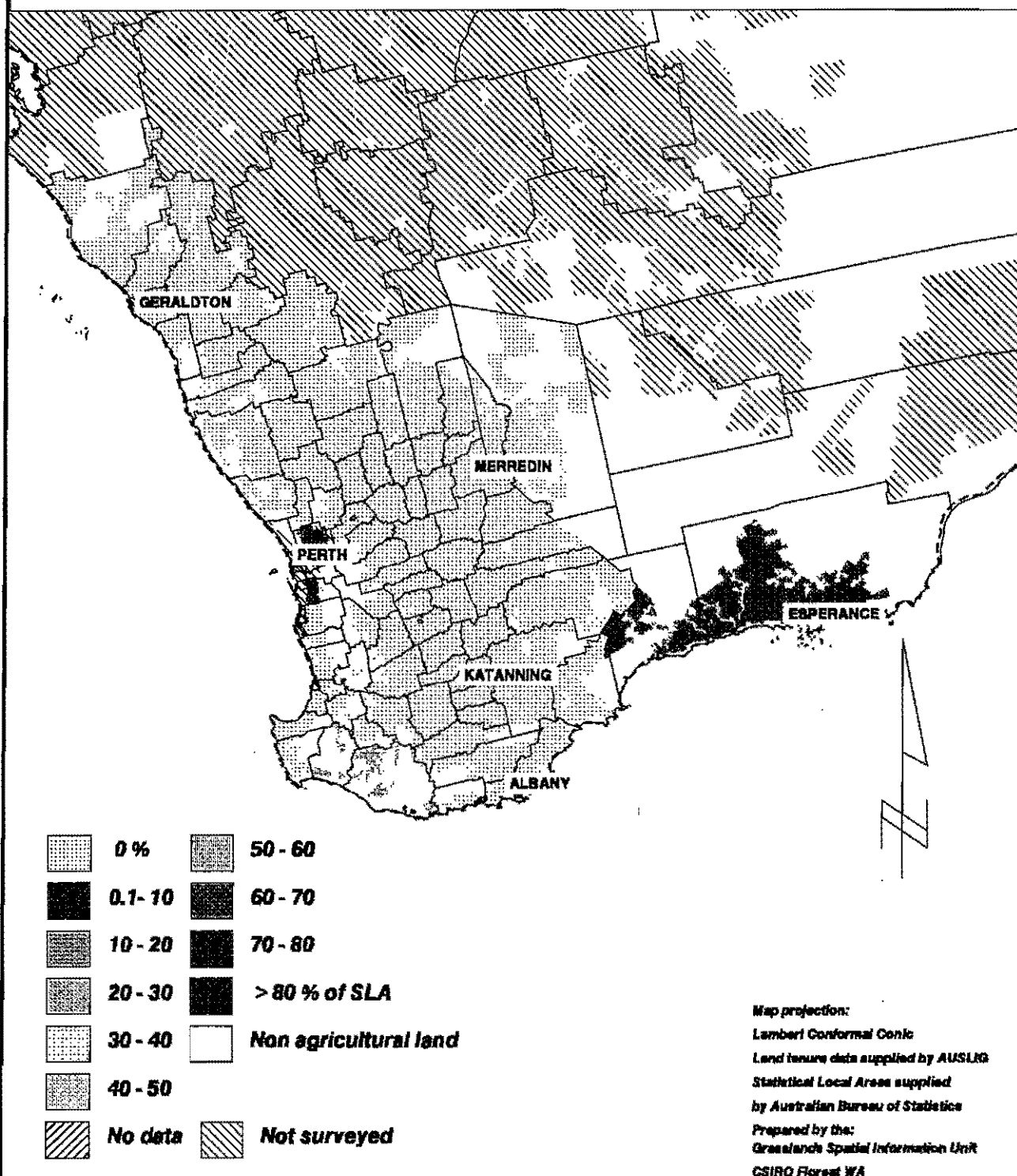


Map 13a. Distribution of pasture containing phalaris in SE Australia.



Map 13b. Distribution of pasture containing phalaris in Western Australia.

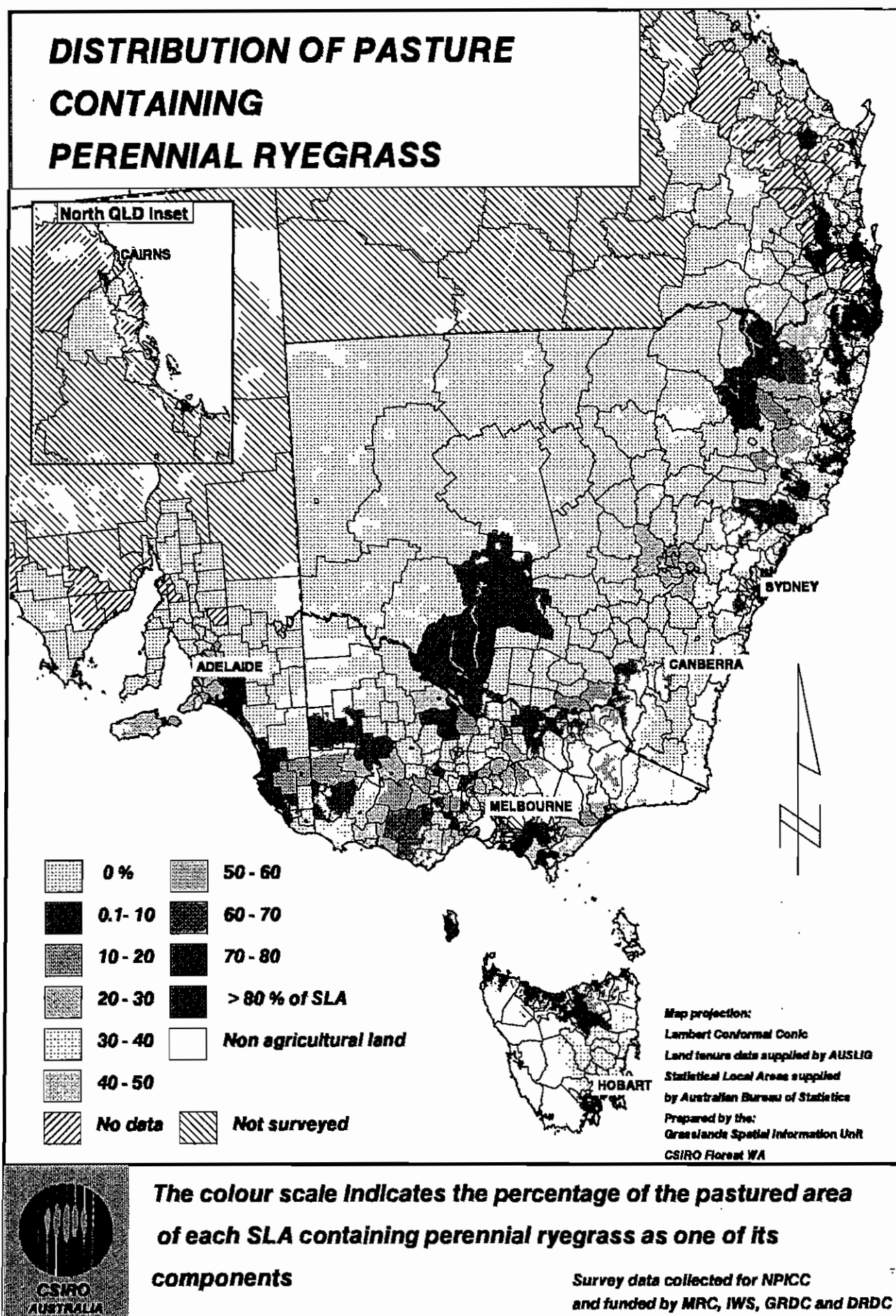
DISTRIBUTION OF PASTURE CONTAINING PHALARIS



The colour scale indicates the percentage of the pastured area of each SLA containing phalaris as one of its components

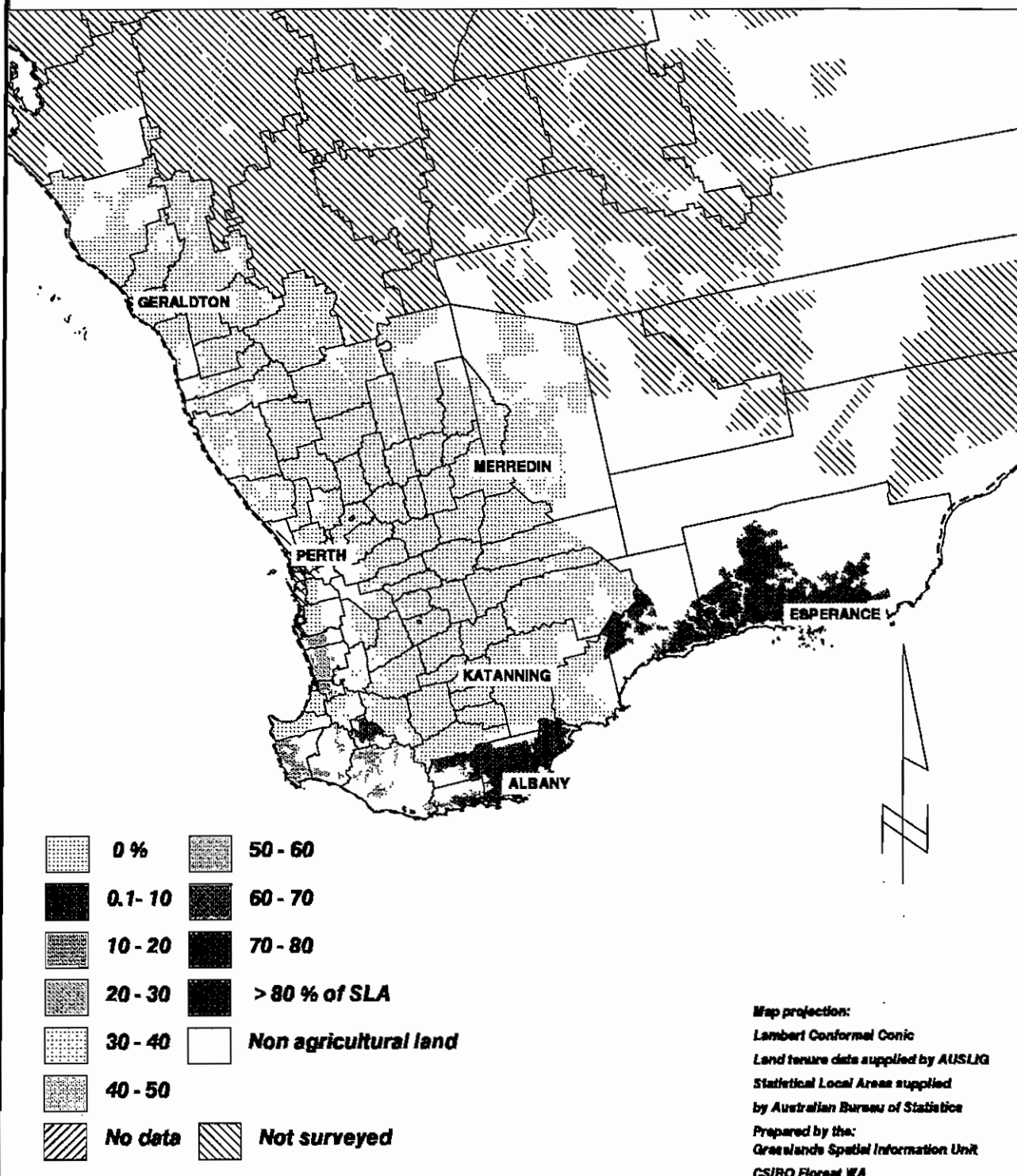
Survey data collected for NPICC
 and funded by MRC, IWS, GRDC and DRDC

Map 14a. Distribution of pasture containing perennial ryegrass in SE Australia.



Map 14b. Distribution of pasture containing perennial ryegrass in Western Australia.

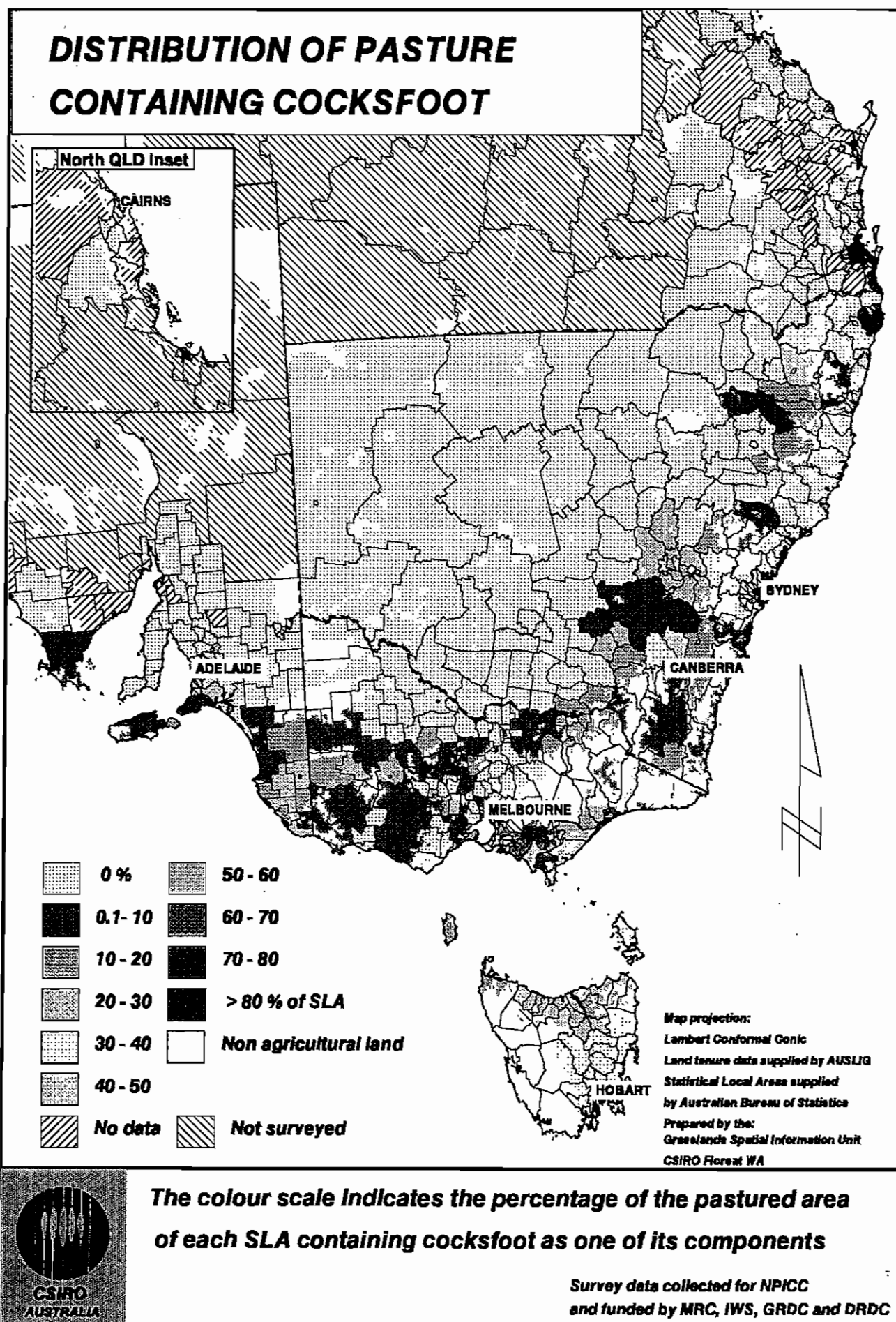
DISTRIBUTION OF PASTURE CONTAINING PERENNIAL RYEGRASS



The colour scale indicates the percentage of the pastured area of each SLA containing perennial ryegrass as one of its components

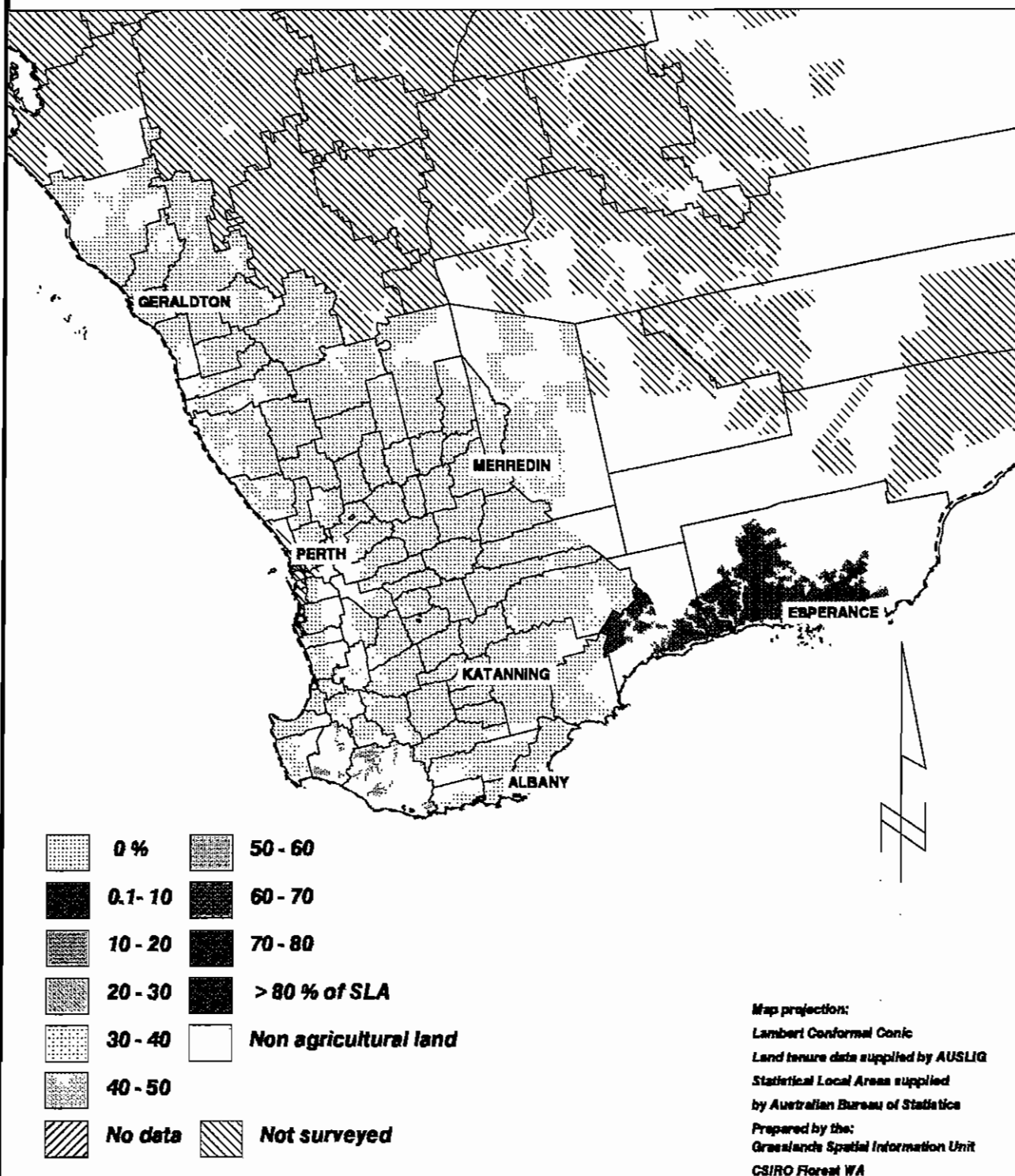
**Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC**

Map 15a. Distribution of pasture containing cocksfoot in SE Australia.



Map 15b. Distribution of pasture containing cocksfoot in Western Australia.

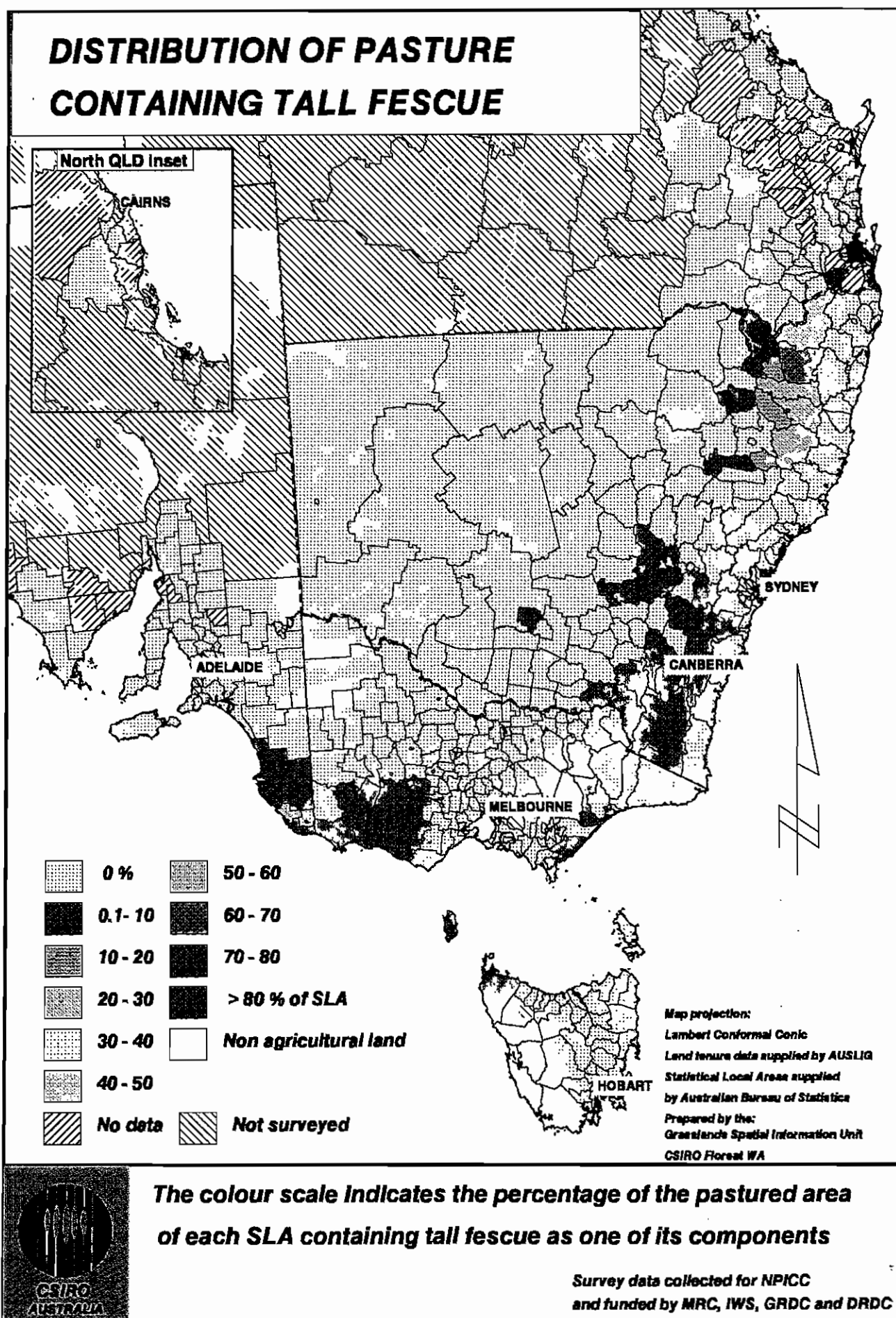
DISTRIBUTION OF PASTURE CONTAINING COCKSFOOT



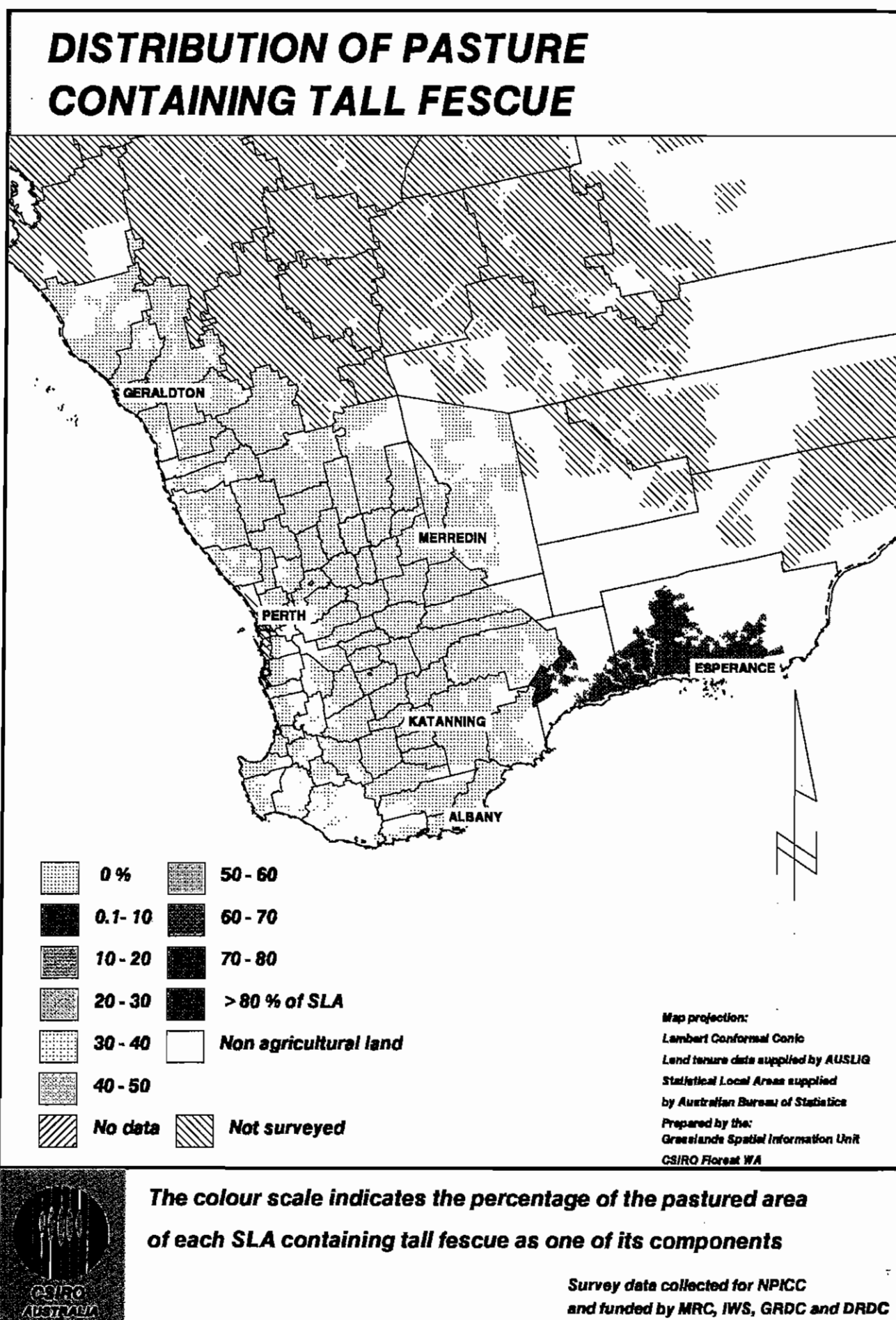
The colour scale indicates the percentage of the pastured area of each SLA containing cocksfoot as one of its components

Survey data collected for NPICC and funded by MRC, IWS, GRDC and DRDC

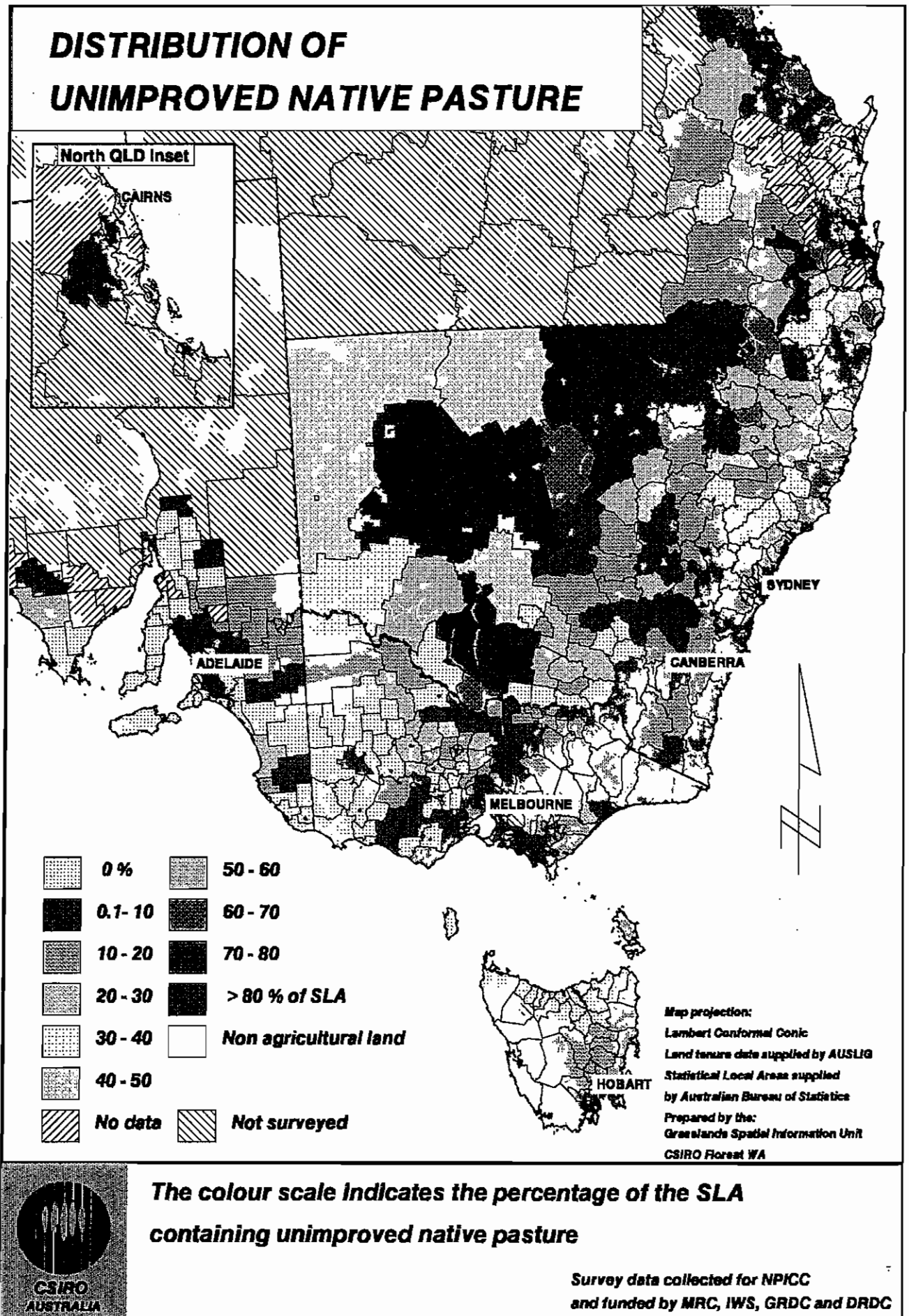
Map 16a. Distribution of pasture containing tall fescue in SE Australia.



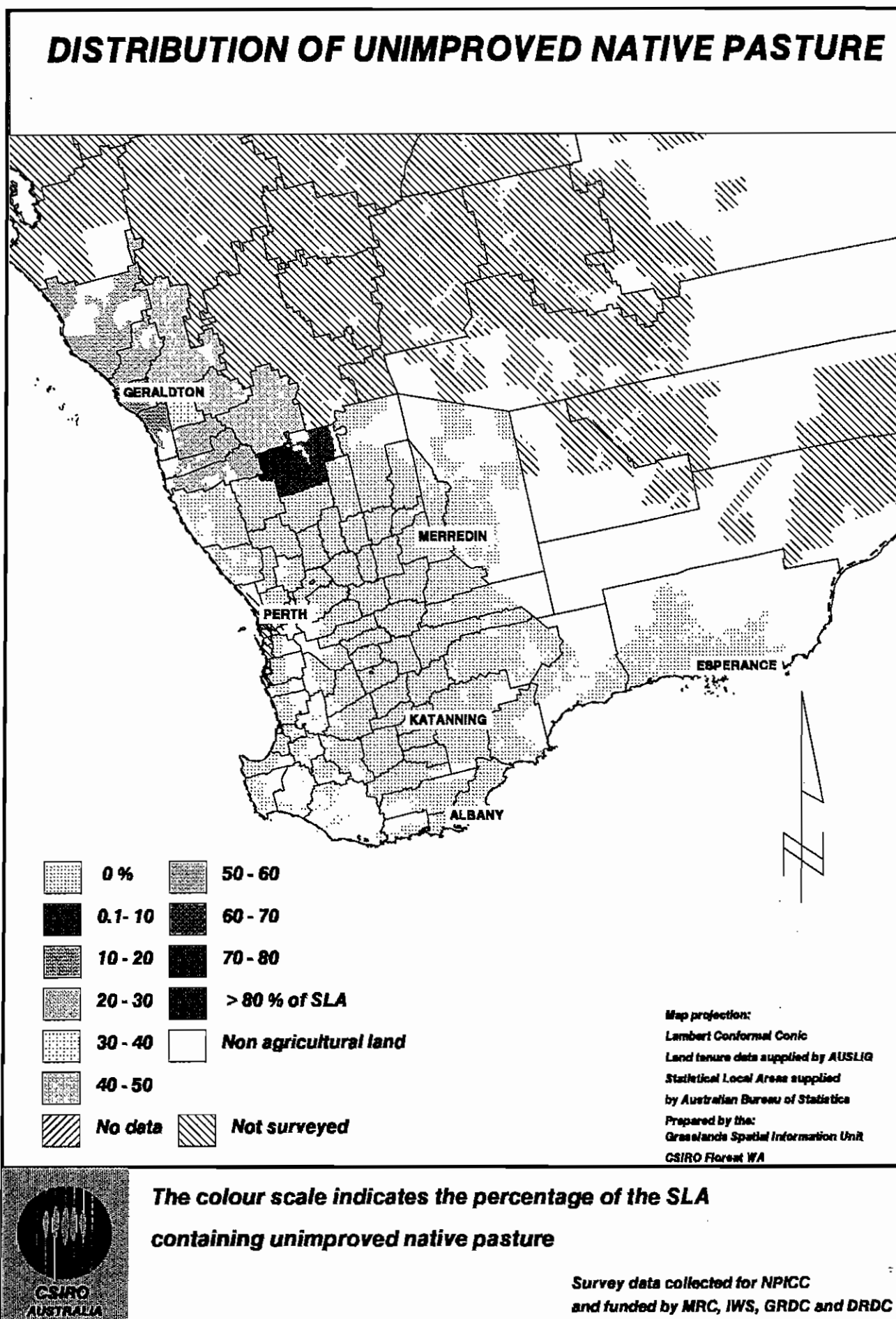
Map 16b. Distribution of pasture containing tall fescue in Western Australia.



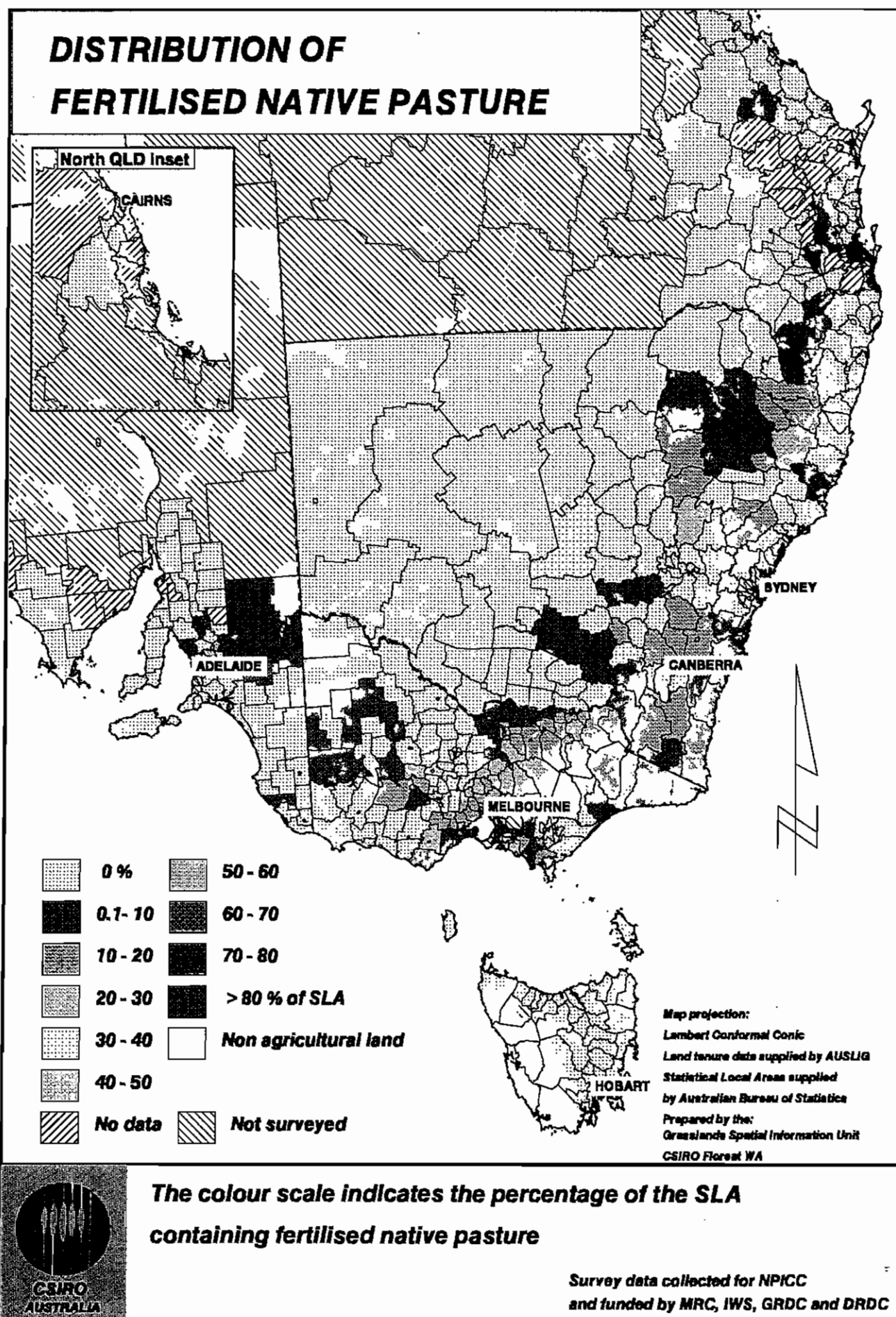
Map 17a. Distribution of unimproved native pasture in SE Australia.



Map 17b. Distribution of unimproved native pasture in Western Australia.

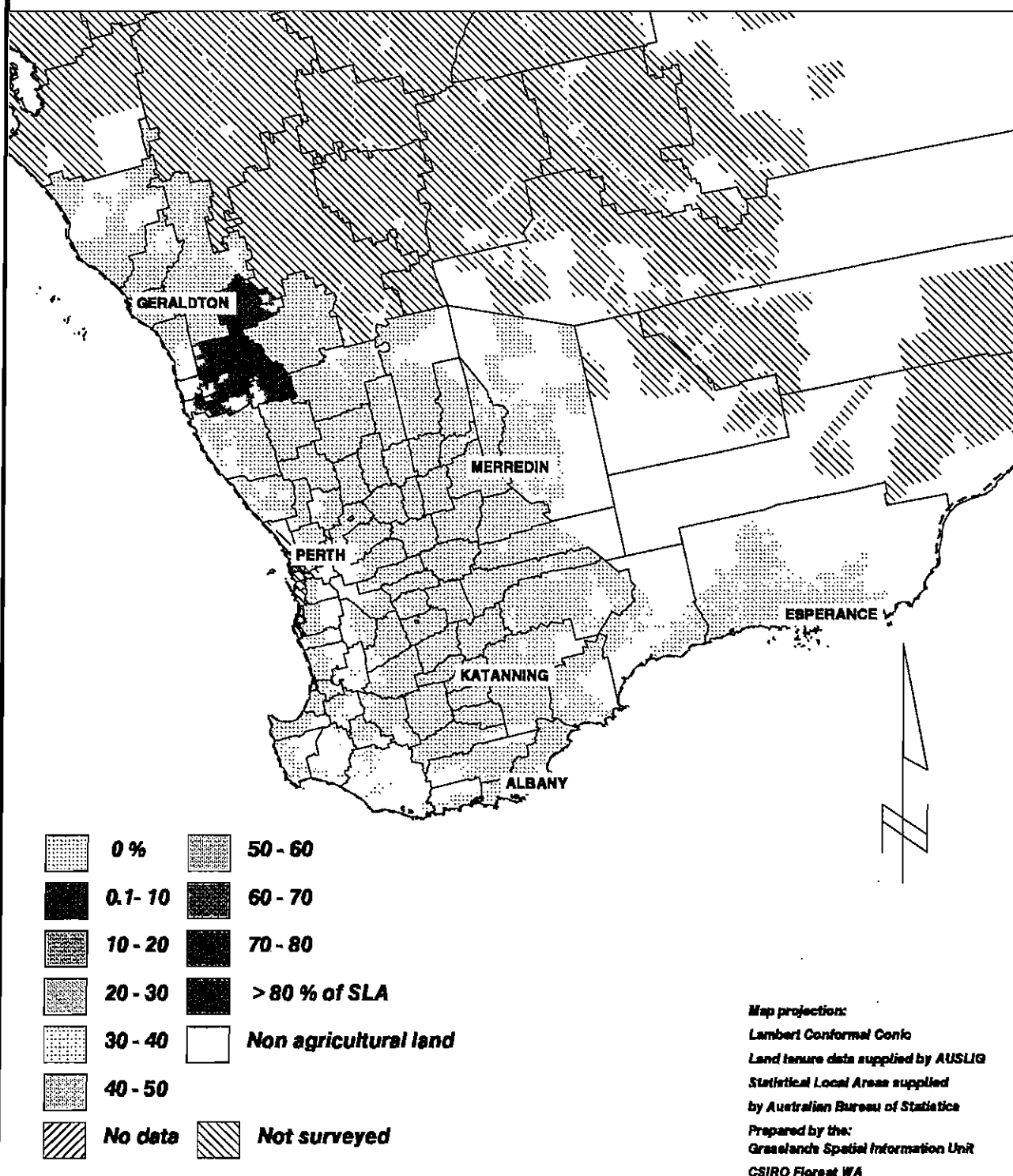


Map 18a. Distribution of fertilised native pasture in SE Australia.



Map 18b. Distribution of fertilised native pasture in Western Australia.

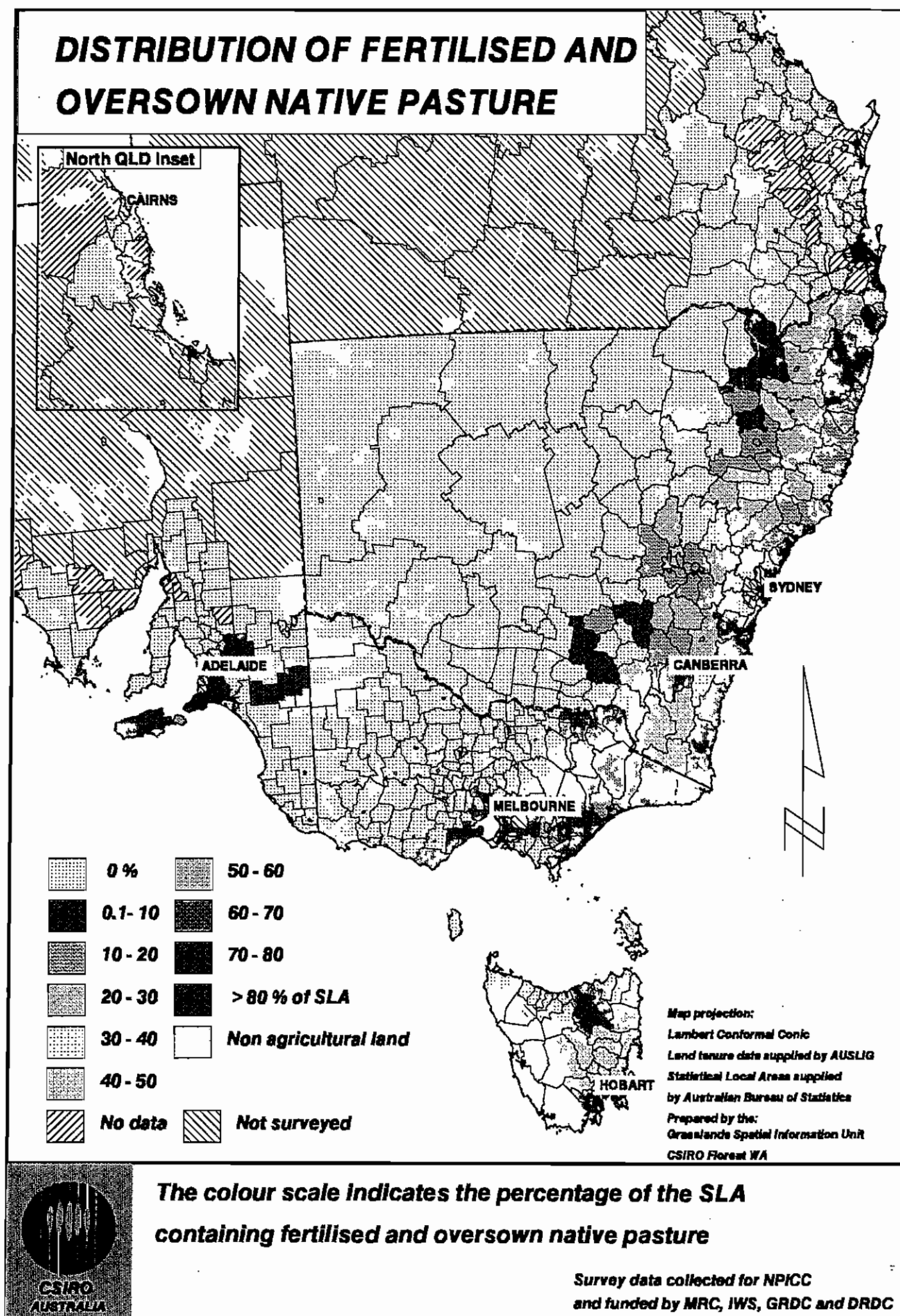
DISTRIBUTION OF FERTILISED NATIVE PASTURE



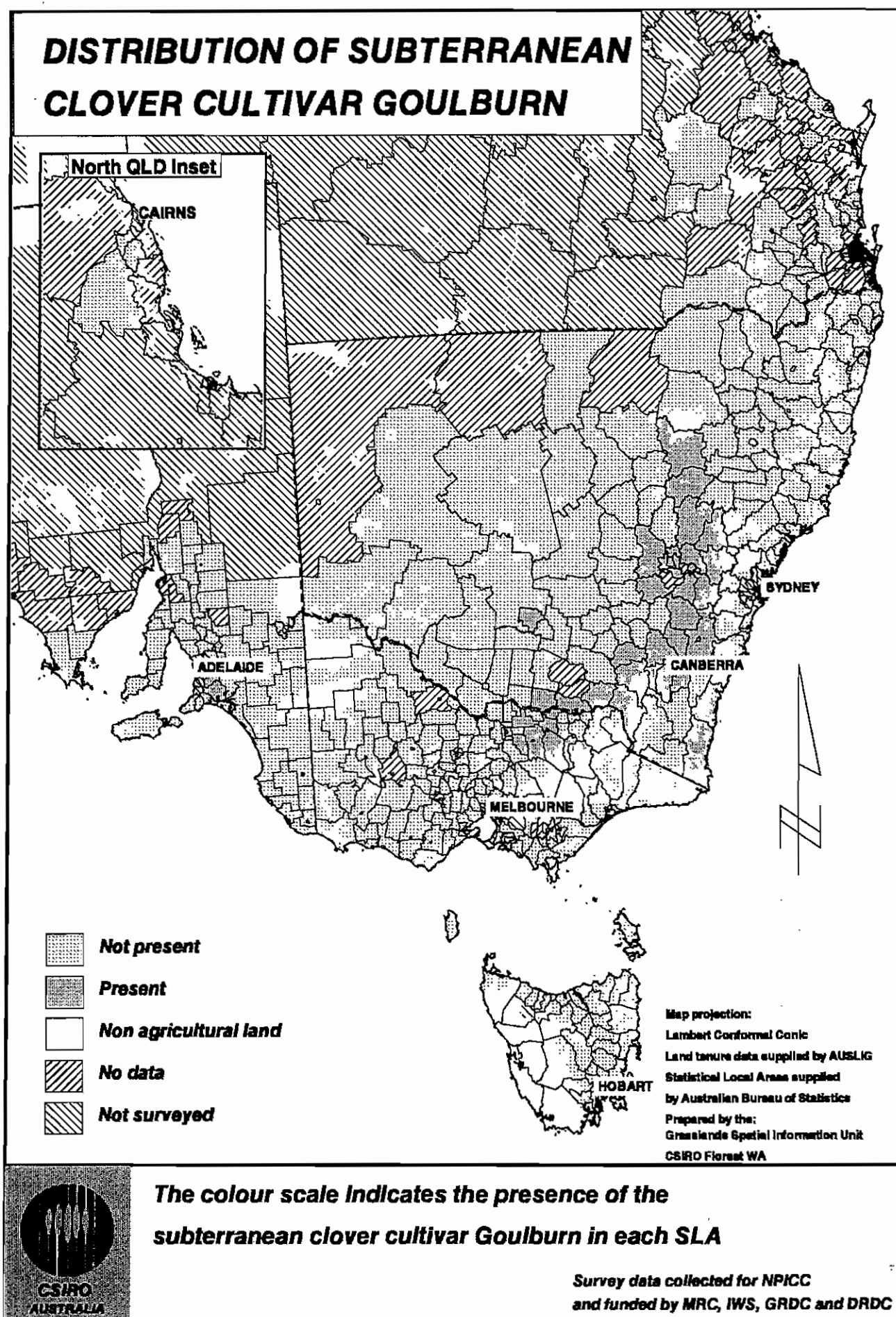
The colour scale indicates the percentage of the SLA containing fertilised native pasture

Survey data collected for NPICC and funded by MRC, IWS, GRDC and DRDC

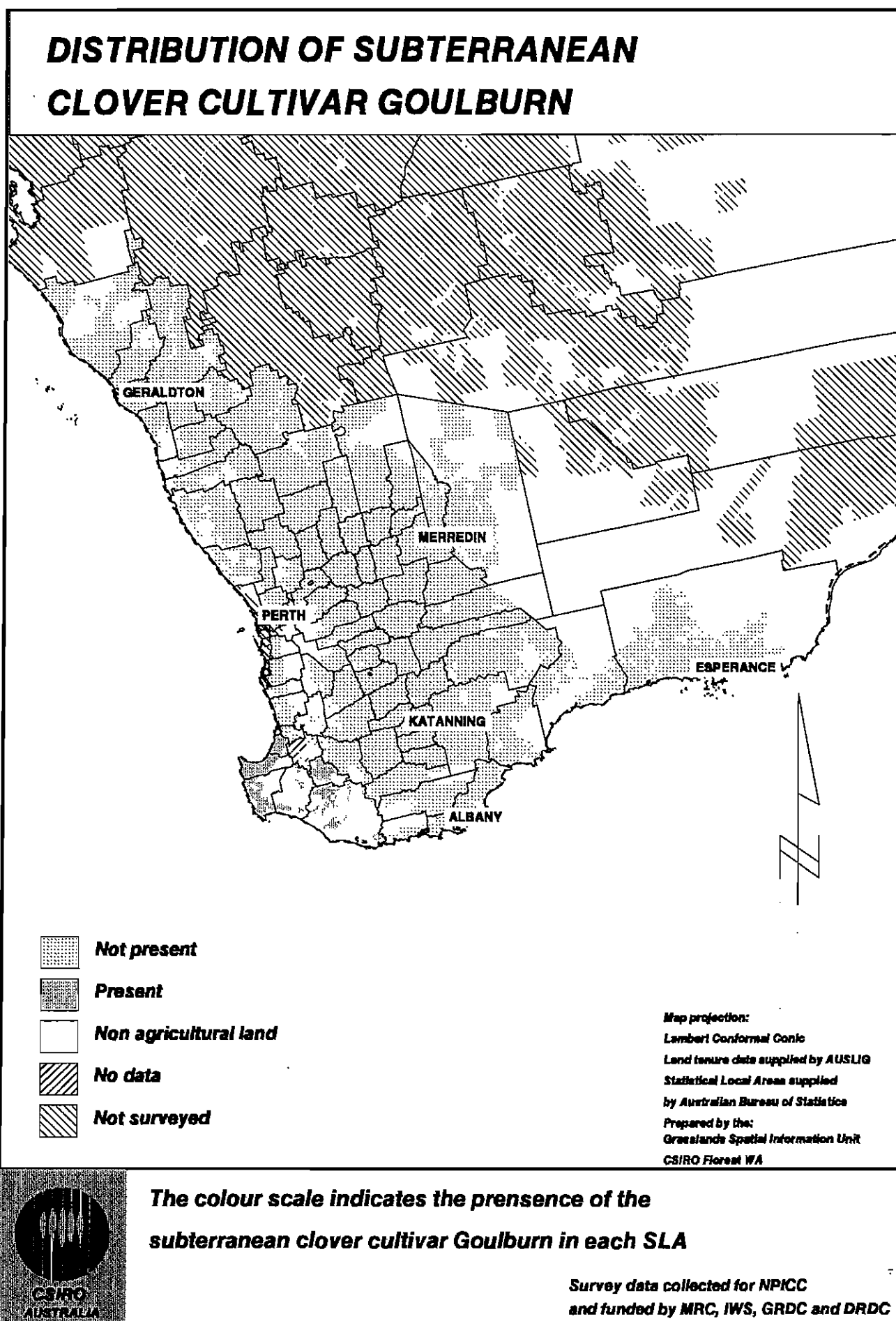
Map 19. Distribution of fertilised and oversown native pasture in SE Australia.

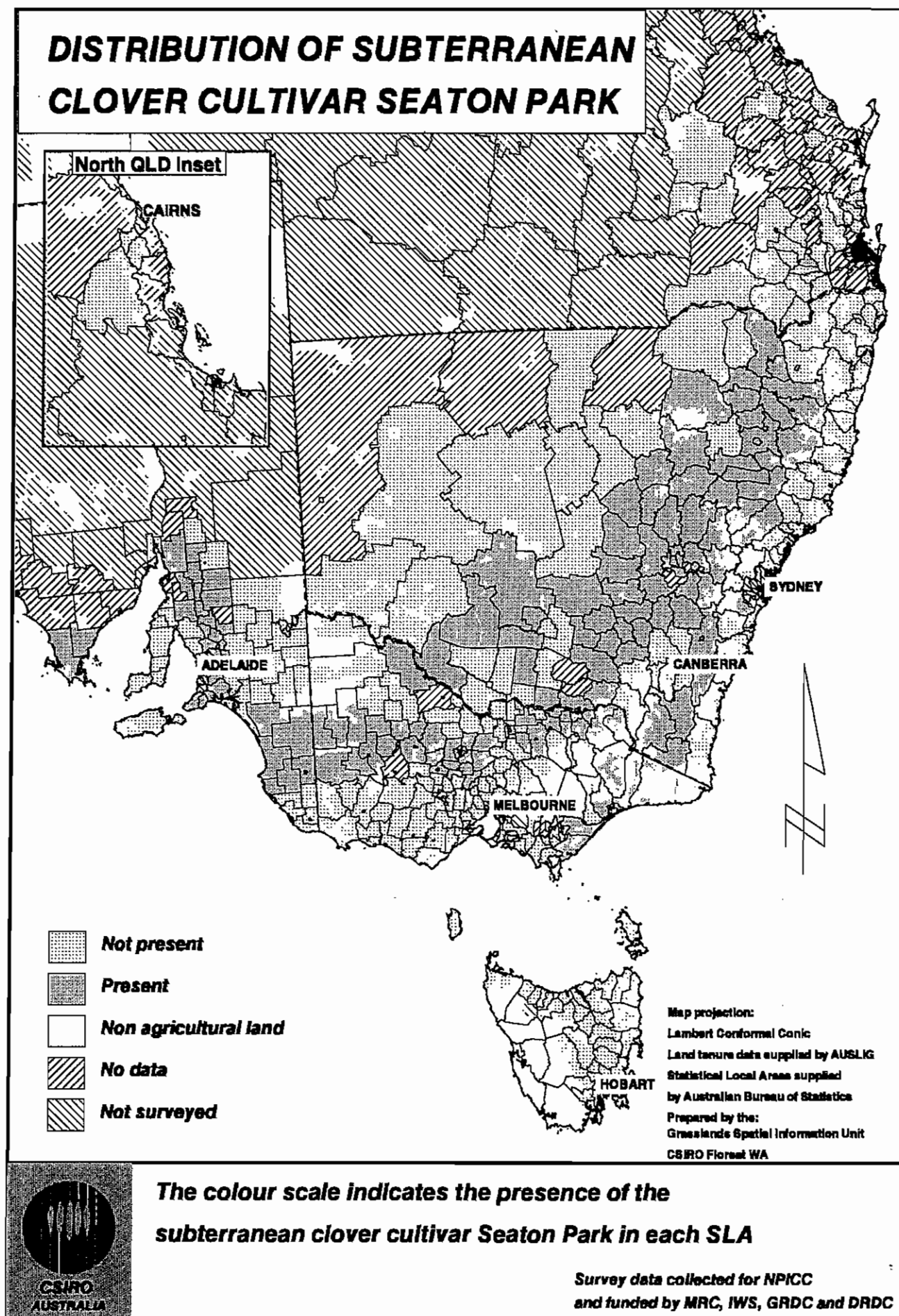


Map 20a. Distribution of subterranean clover cultivar Goulburn in SE Australia.

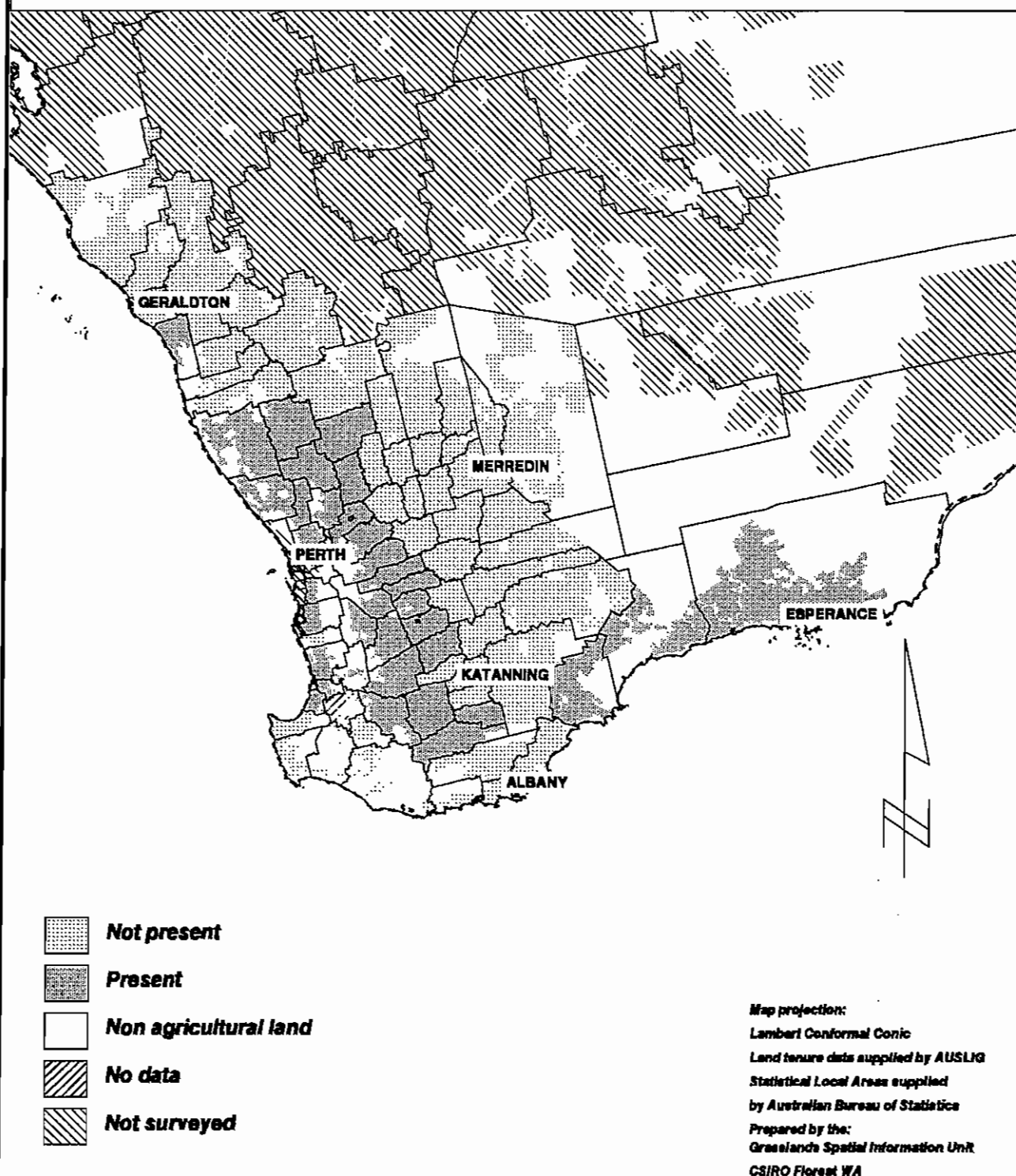


Map 20b. Distribution of subterranean clover cultivar Goulburn in Western Australia.





DISTRIBUTION OF SUBTERRANEAN CLOVER CULTIVAR SEATON PARK

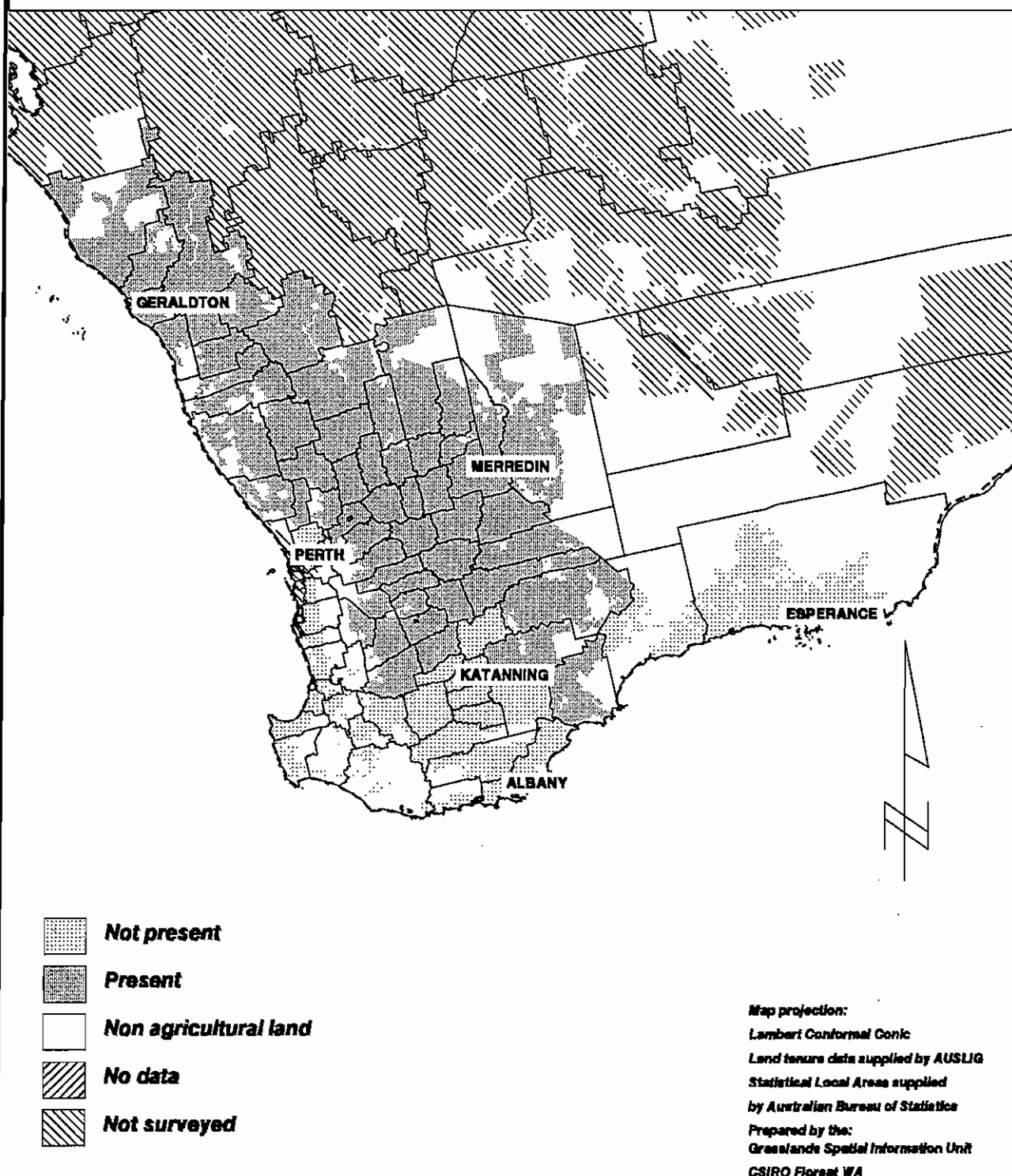


**The colour scale indicates the presence of the
subterranean clover cultivar Seaton Park in each SLA**

**Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC**

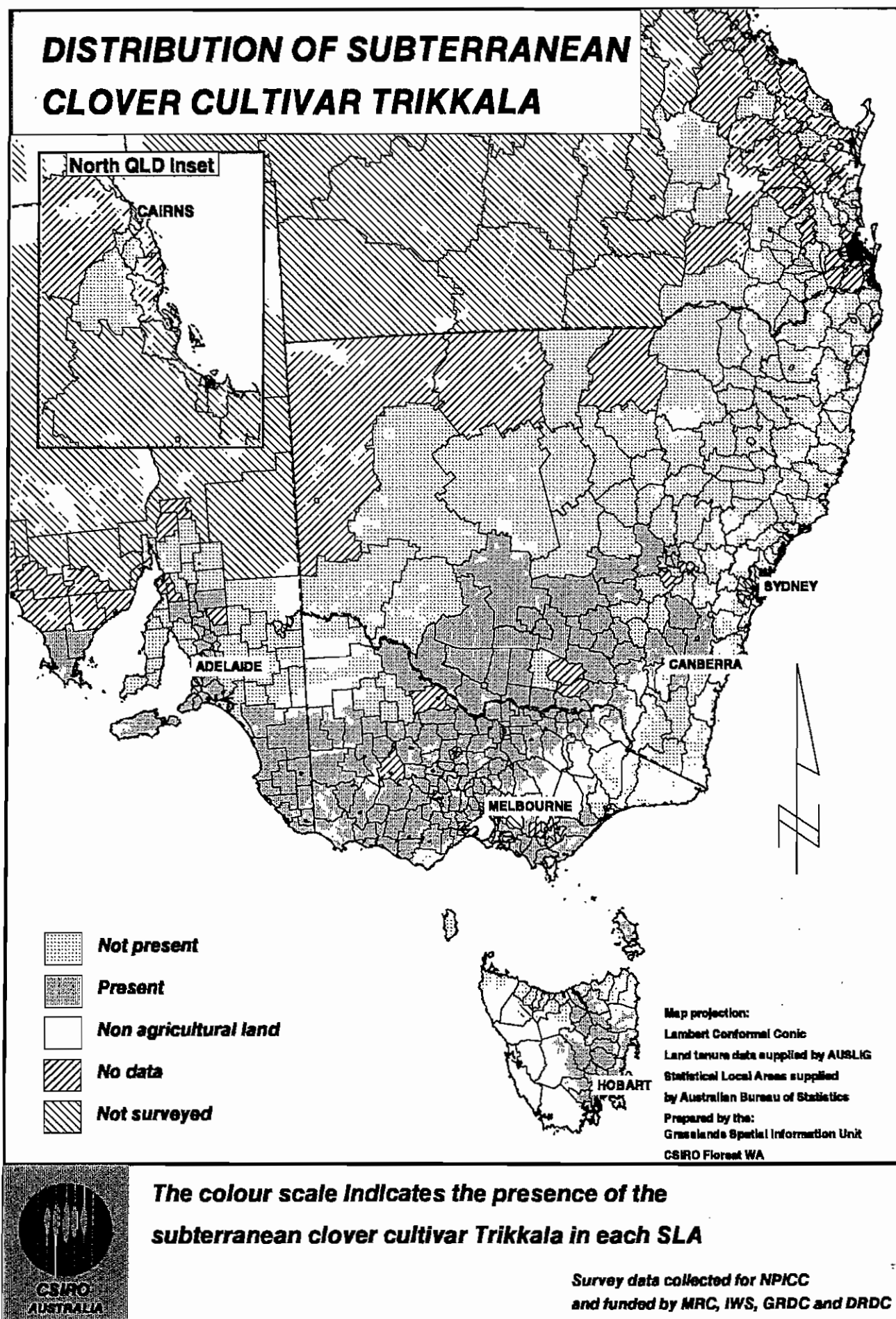
Map 22. Distribution of subterranean clover cultivar Geraldton in Western Australia.

DISTRIBUTION OF SUBTERRANEAN CLOVER CULTIVAR GERALDTON



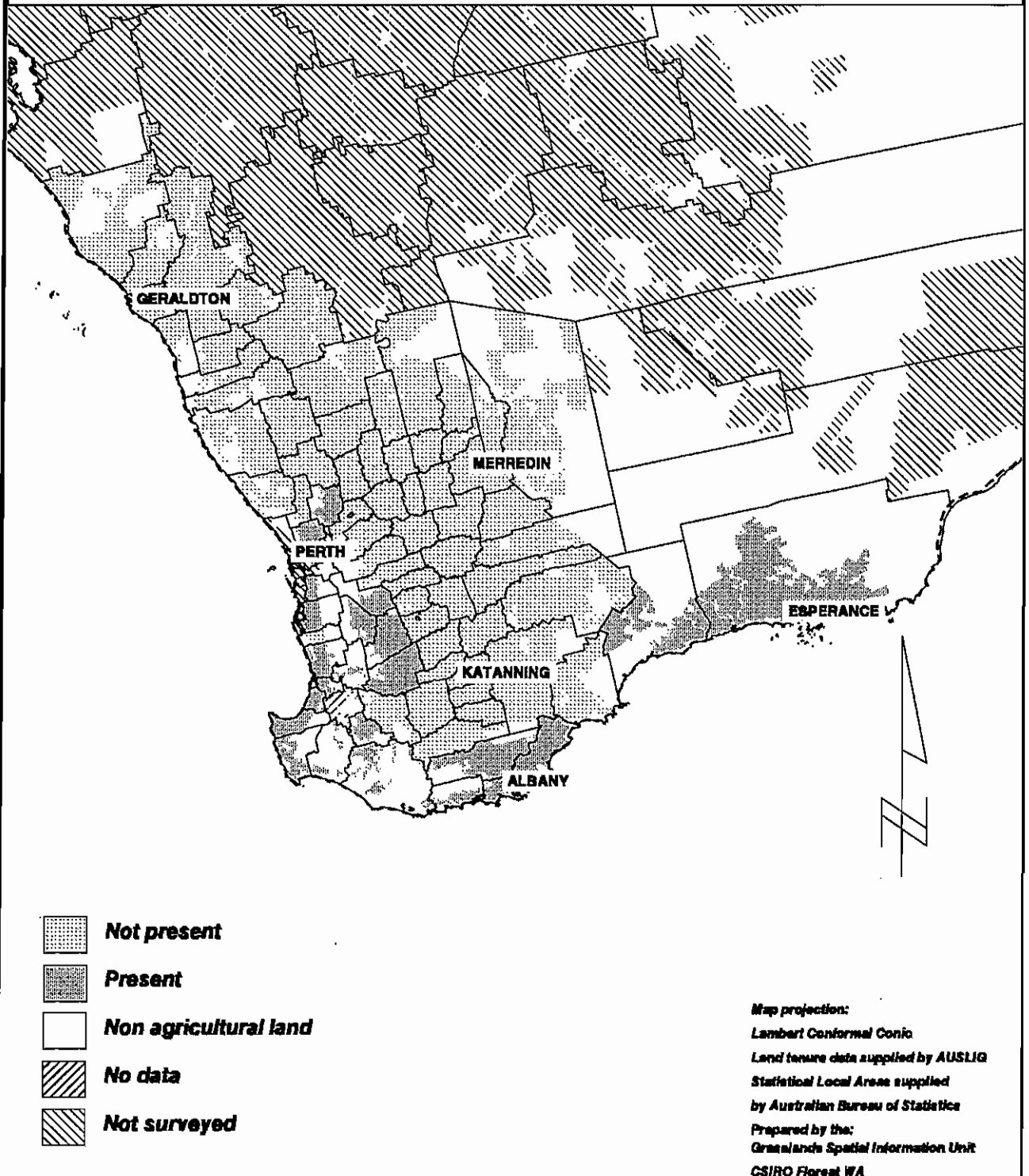
The colour scale indicates the presence of the subterranean clover cultivar Geraldton in each SLA

Survey data collected for NPICC and funded by MRC, IWS, GRDC and DRDC



Map 23b. Distribution of subterranean clover cultivar Trikkala in Western Australia.

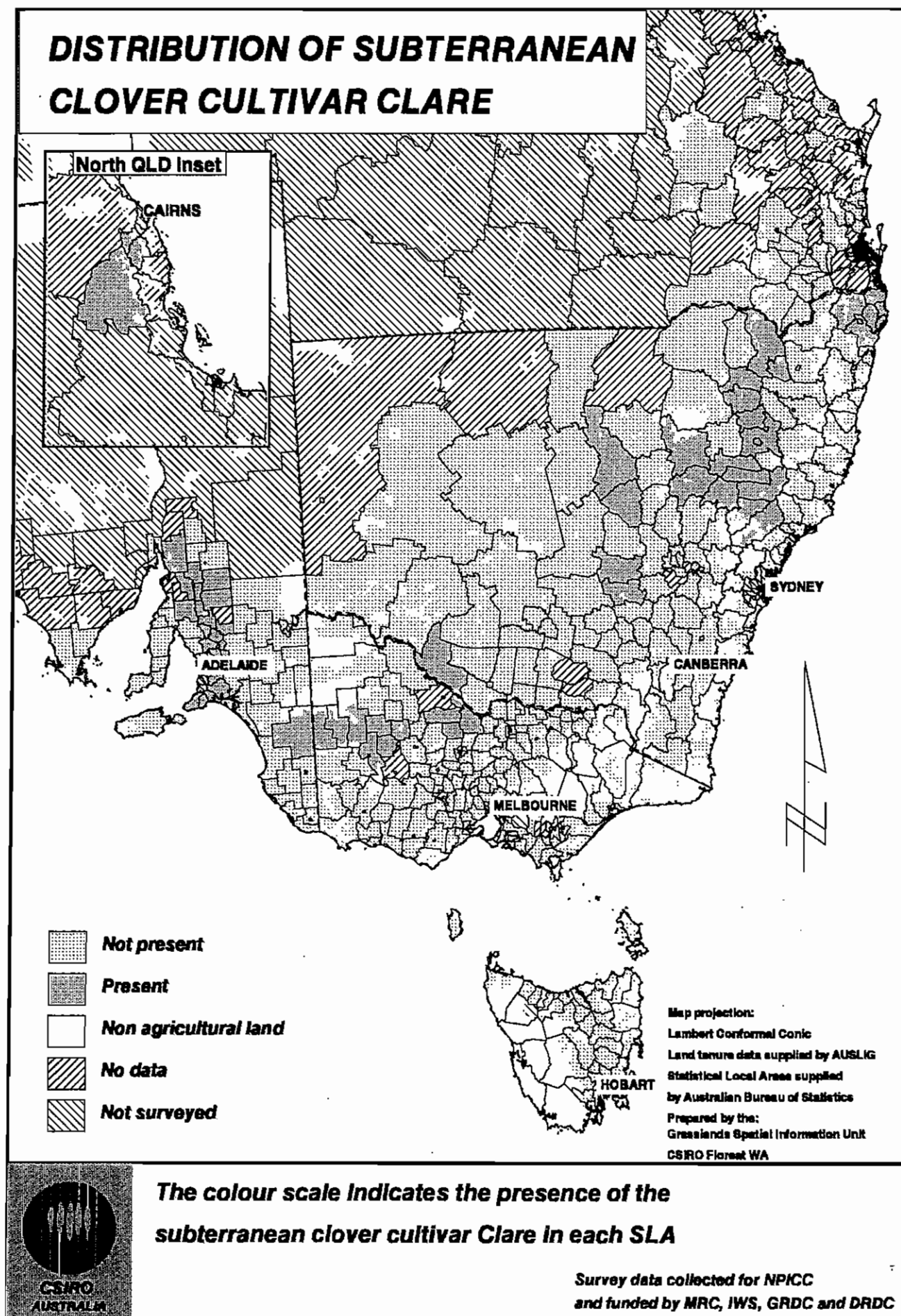
DISTRIBUTION OF SUBTERRANEAN CLOVER CULTIVAR TRIKKALA



The colour scale indicates the presence of the subterranean clover cultivar trikkala in each SLA

Survey data collected for NPICC and funded by MRC, IWS, GRDC and DRDC

Map 24. Distribution of subterranean clover cultivar Clare in SE Australia.



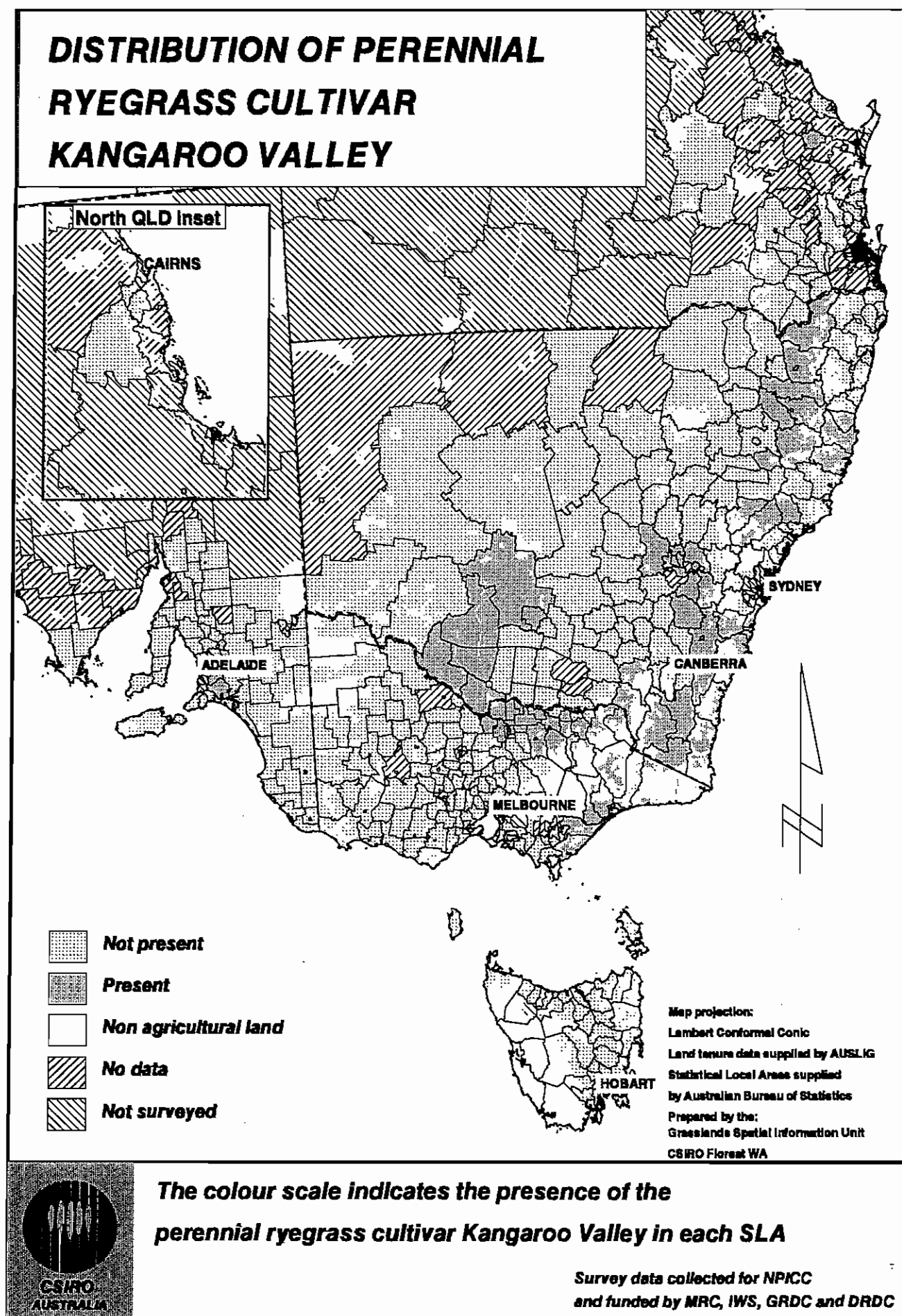


Figure 26a. Mean subterranean clover content of pastures in SE Australia.

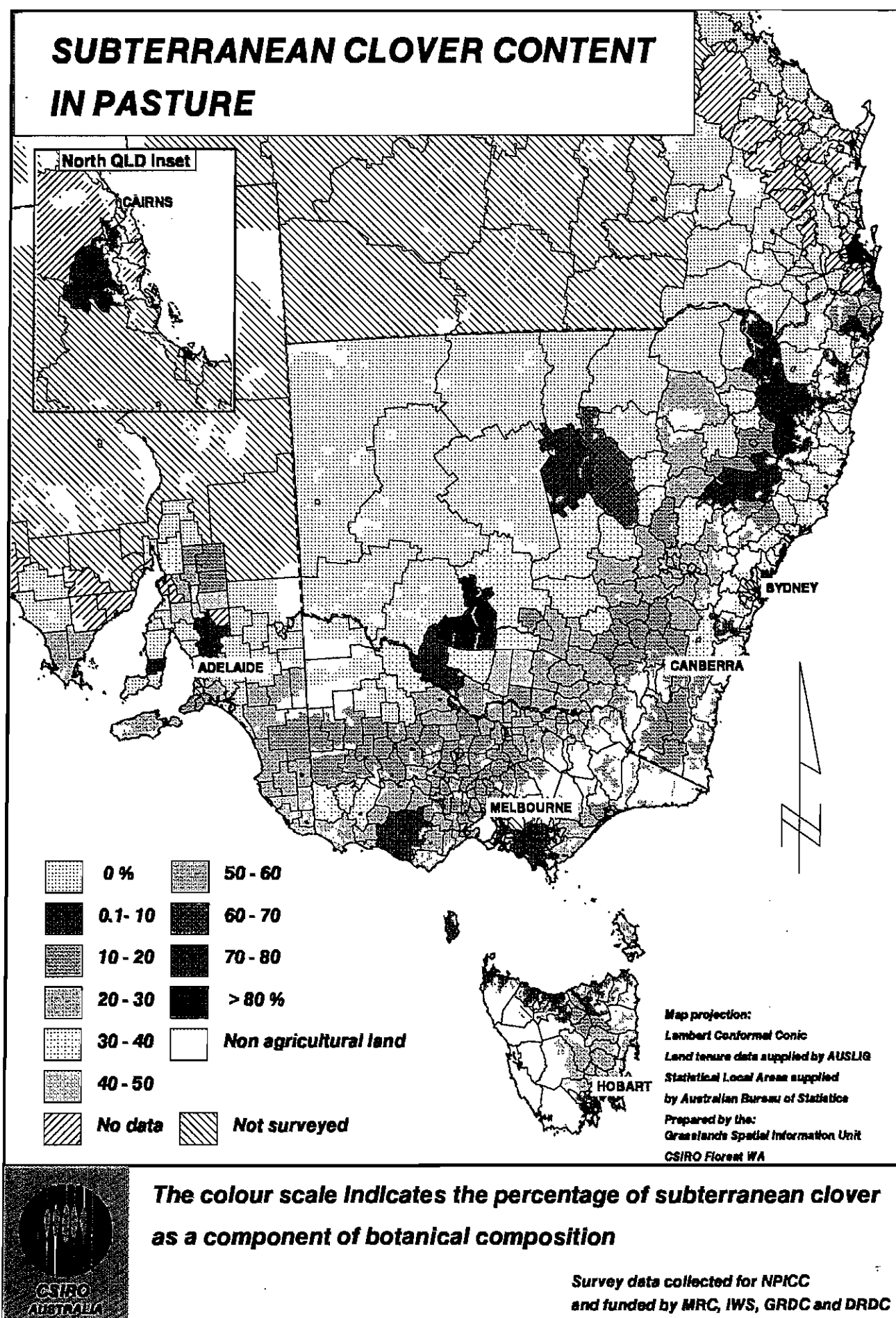
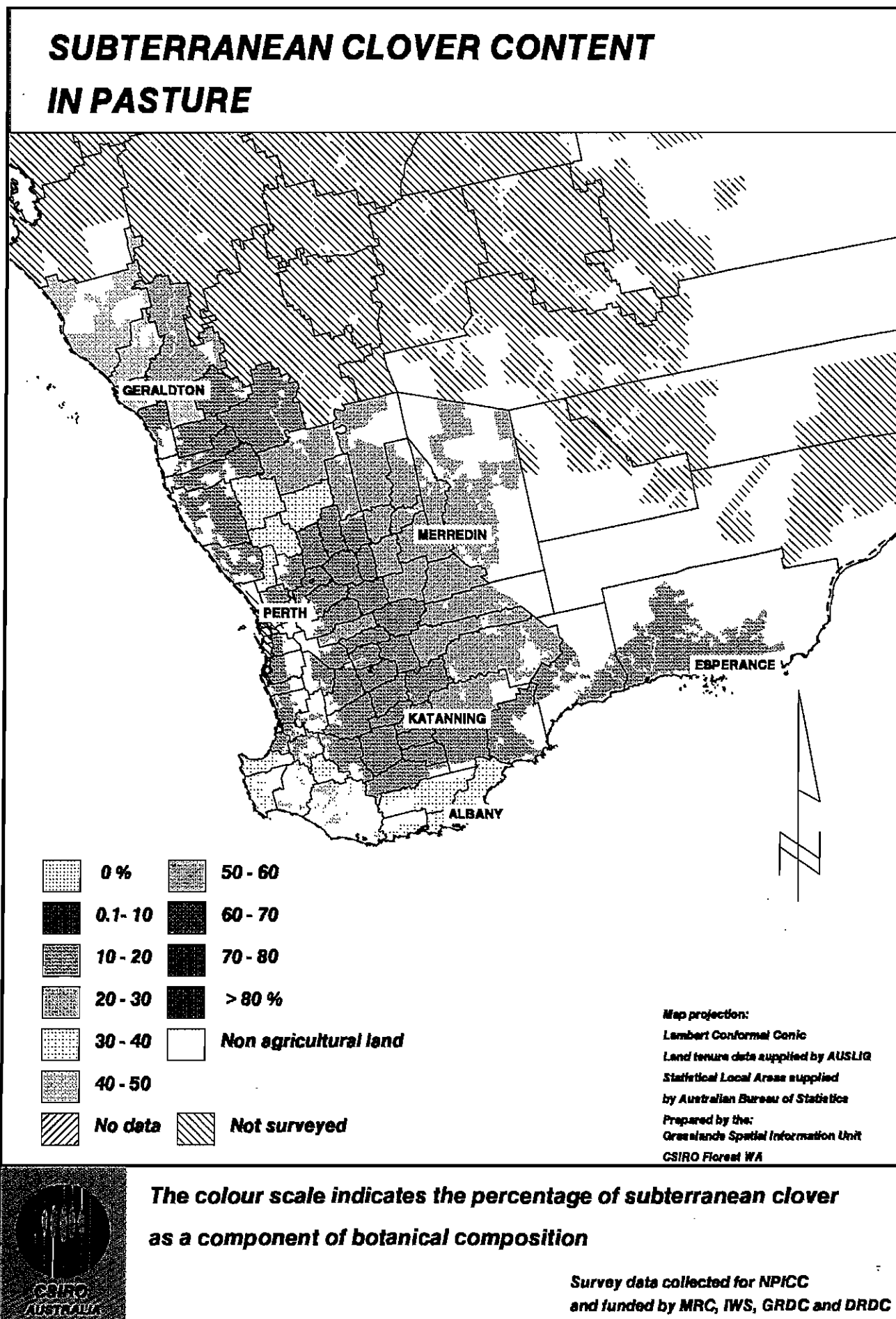


Figure 26b. Mean subterranean clover content of pastures in Western Australia.



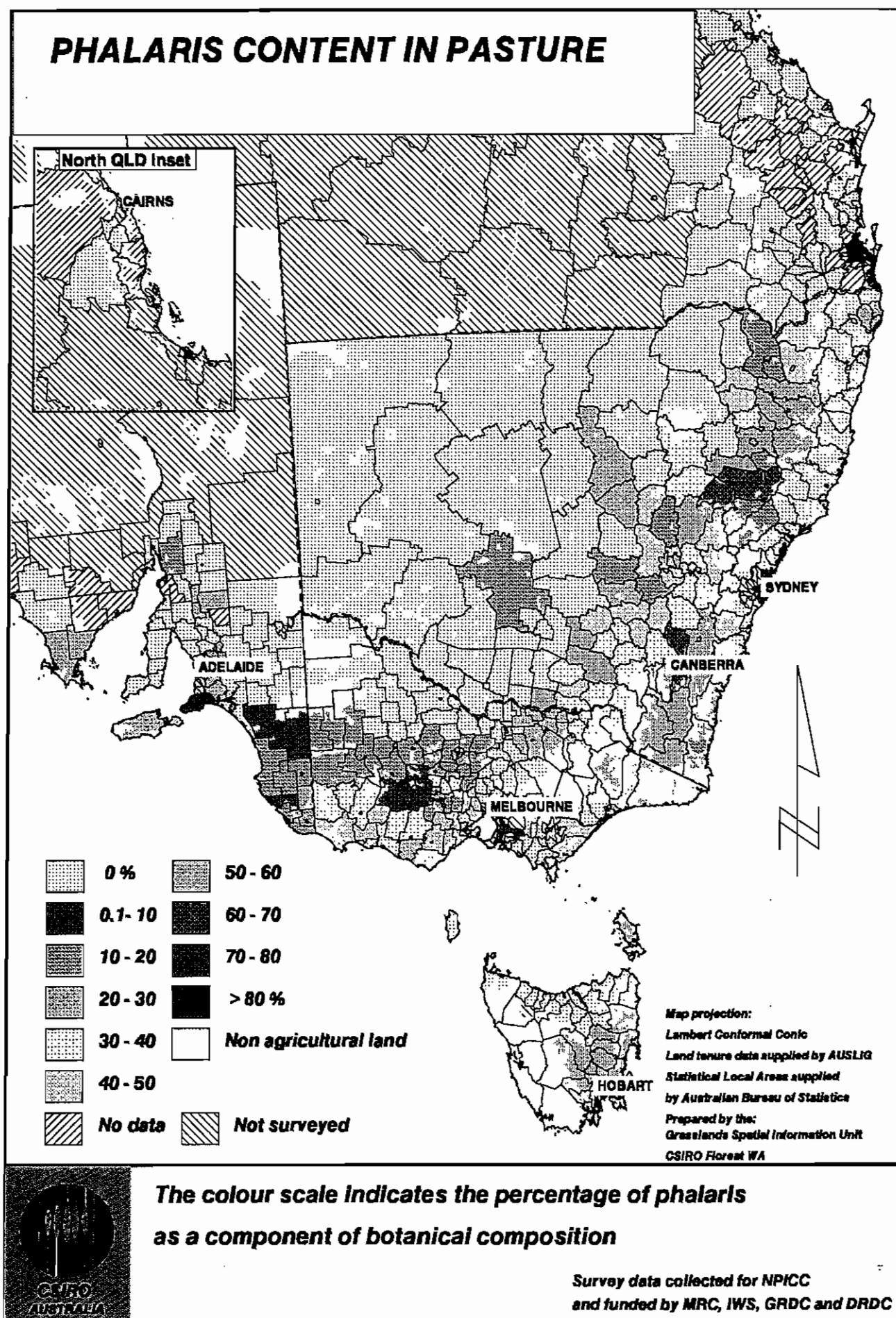


Figure 28. Mean clover content of temperate perennial grass-based pastures in SE Australia.

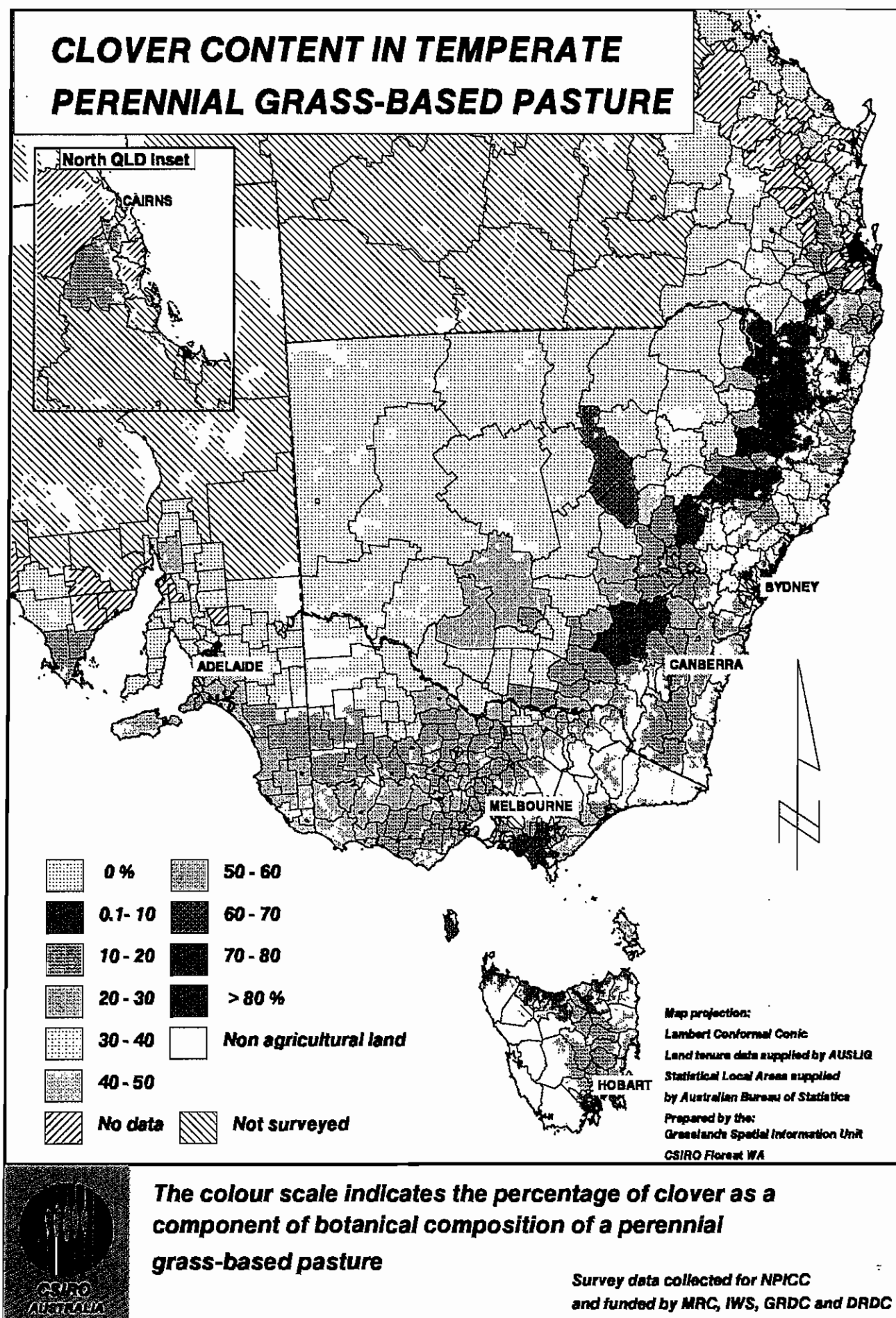
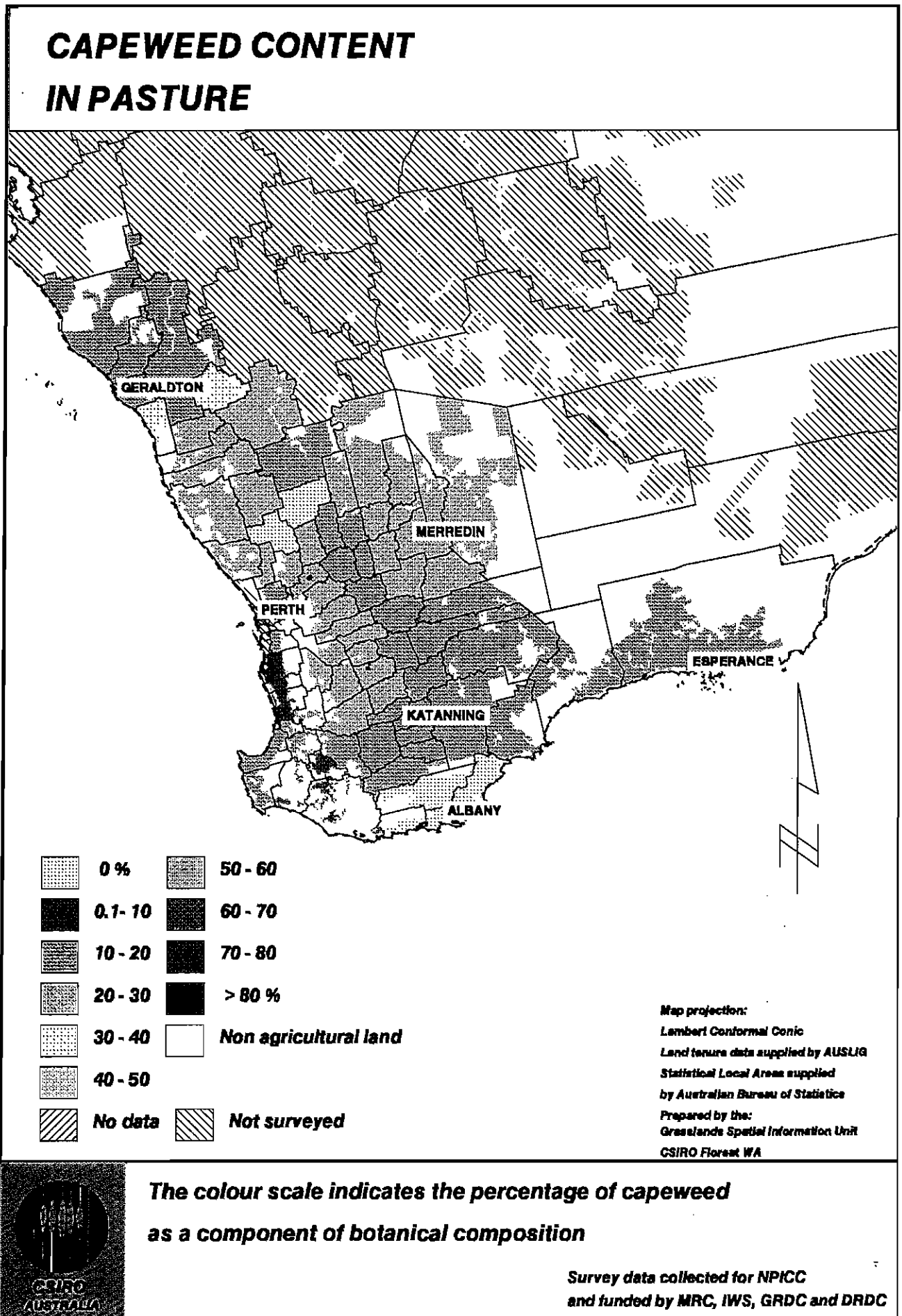
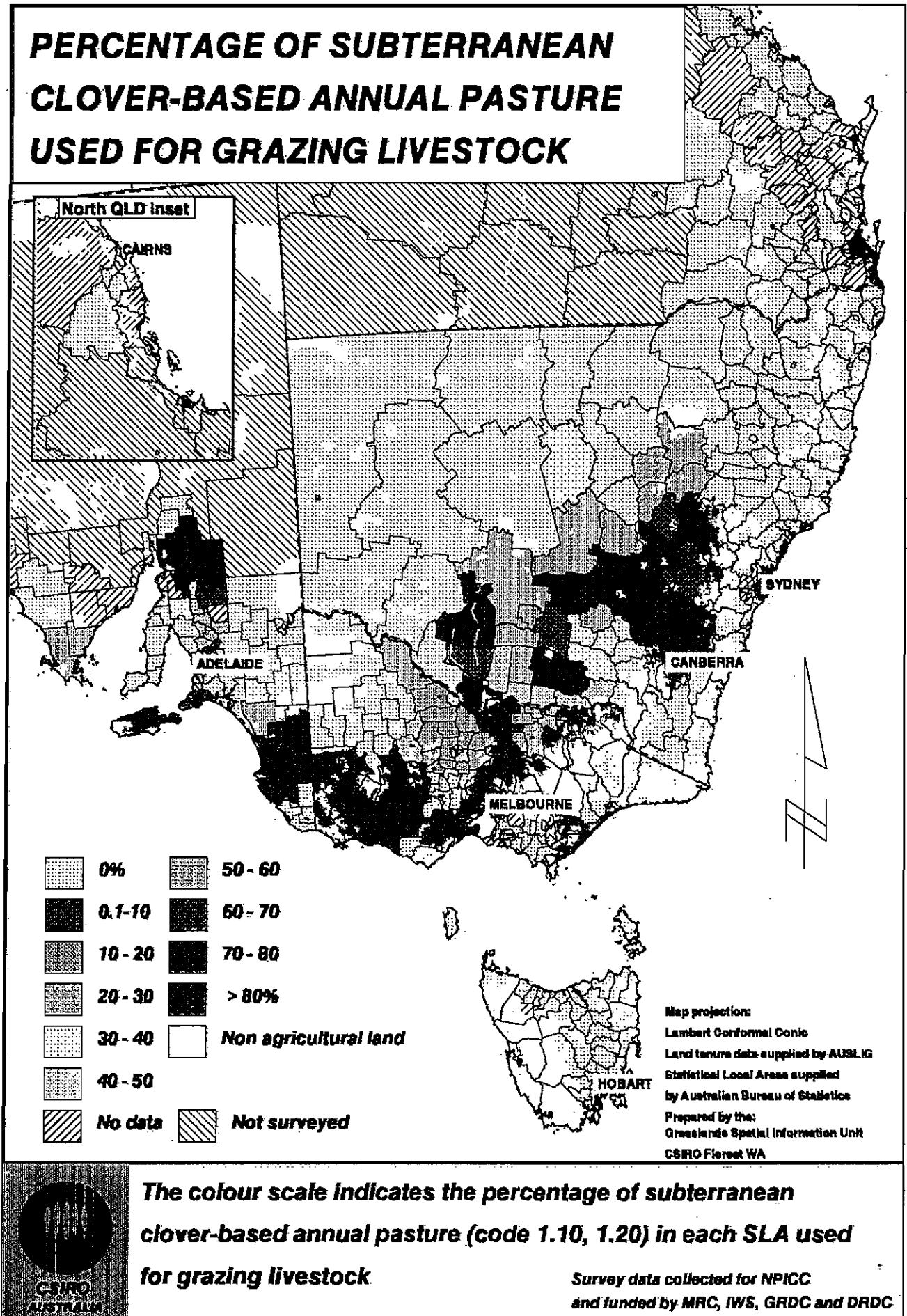


Figure 29. Mean capeweed content of annual pastures in Western Australia.

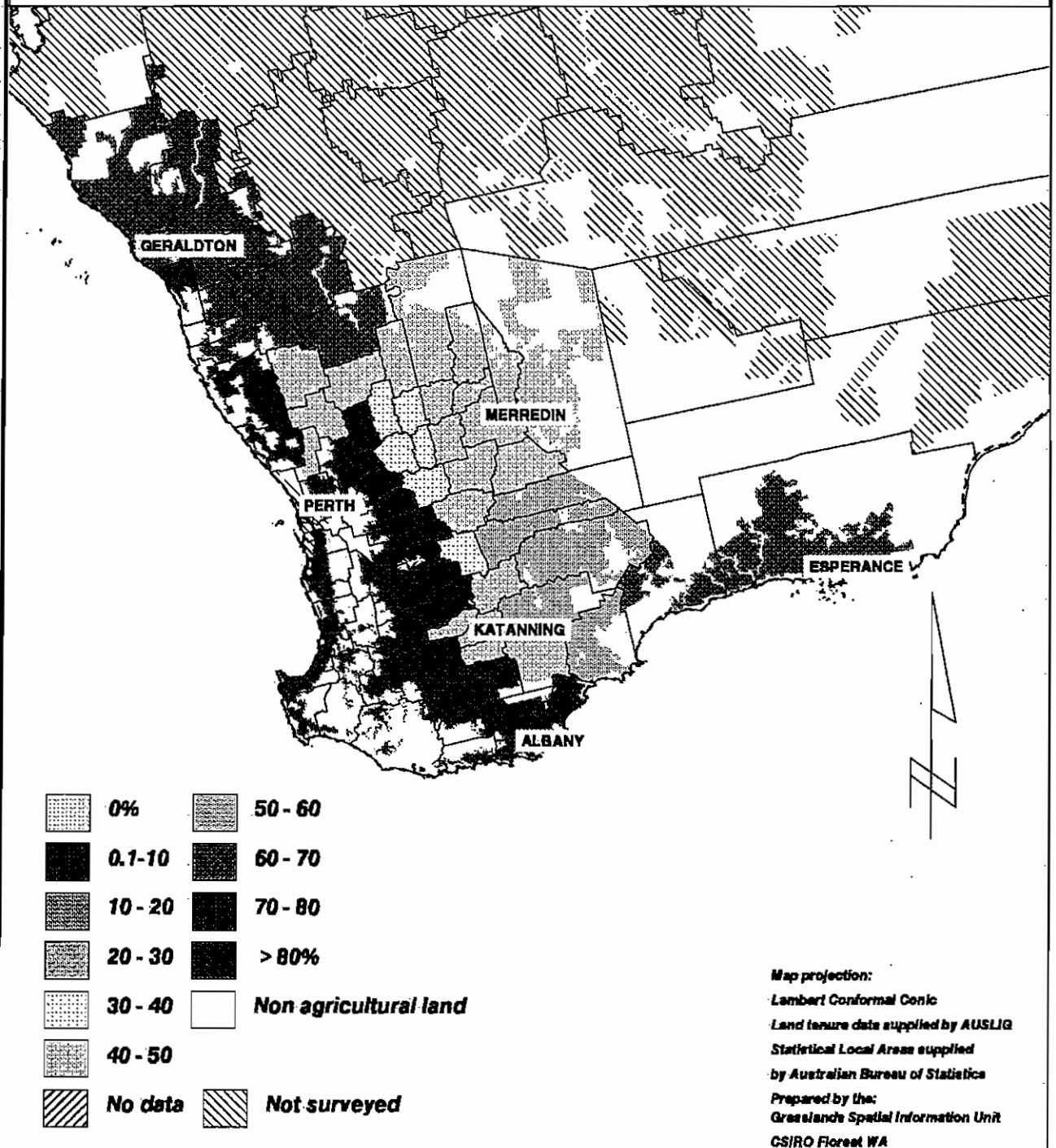


Map 30a. Percentage of annual subterranean clover-based pasture used for livestock production in SE Australia.



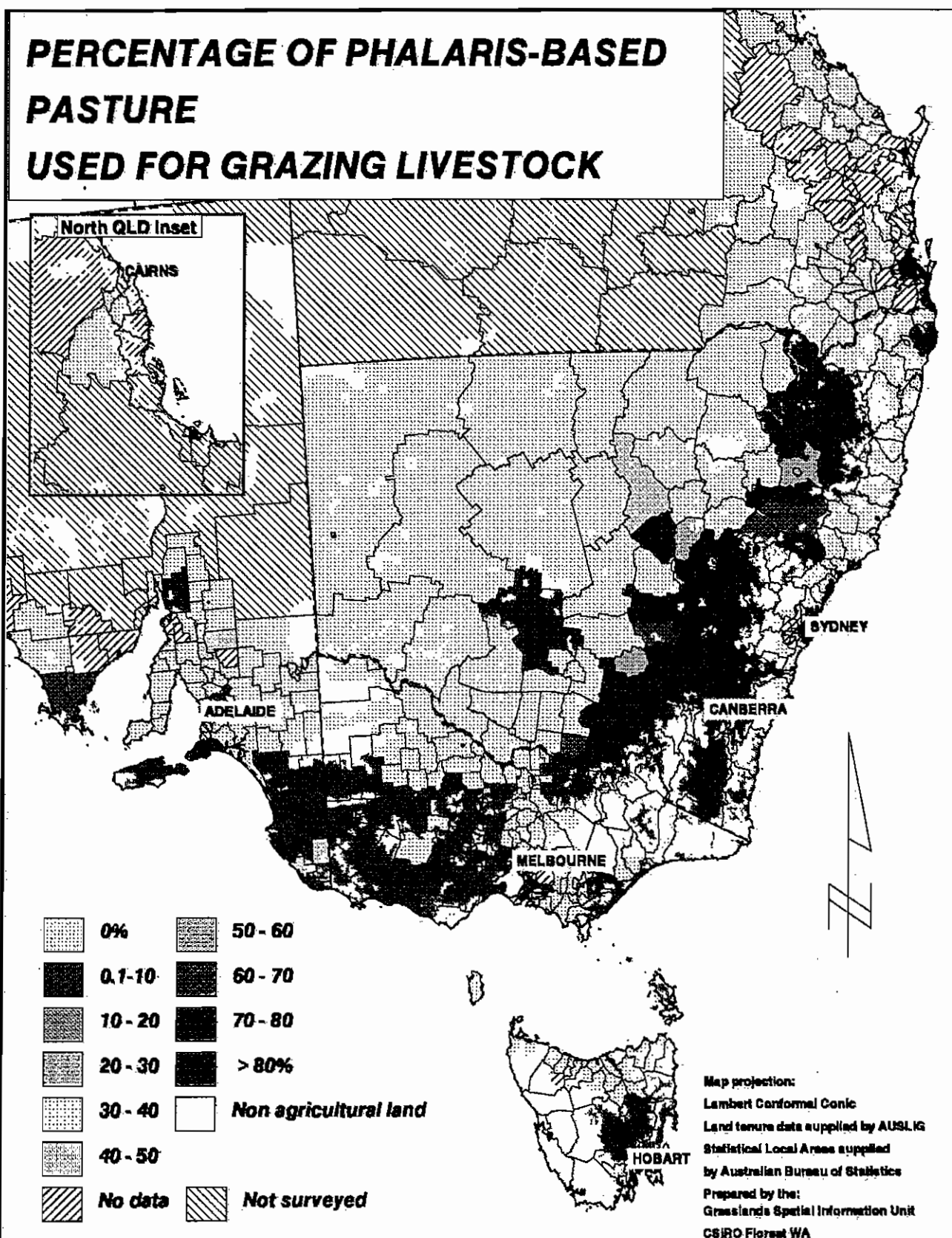
Map 30b. Percentage of annual subterranean clover-based pasture used for livestock production in WA.

PERCENTAGE OF SUBTERRANEAN CLOVER-BASED ANNUAL PASTURE USED FOR GRAZING LIVESTOCK



The colour scale indicates the percentage of subterranean clover-based annual pasture (code 1.10, 1.20) in each SLA used for grazing livestock

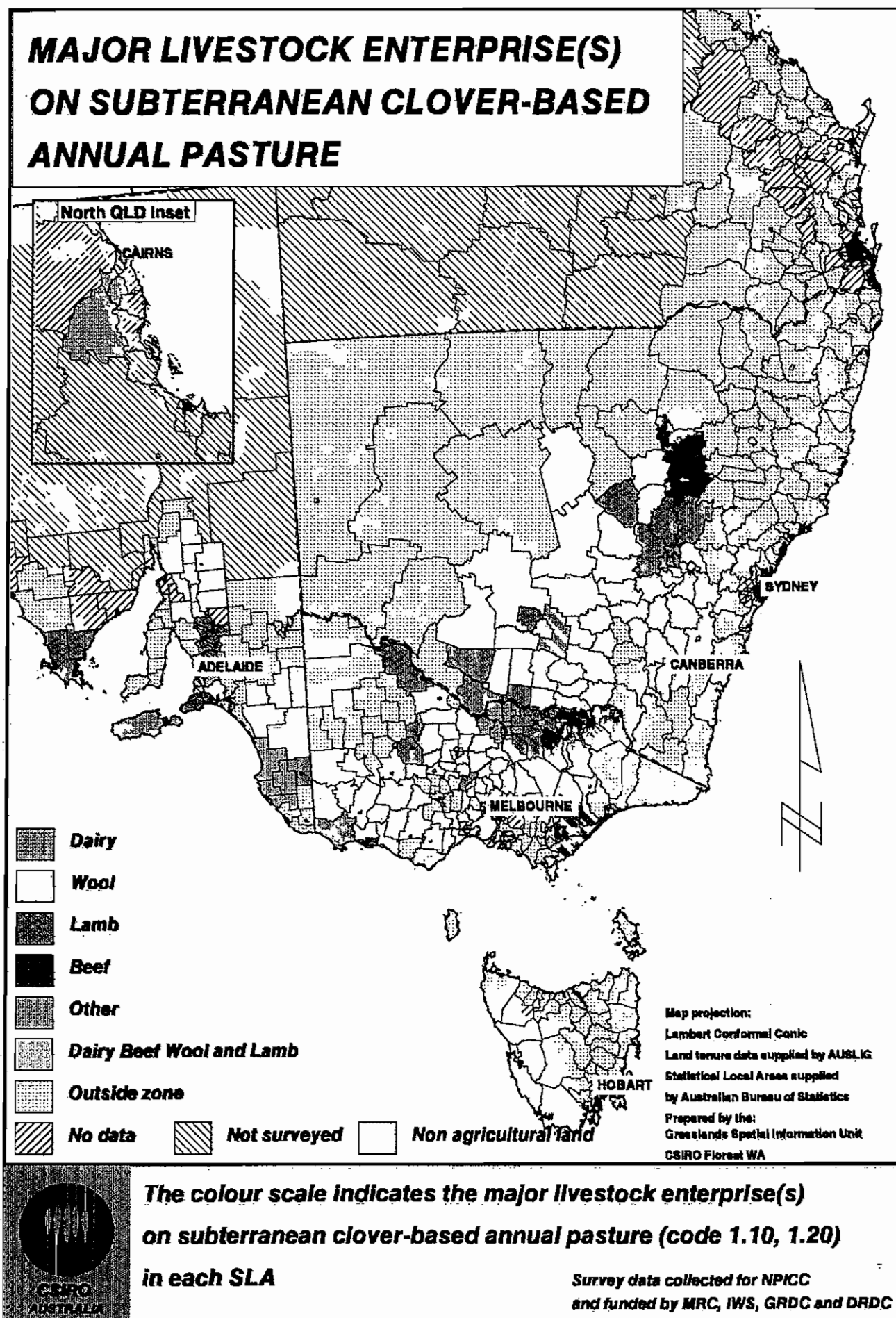
Survey data collected for NPICC and funded by MRC, IWS, GRDC and DRDC



**The colour scale indicates the percentage of
phalaris-based pasture in each SLA used
for grazing livestock**

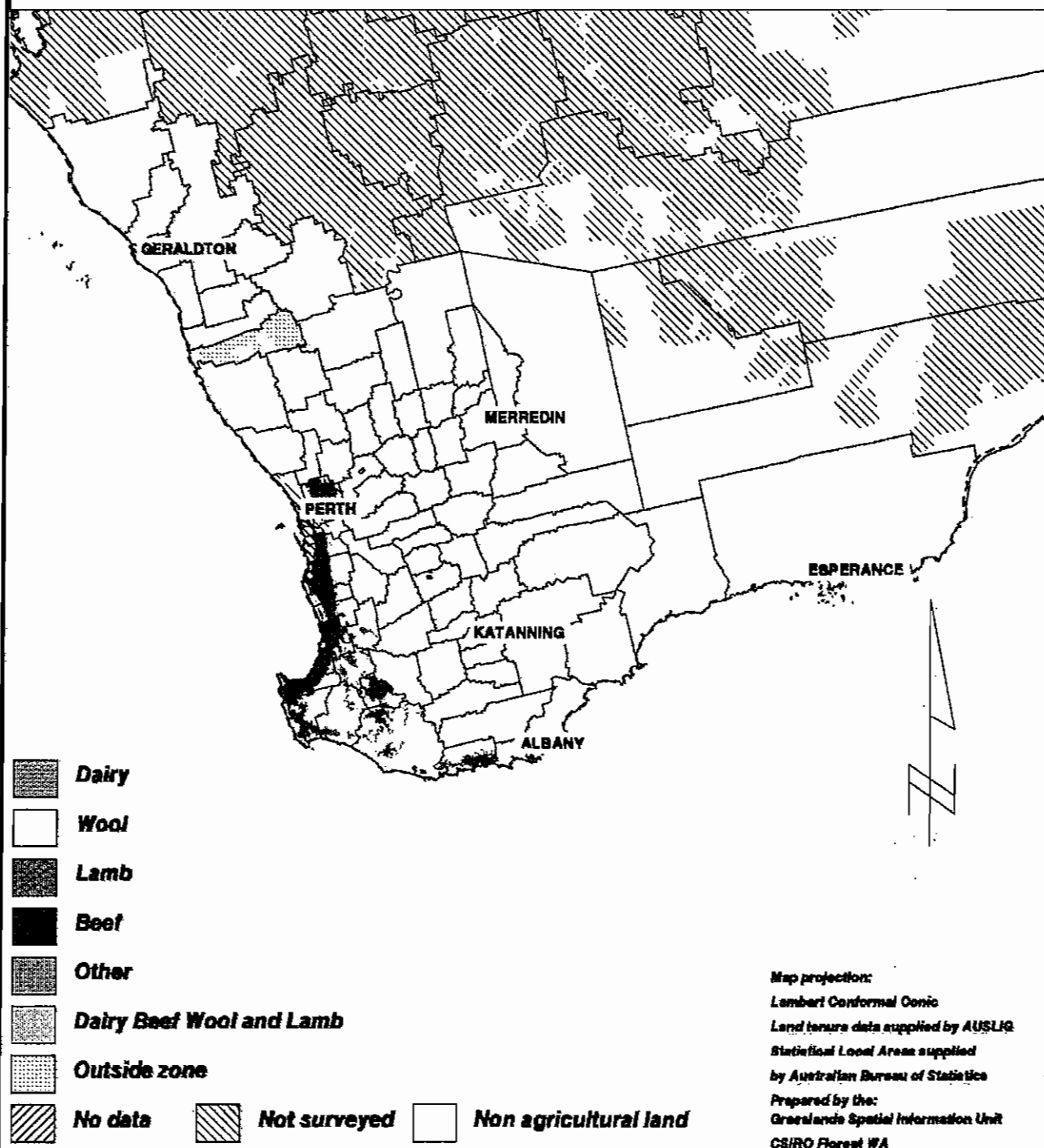
Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC

Map 31a. Main enterprise using annual subterranean clover-based pasture in SE Australia.



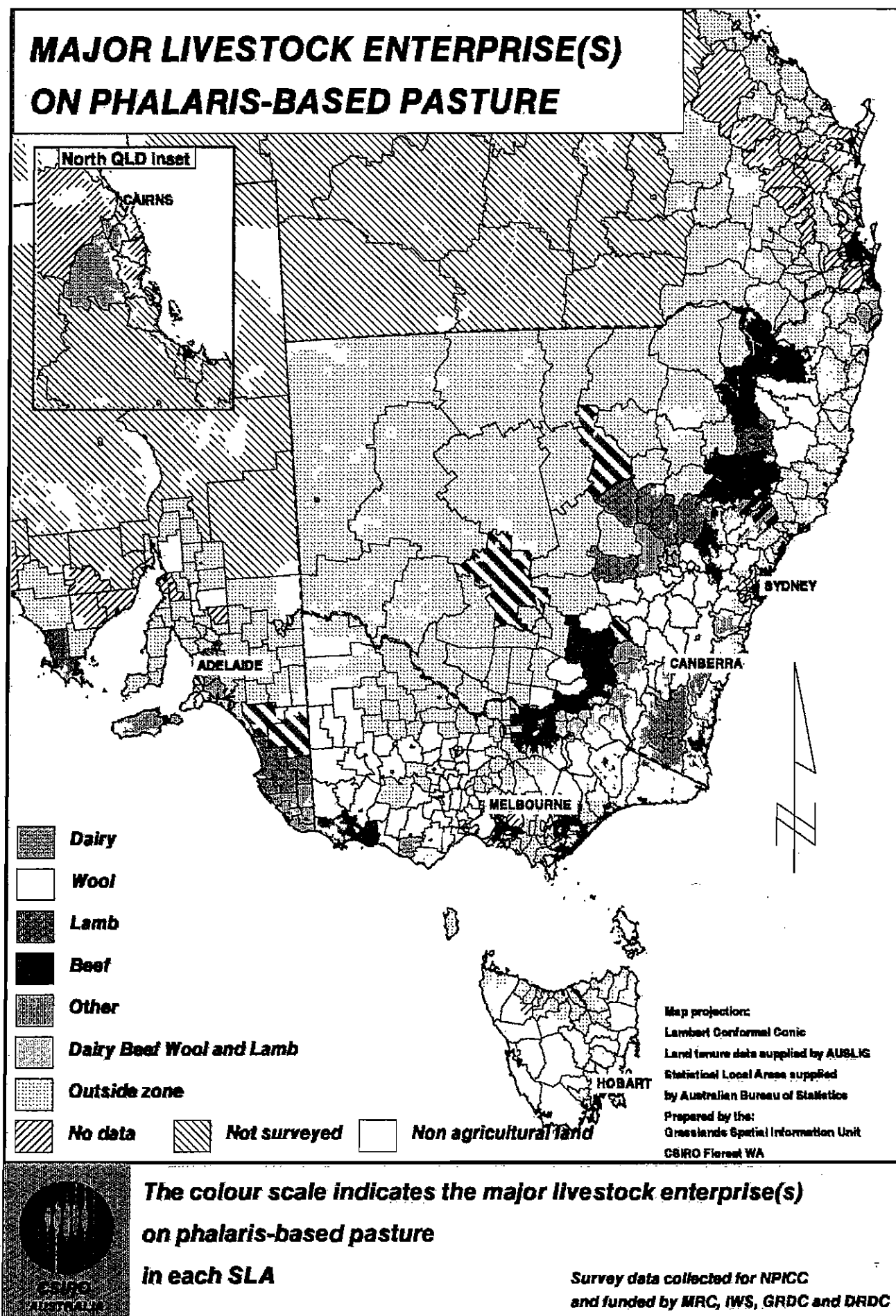
Map 31b. Main enterprise using annual subterranean clover-based pasture in WA.

MAJOR LIVESTOCK ENTERPRISE(S) ON SUBTERRANEAN CLOVER-BASED ANNUAL PASTURE

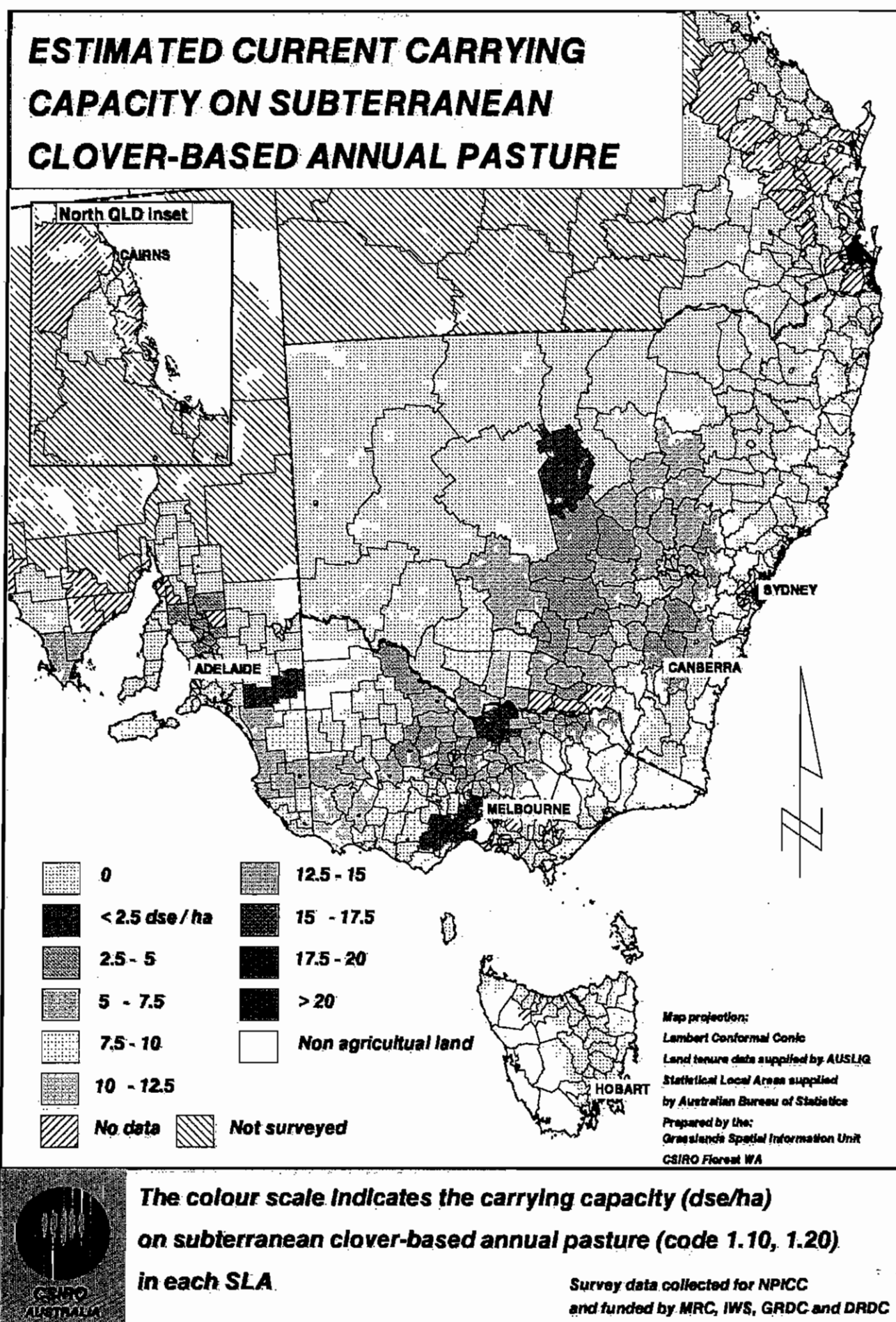


The colour scale indicates the major livestock enterprise(s)
on subterranean clover-based annual pasture (code 1.10, 1.20)
in each SLA

Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC

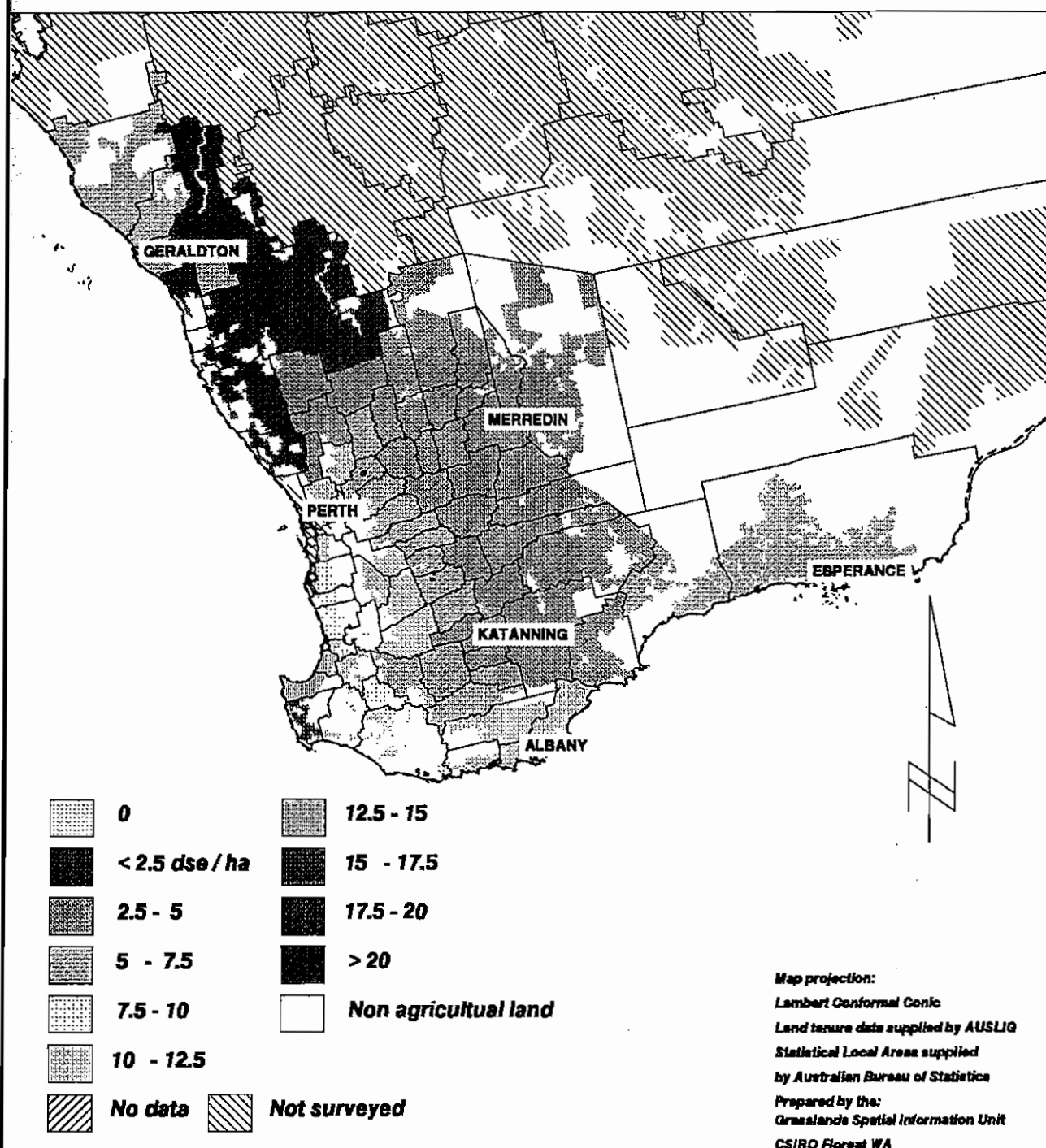


Map 32a. Estimated actual carry capacity of annual subterranean clover-based pasture in SE Australia.



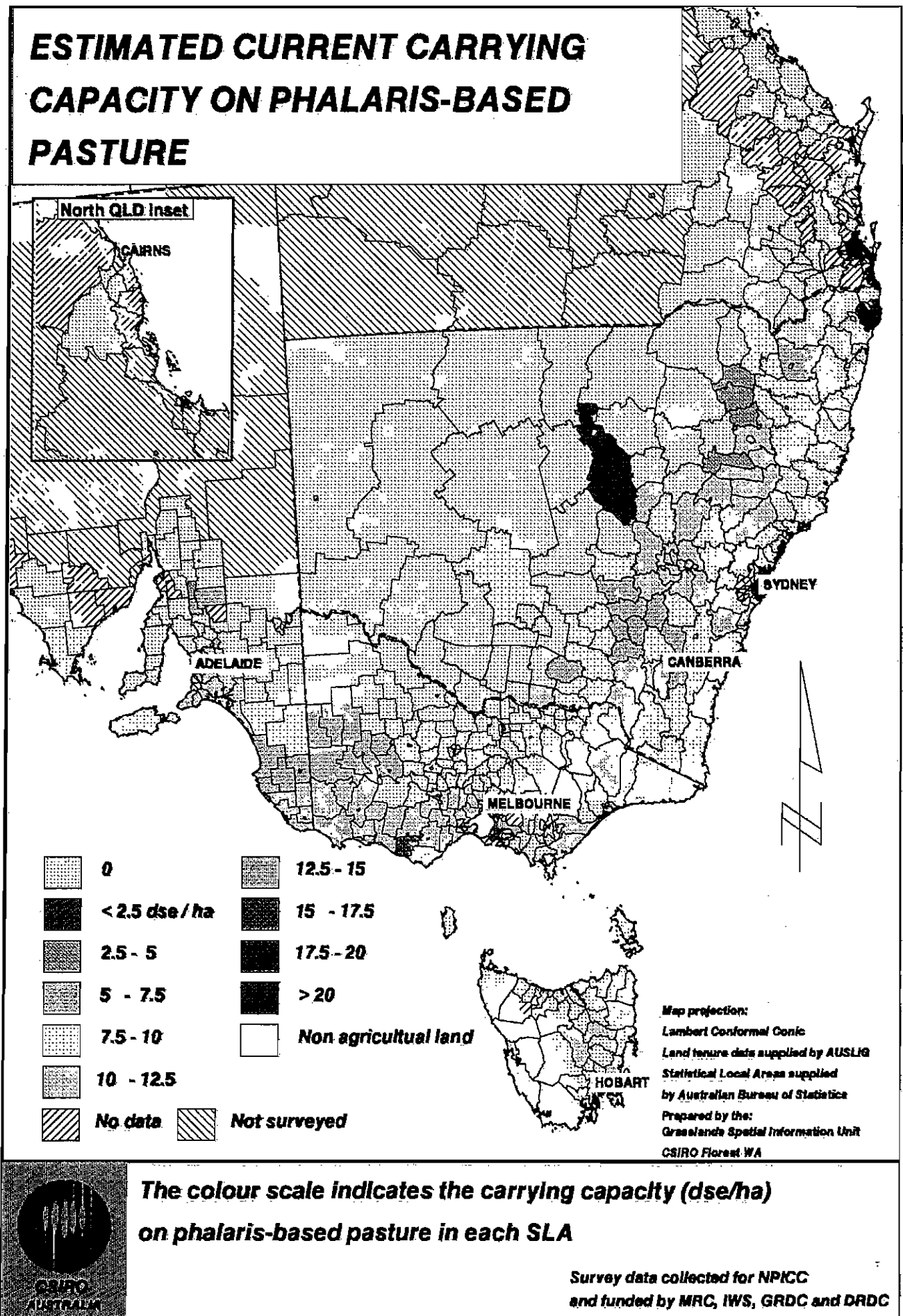
Map 32b. Estimated actual carry capacity of annual subterranean clover-based pasture in WA.

ESTIMATED CURRENT CARRYING CAPACITY ON SUBTERRANEAN CLOVER-BASED ANNUAL PASTURE

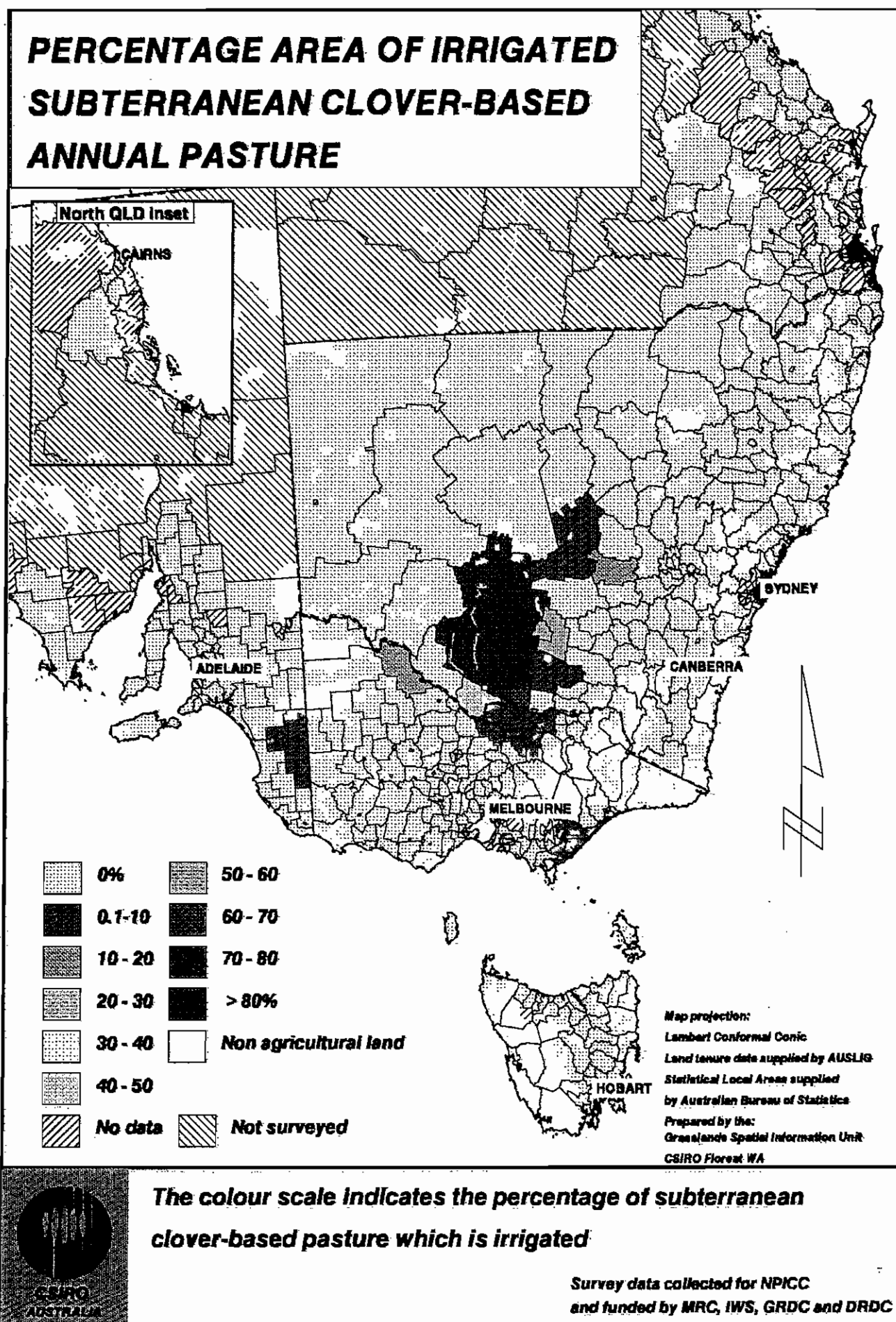


The colour scale indicates the carrying capacity (dse/ha)
on subterranean clover-based annual pasture (code 1.10, 1.20)
in each SLA

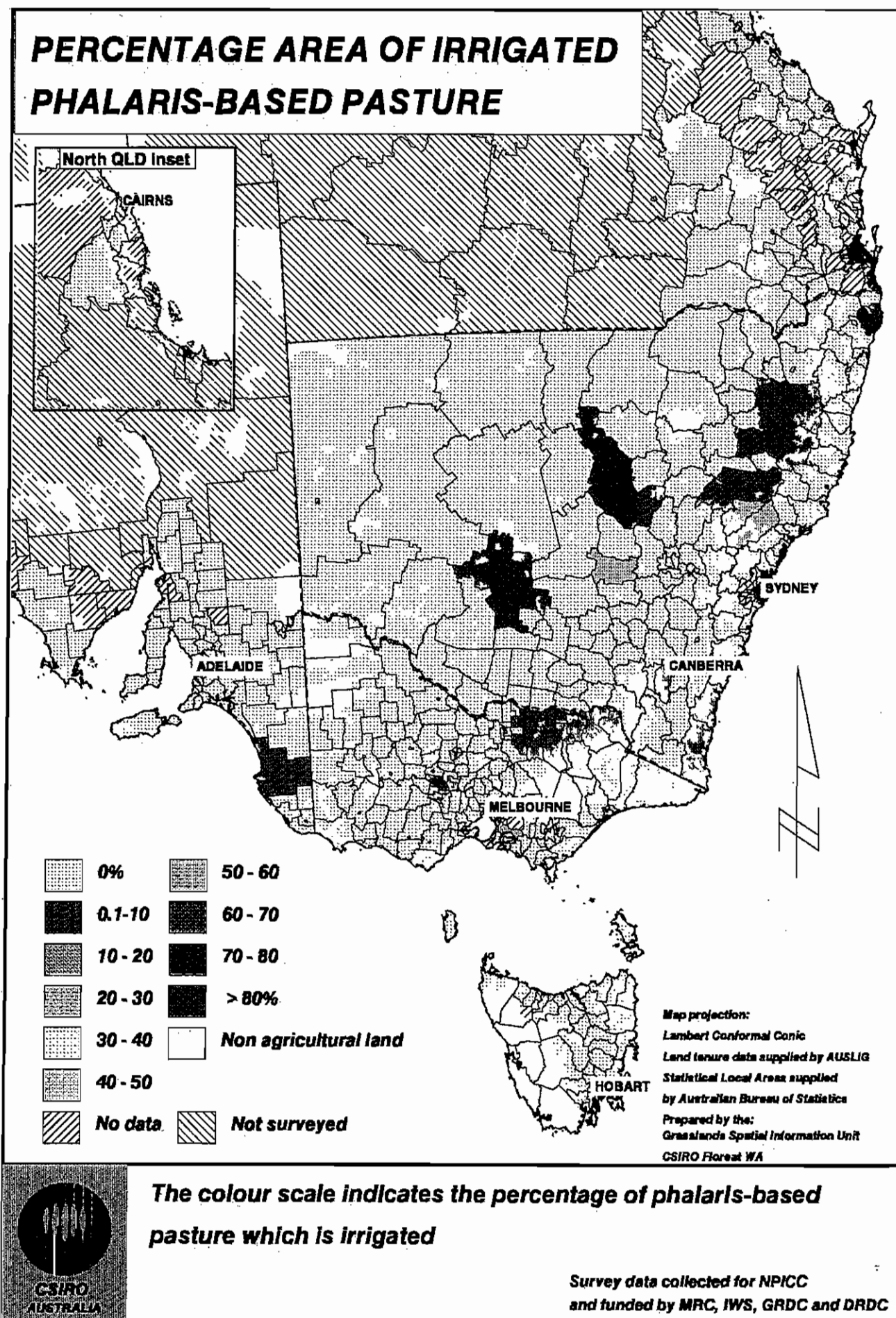
Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC

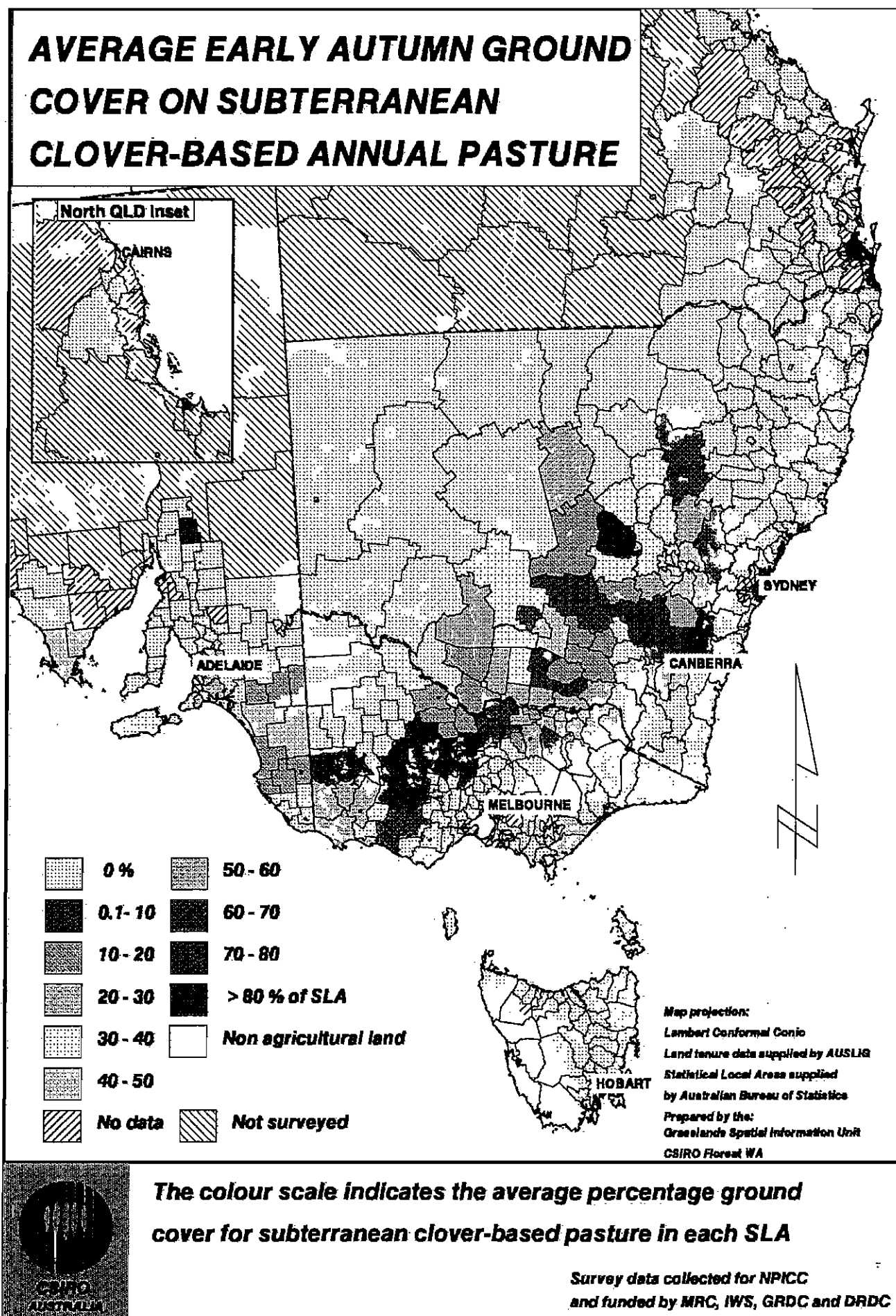


Map 33a. Proportion of irrigated annual subterranean clover-based pasture in SE Australia.



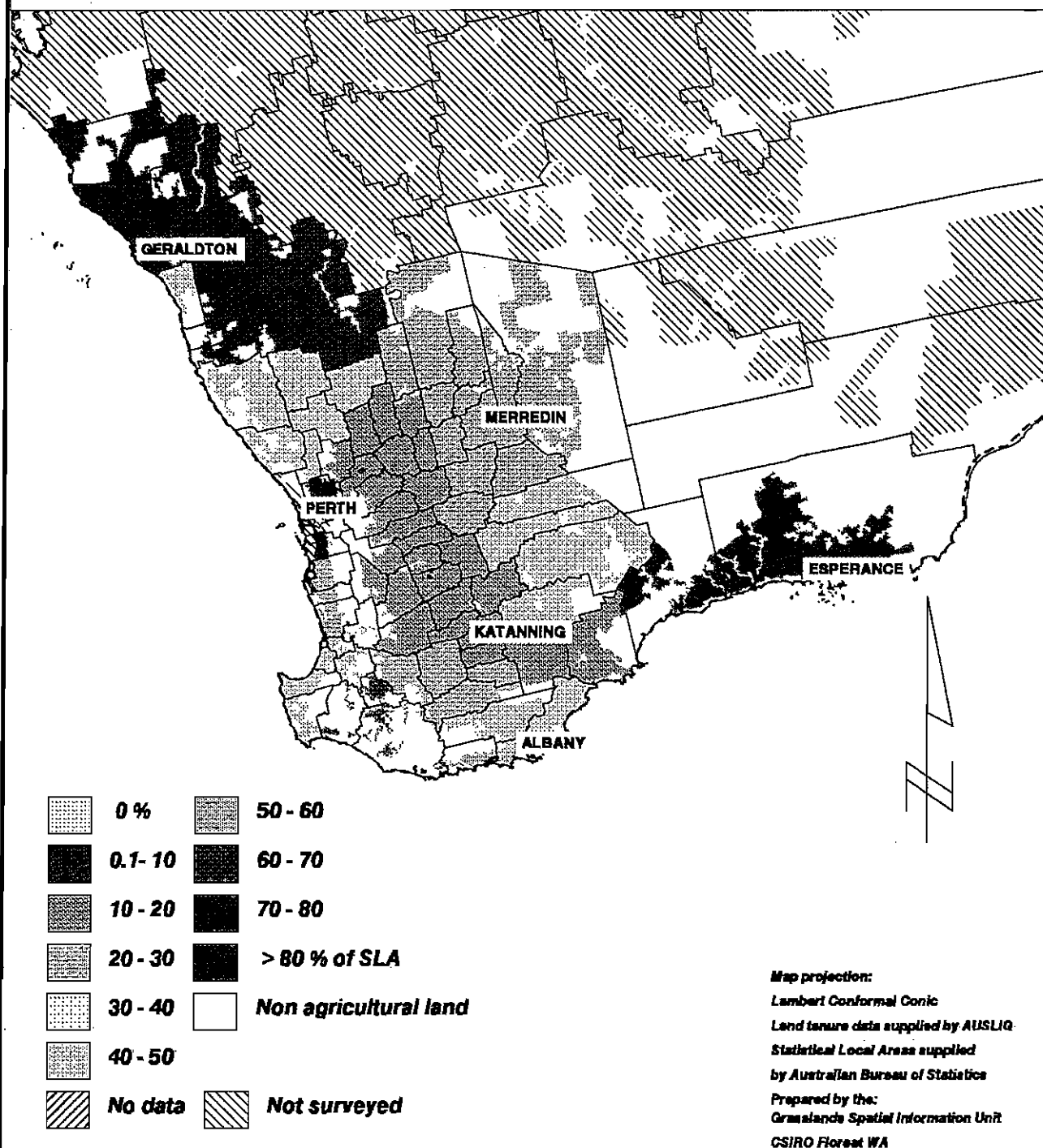
Map 33b. Proportion of irrigated perennial phalaris-based pasture in SE Australia.





Map 34b. Average % ground cover in autumn on annual subterranean clover-based pasture in WA.

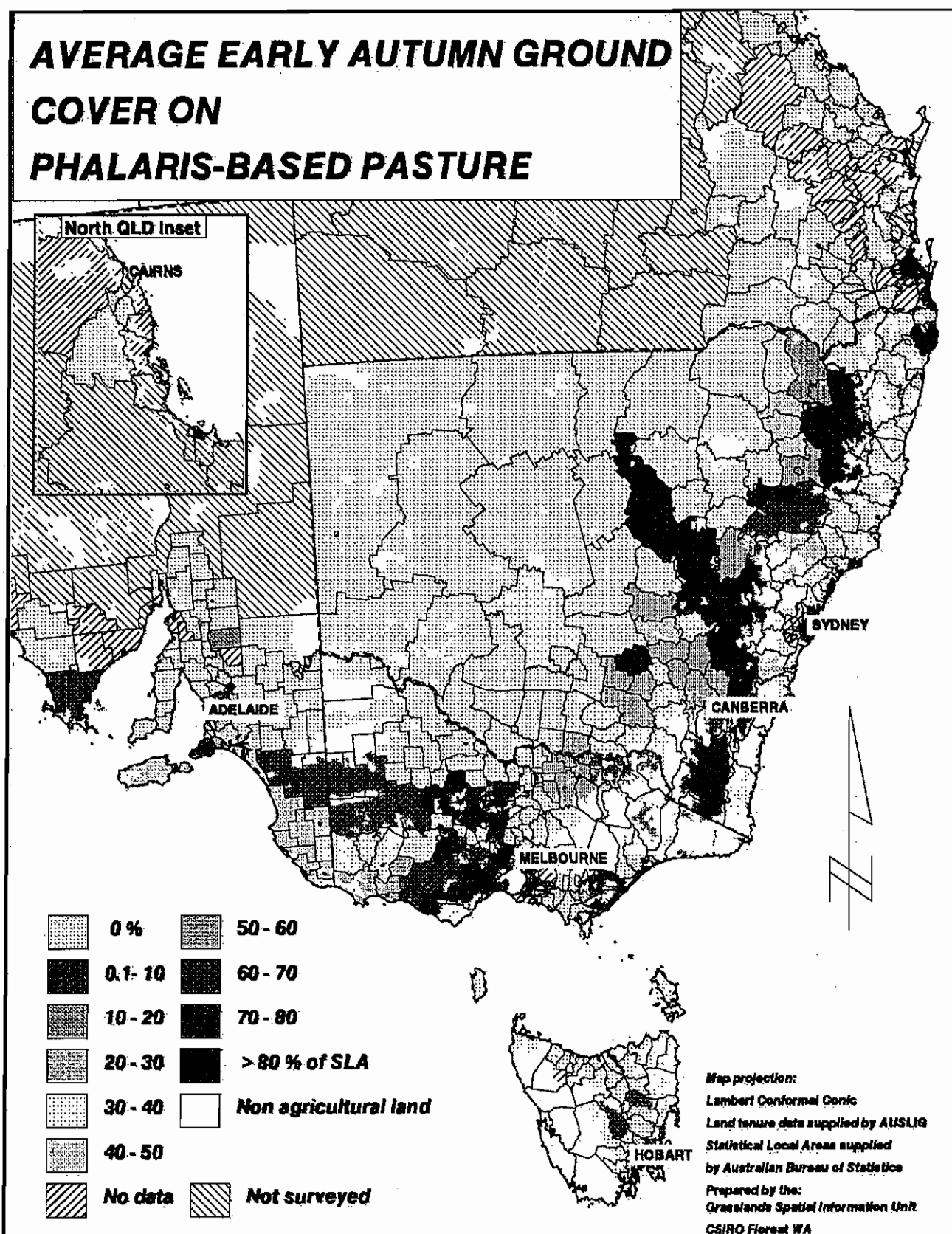
AVERAGE EARLY AUTUMN GROUND COVER ON SUBTERRANEAN CLOVER-BASED ANNUAL PASTURE



The colour scale indicates the average percentage ground cover for subterranean clover-based pasture in each SLA

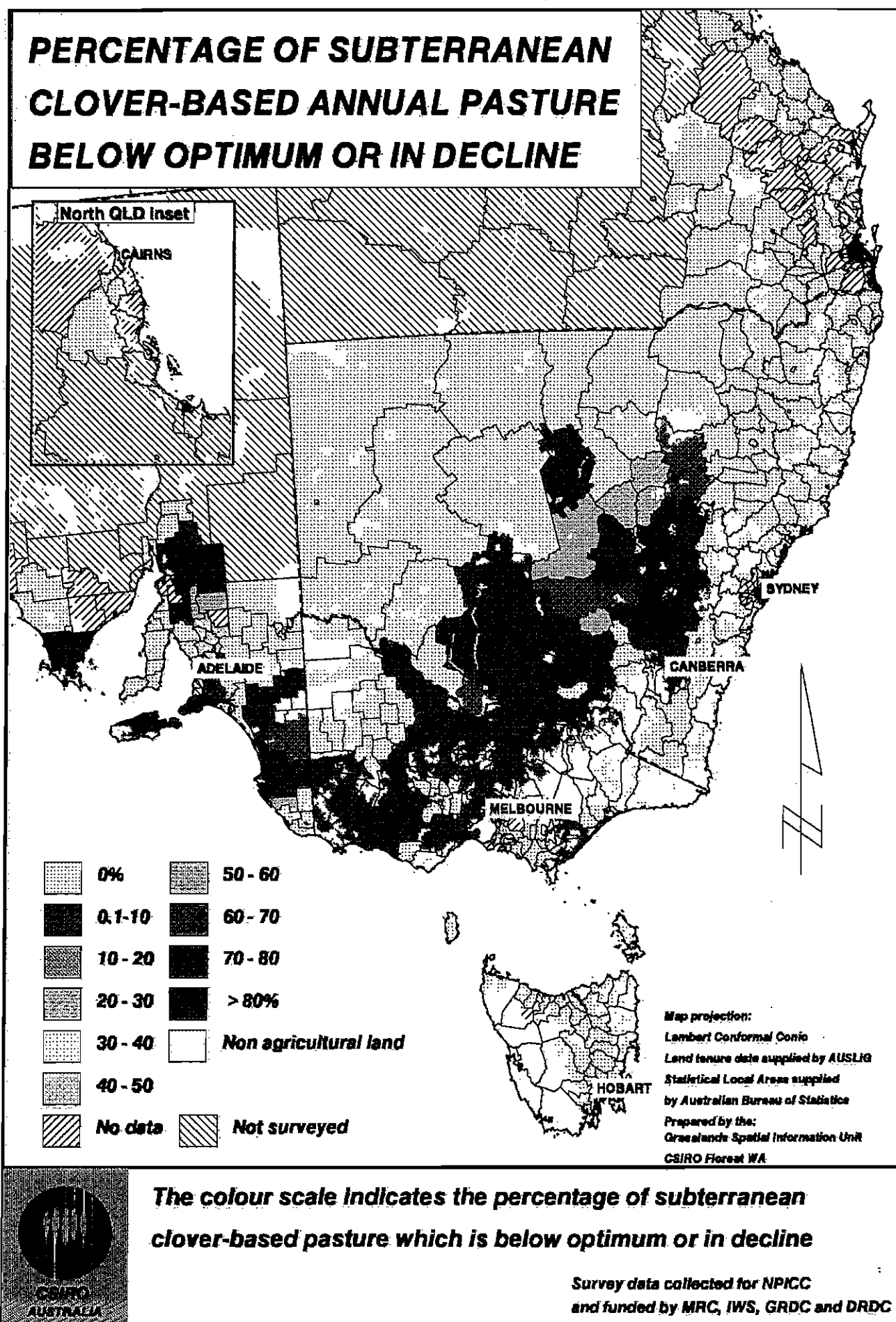
**Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC**

Map 34c. Average % ground cover in autumn on perennial phalaris-based pasture in SE Australia.



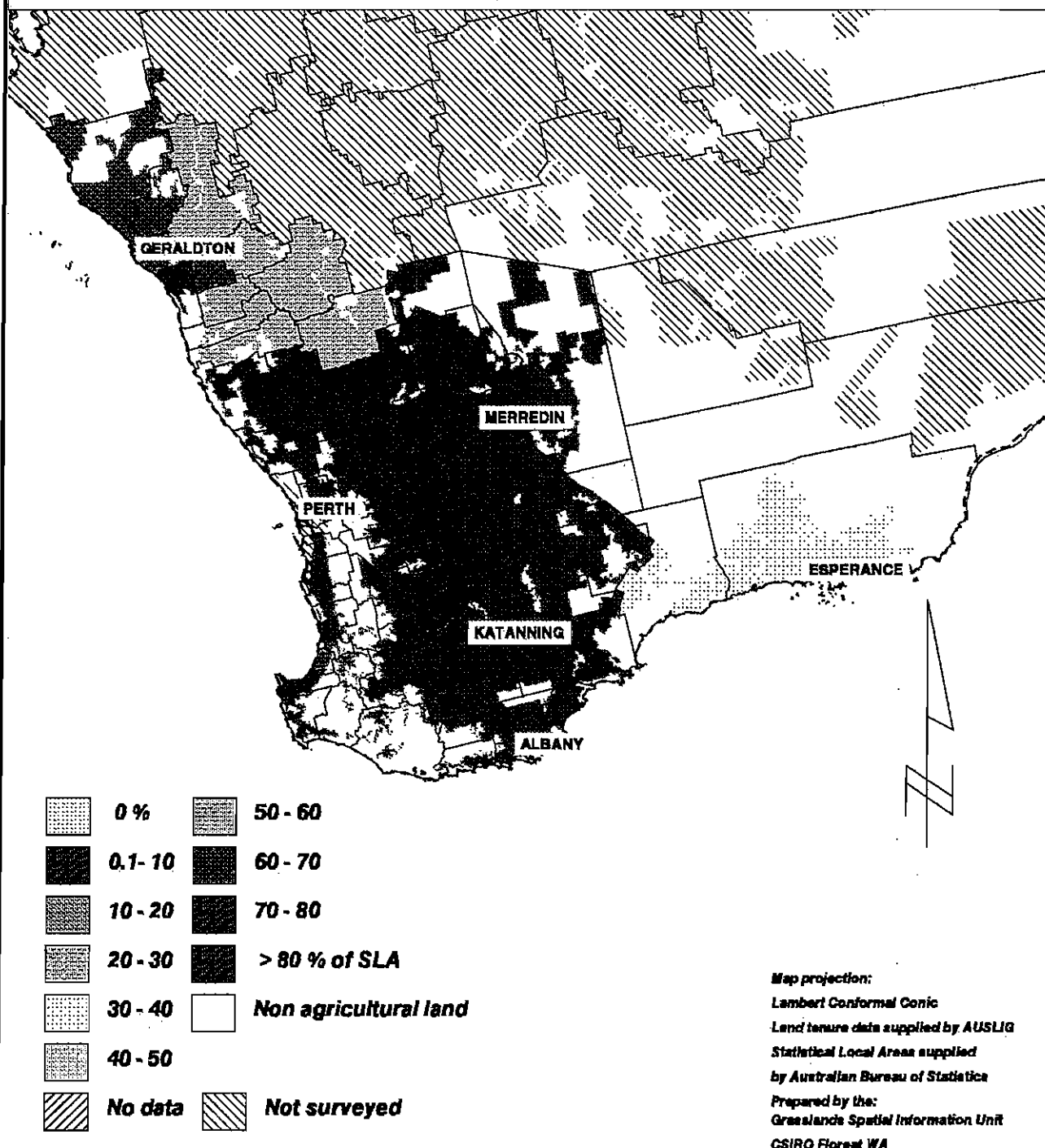
The colour scale indicates the average percentage ground cover for phalaris-based pasture in each SLA

Survey data collected for NPICC
 and funded by MRC, IWS, GRDC and DRDC



Map 35b. Percentage of annual subterranean clover-based pasture below optimum or in decline in WA.

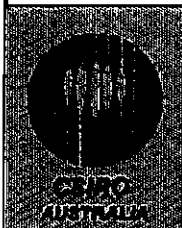
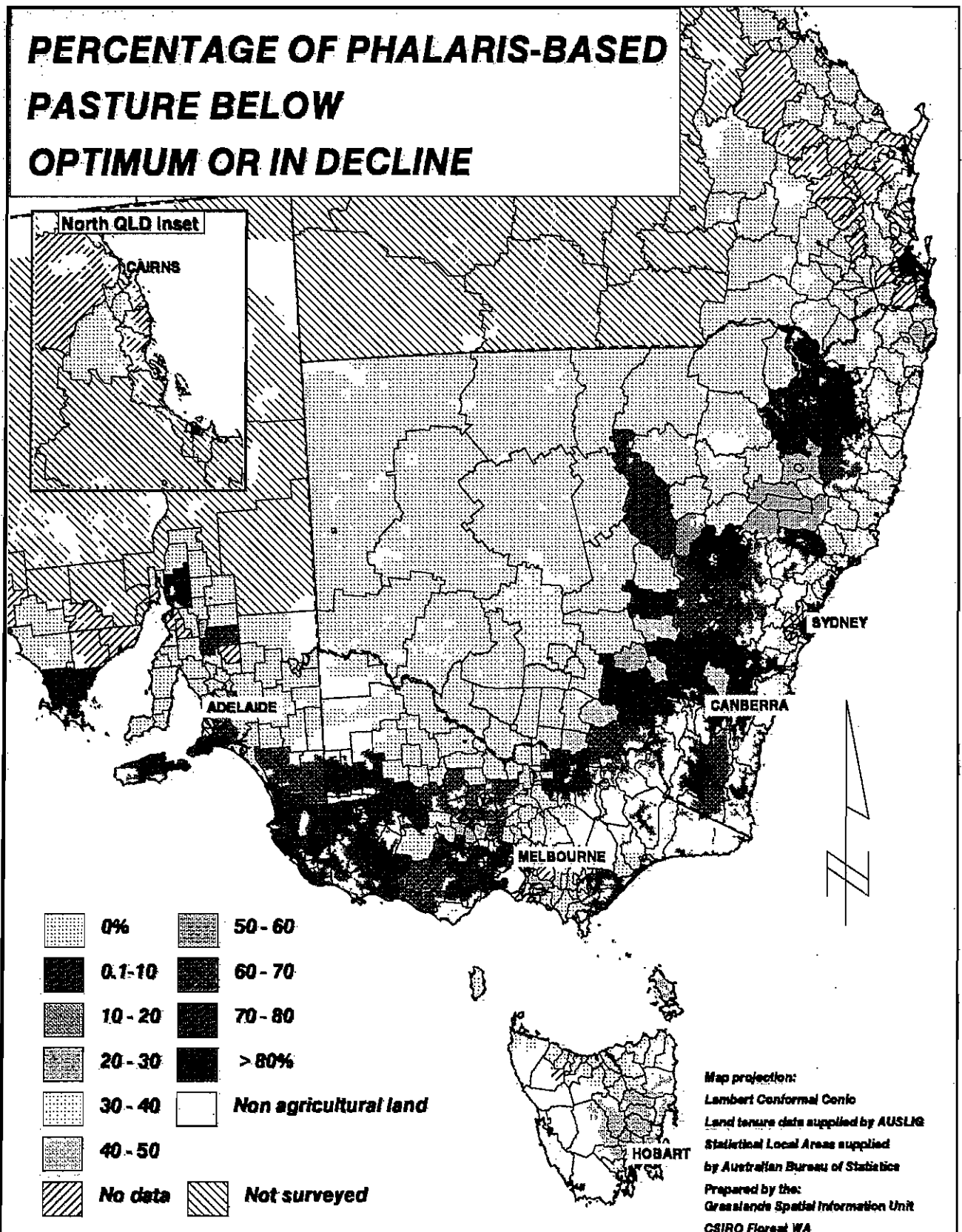
PERCENTAGE OF SUBTERRANEAN CLOVER-BASED ANNUAL PASTURE BELOW OPTIMUM OR IN DECLINE



The colour scale indicates the percentage of subterranean clover-based pasture which is below optimum or in decline

Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC

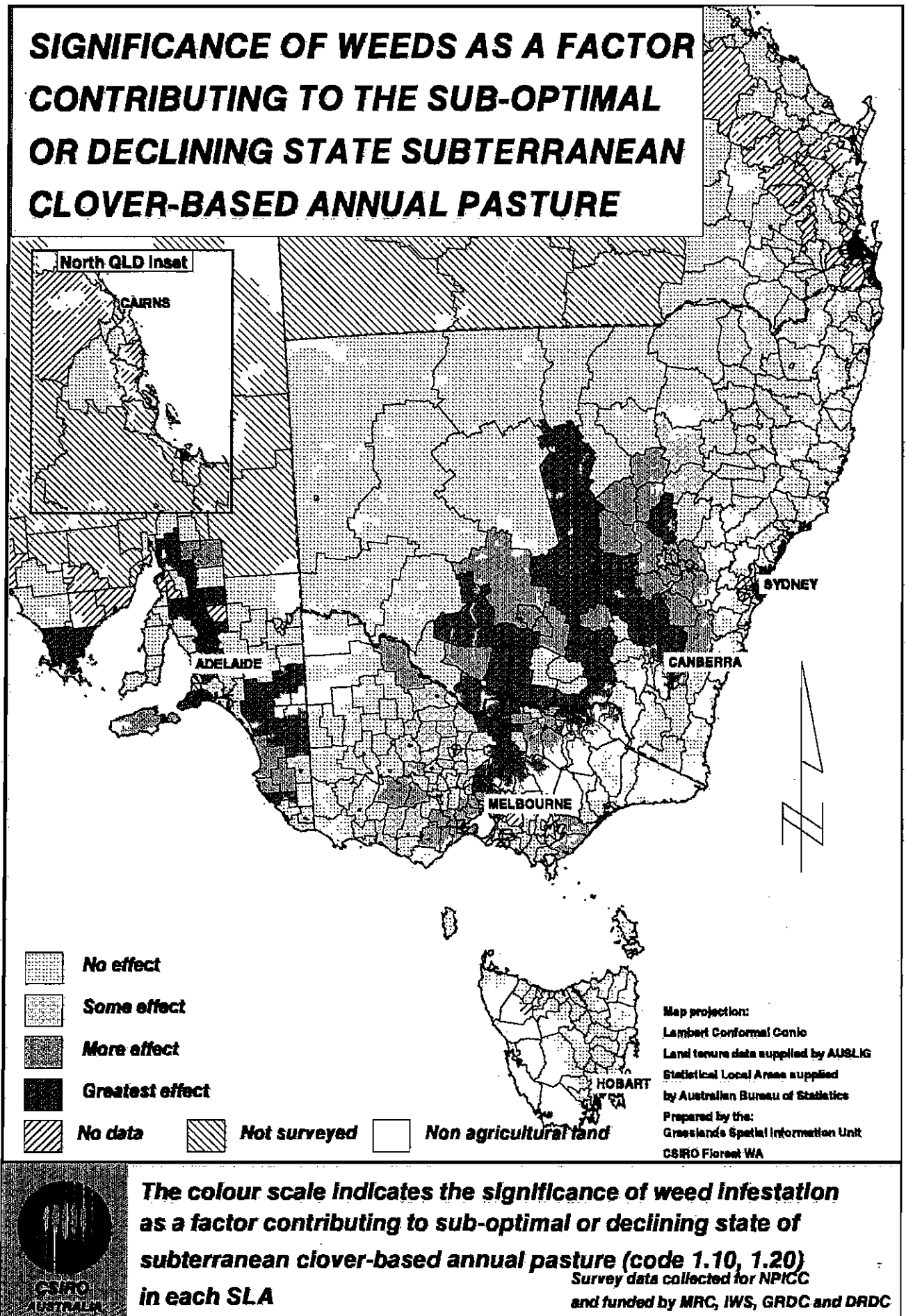
Map 35c. Percentage of perennial phalaris-based pasture below optimum or in decline in SE Australia.



The colour scale indicates the percentage of phalaris-base pasture which is below optimum or in decline

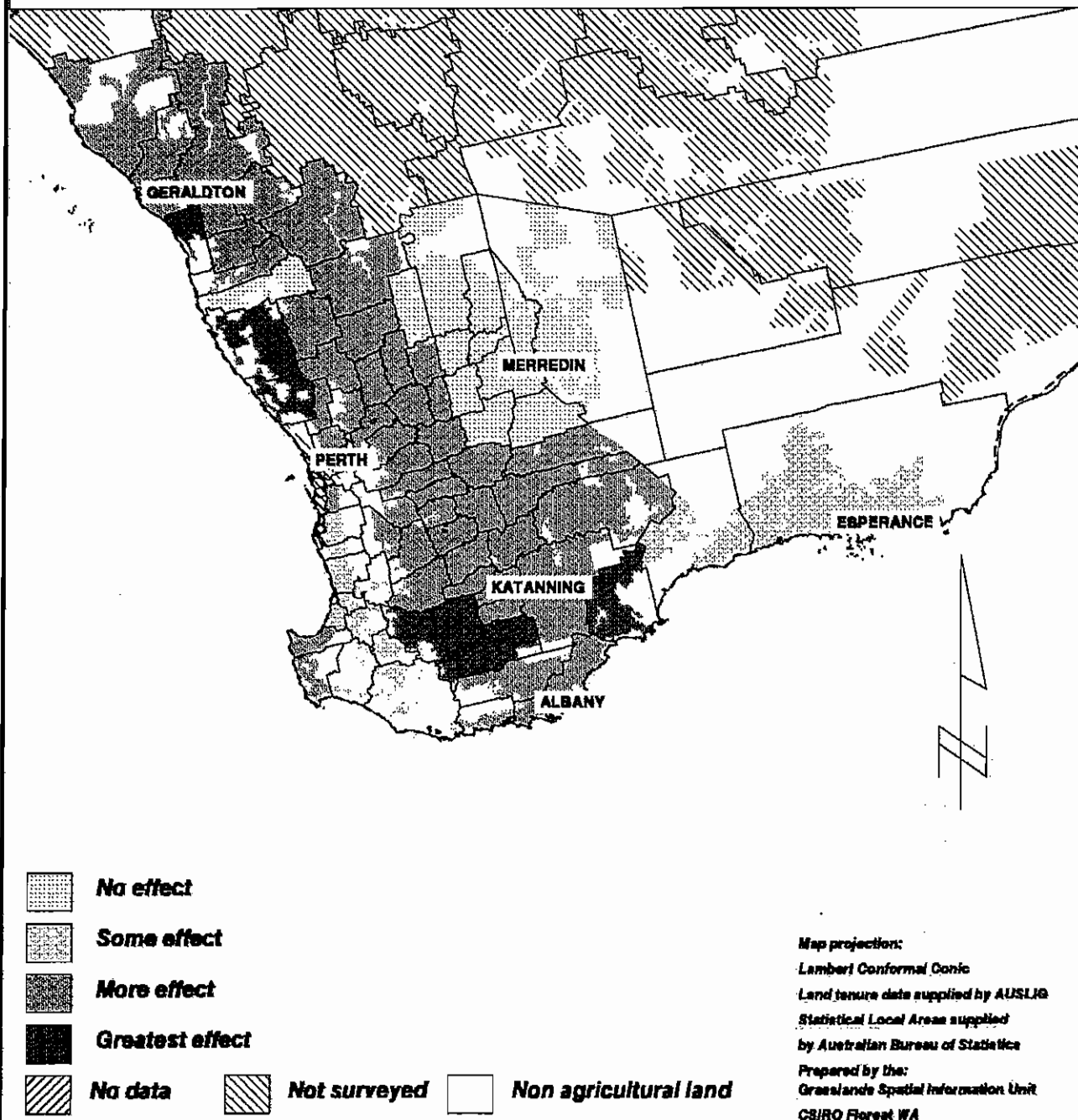
**Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC**

Map 36a. Weed infestation as a factor leading to decline in subterranean clover-based pasture in SE Australia.



Map 36b. Weed infestation as a factor leading to decline in subterranean clover-based pasture in WA.

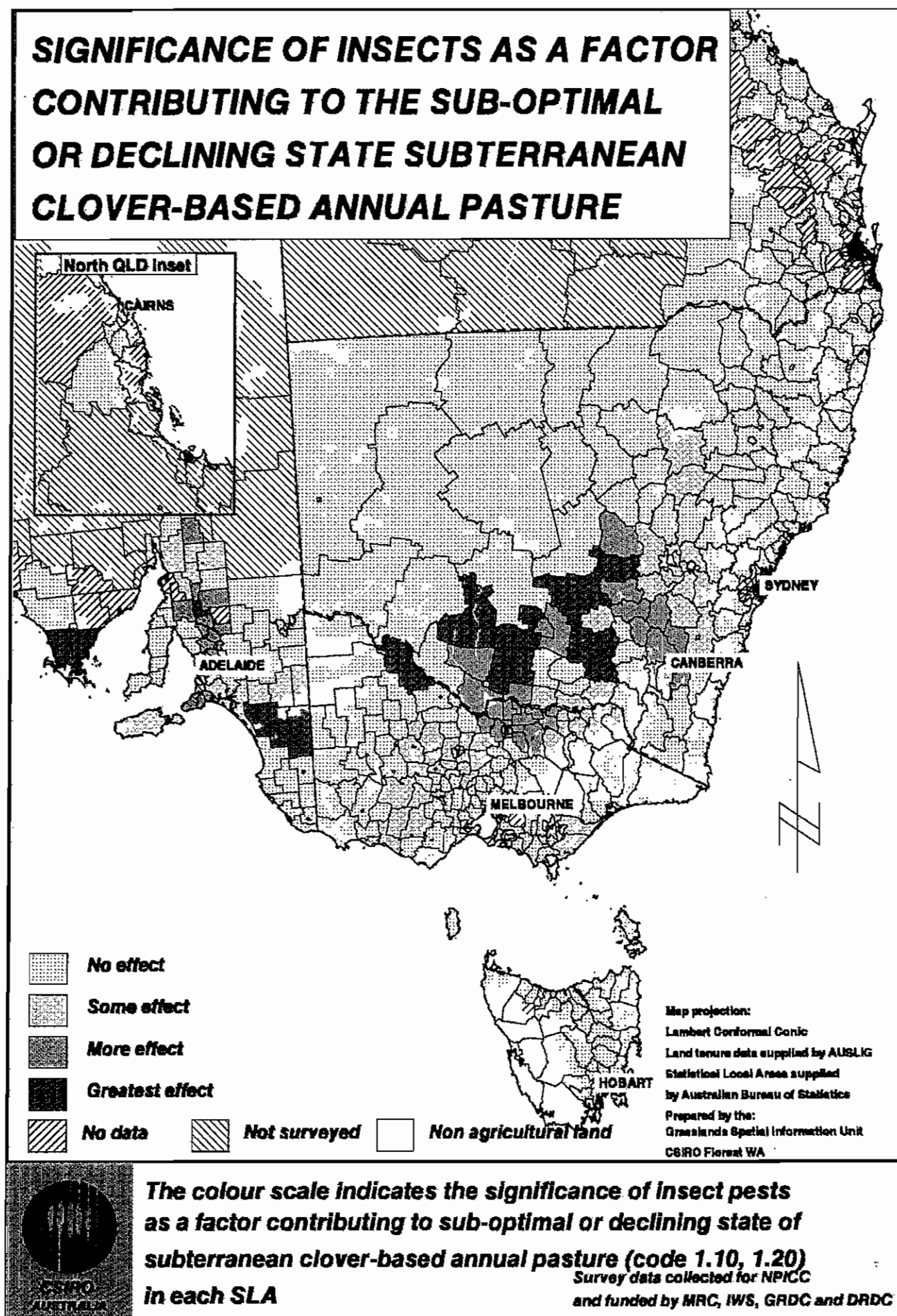
SIGNIFICANCE OF WEEDS AS A FACTOR CONTRIBUTING TO THE SUB-OPTIMAL OR DECLINING STATE SUBTERRANEAN CLOVER-BASED ANNUAL PASTURE



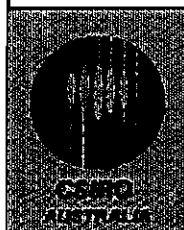
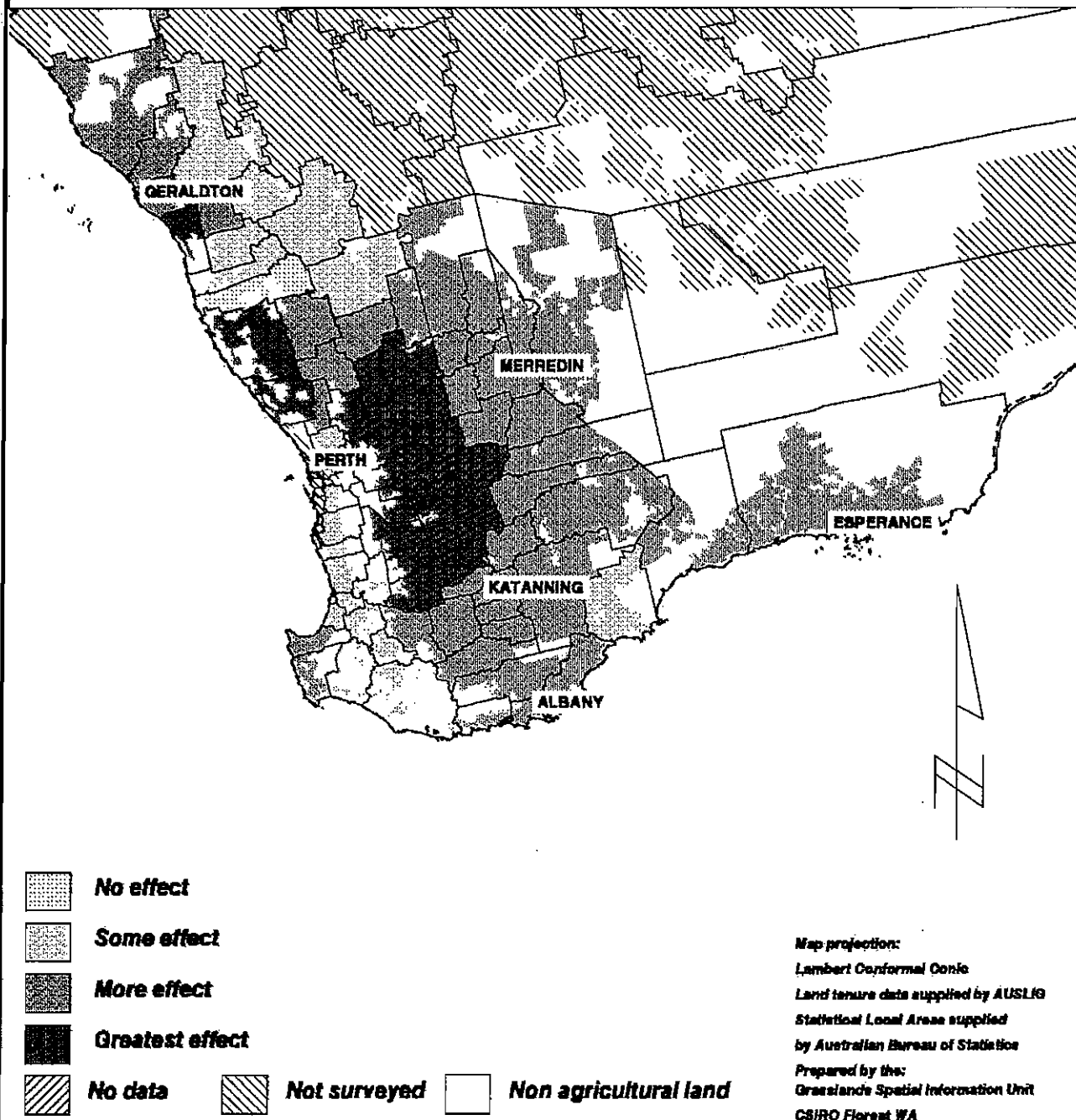
The colour scale indicates the significance of weed infestation as a factor contributing to sub-optimal or declining state of subterranean clover-based annual pasture (code 1.10, 1.20) in each SLA

Survey data collected for NPICC
 and funded by MRC, IWS, GRDC and DRDC

Map 36c. Insect pests as a factor leading to decline in subterranean clover-based pasture in SE Australia.



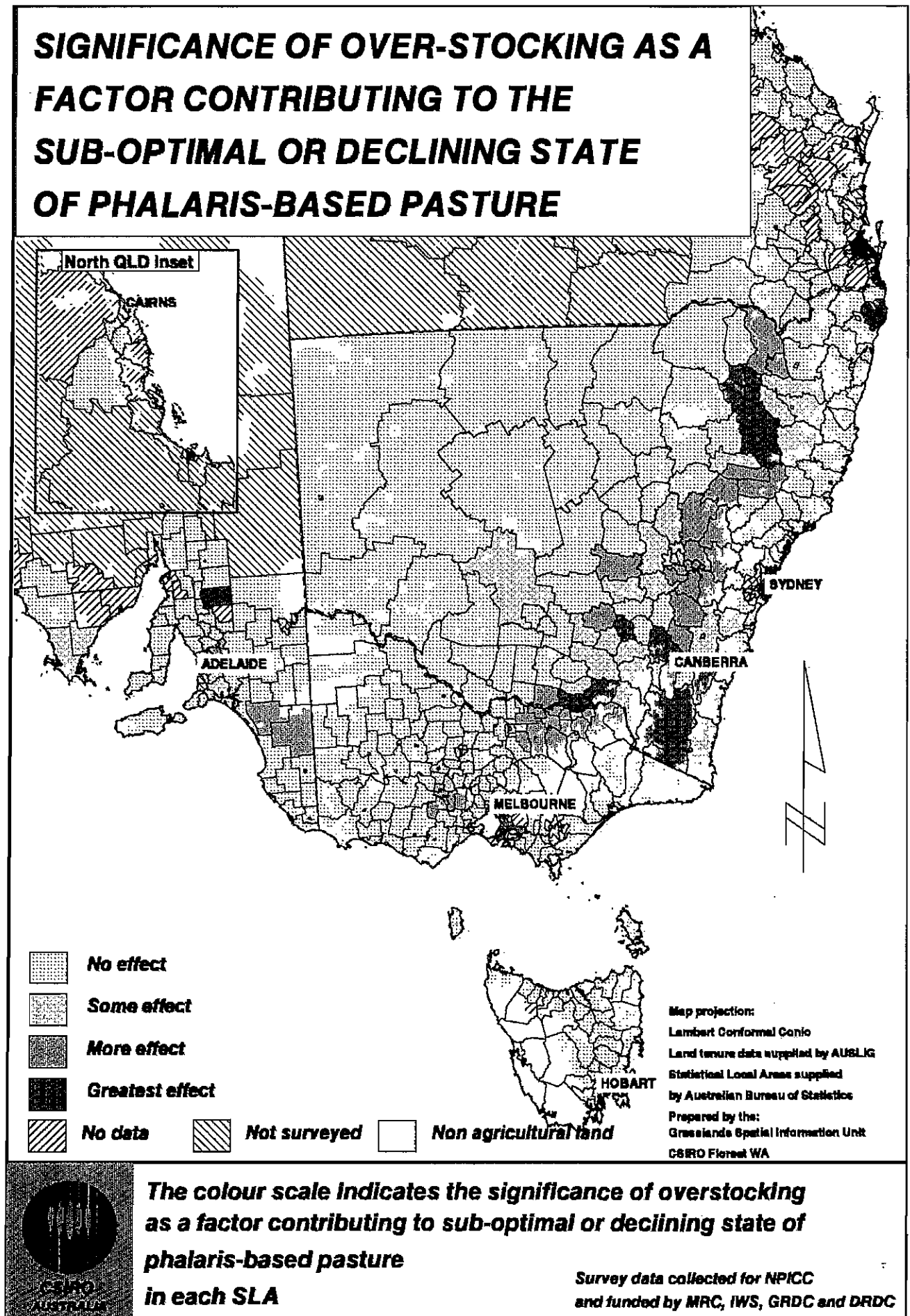
SIGNIFICANCE OF INSECTS AS A FACTOR CONTRIBUTING TO THE SUB-OPTIMAL OR DECLINING STATE SUBTERRANEAN CLOVER-BASED ANNUAL PASTURE



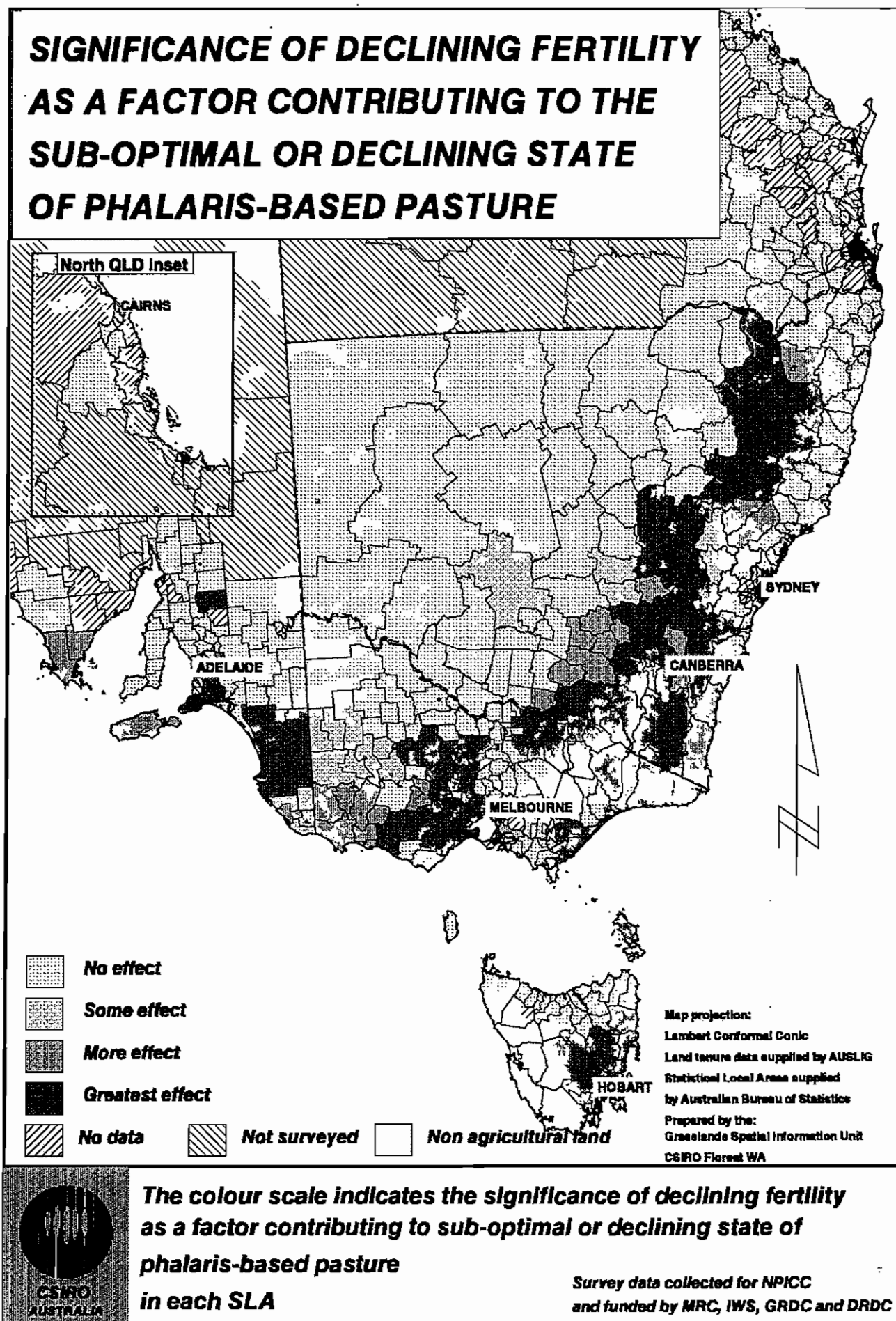
**The colour scale indicates the significance of insect pests
as a factor contributing to sub-optimal or declining state of
subterranean clover-based annual pasture (code 1.10, 1.20)
in each SLA**

Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC

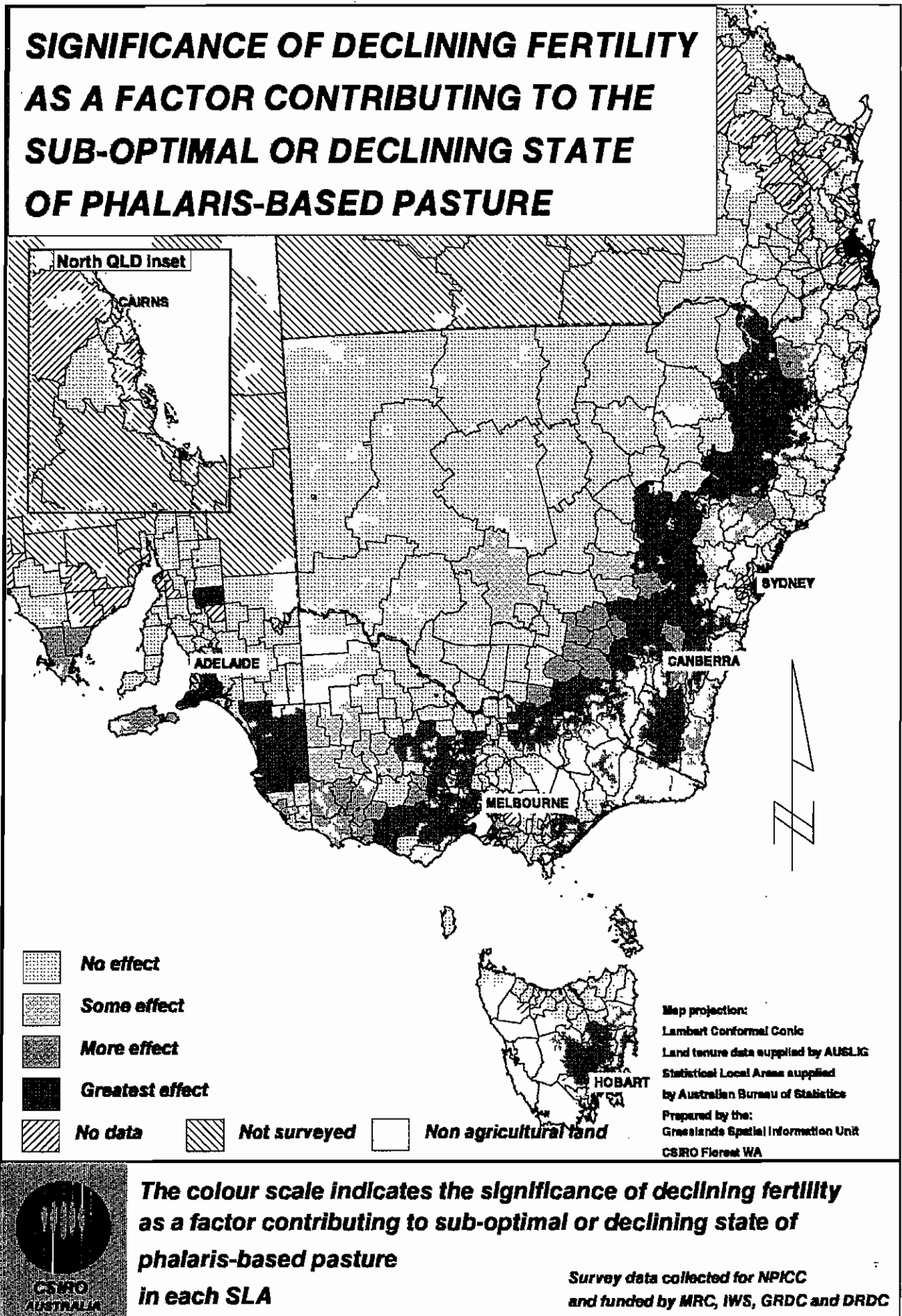
Map 36e. Overstocking as a factor leading to decline in phalaris-based pasture in SE Australia.

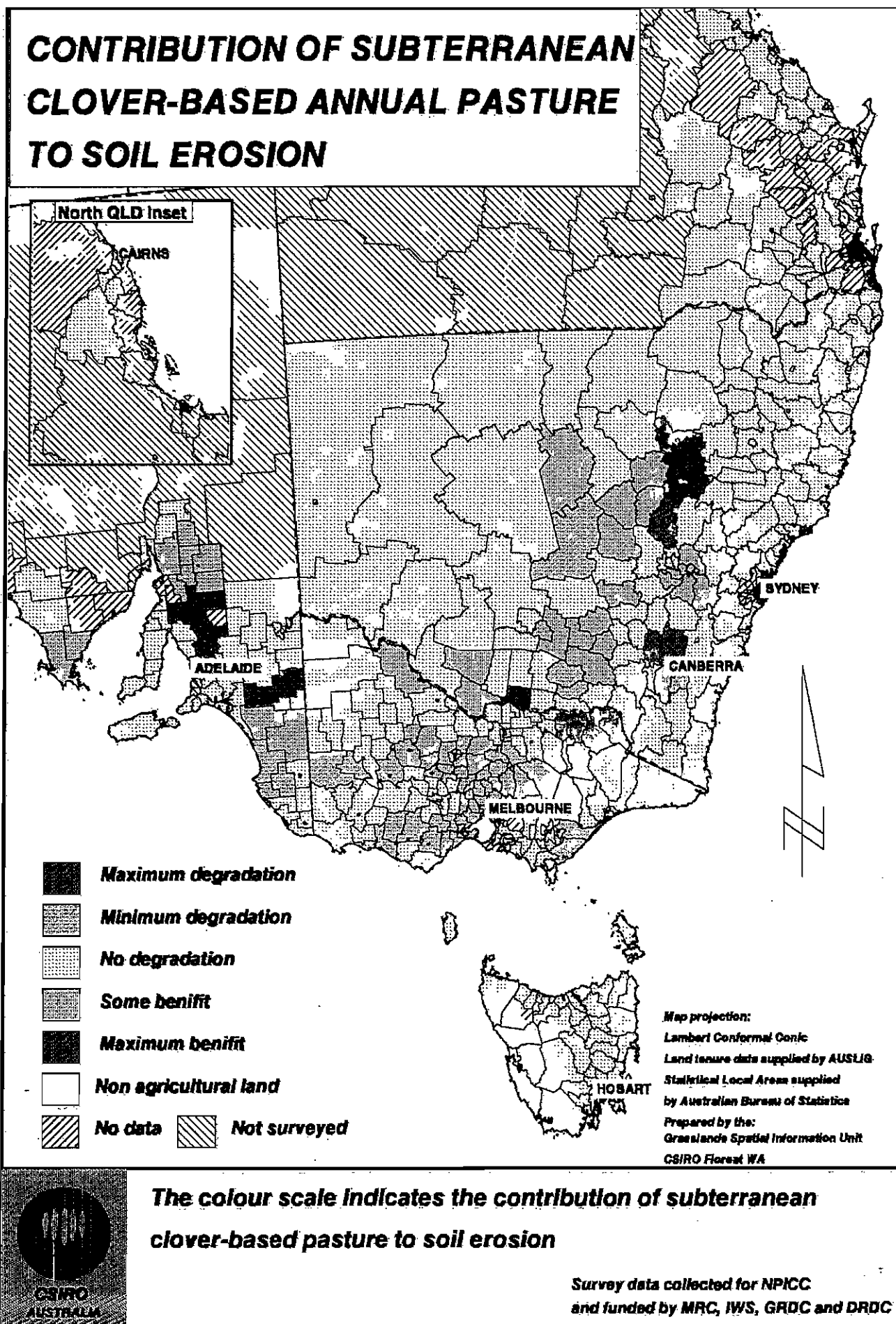


Map 36f. Declining fertility as a factor leading to decline in subterranean clover-based pasture in SE Australia.



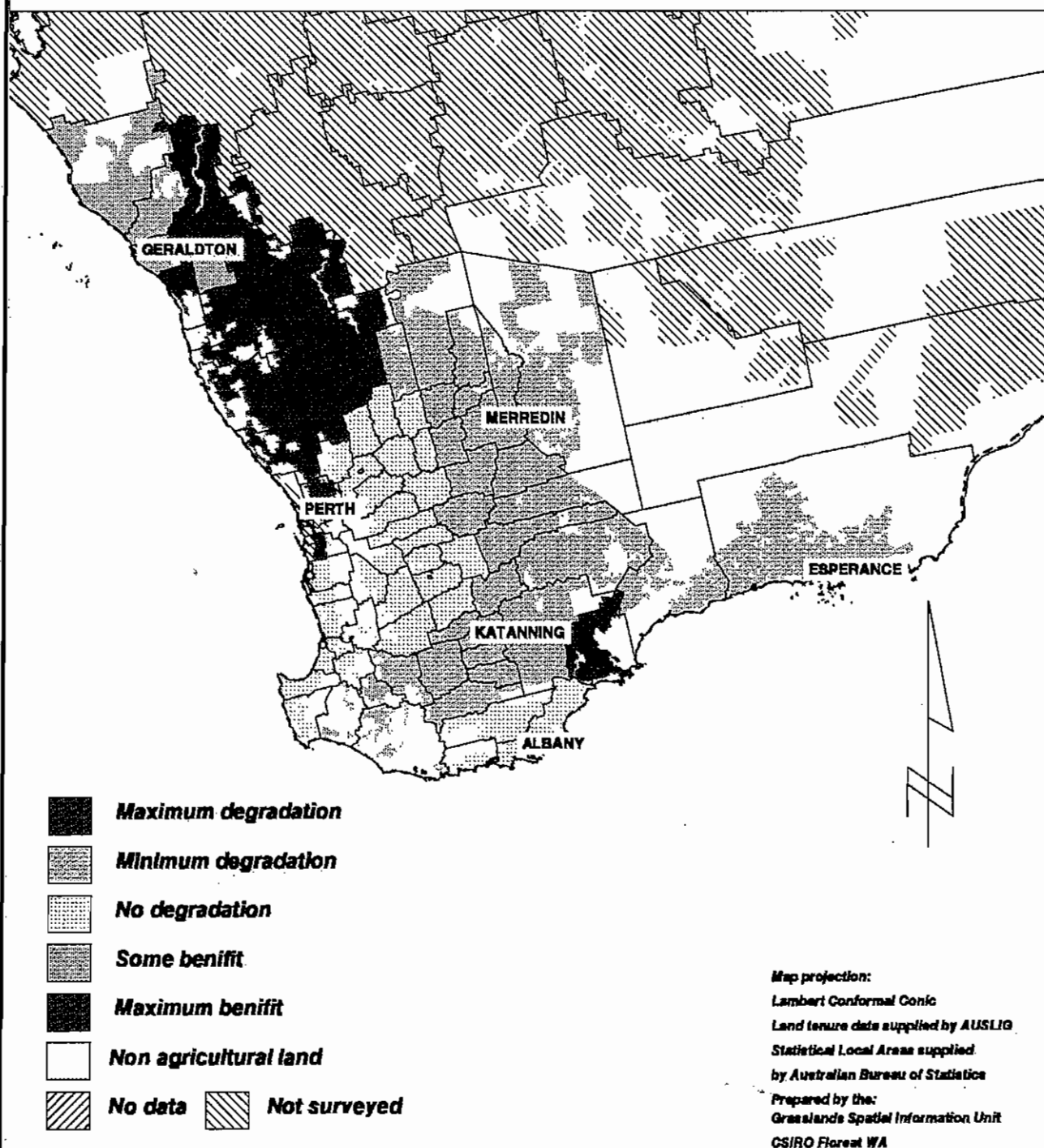
Map 36f. Declining fertility as a factor leading to decline in subterranean clover-based pasture in SE Australia.





Map 37b. Contribution of annual subterranean clover-based pasture to soil erosion or retention in WA.

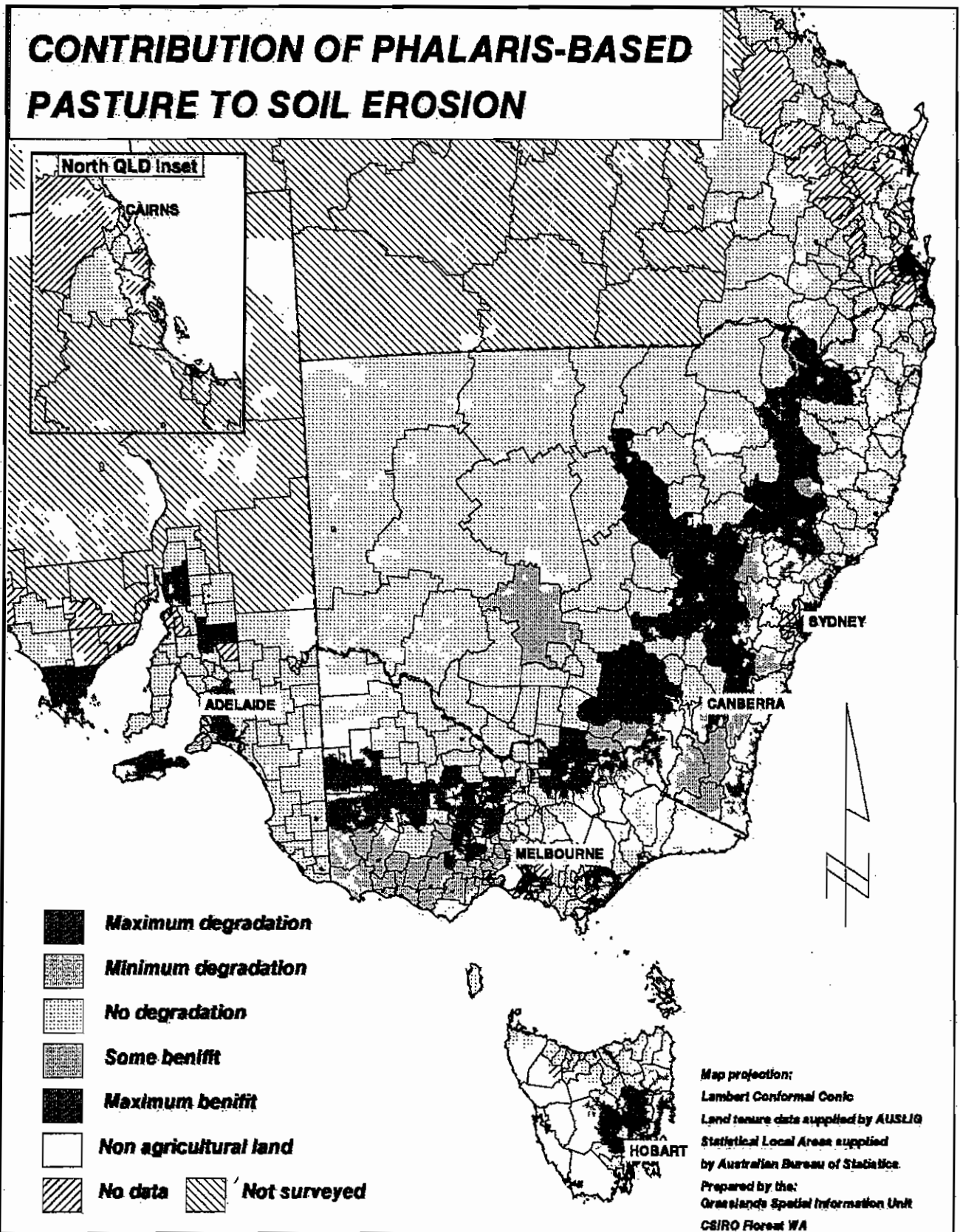
CONTRIBUTION OF SUBTERRANEAN CLOVER-BASED ANNUAL PASTURE TO SOIL EROSION



The colour scale indicates the contribution of subterranean clover-based pasture to soil erosion

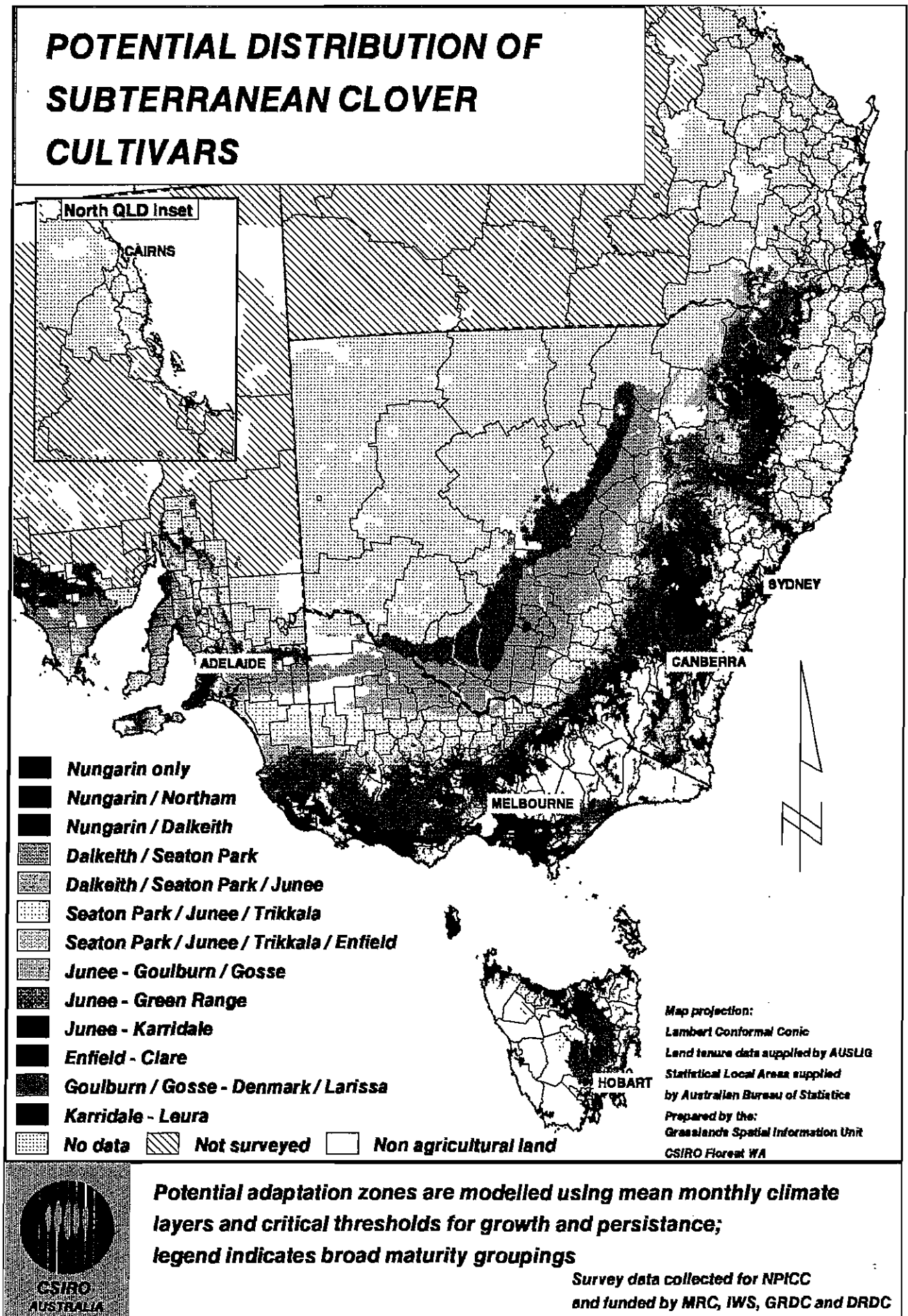
Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC

Map 37c. Contribution of perennial phalaris-based pasture to soil erosion or retention in SE Australia.



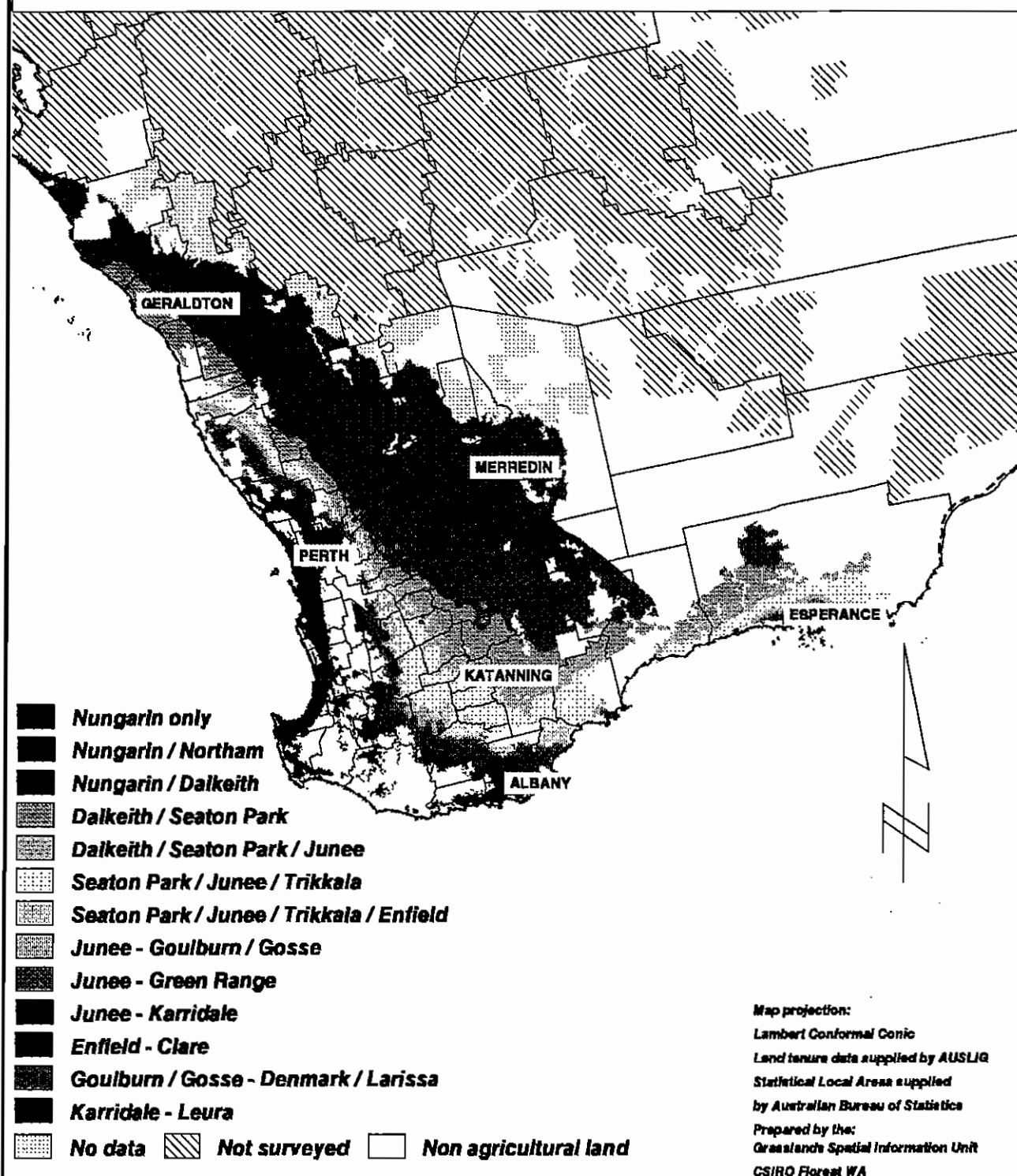
The colour scale indicates the contribution of subterranean clover-based pasture to soil erosion

**Survey data collected for NPICC
 and funded by MRC, IWS, GRDC and DRDC**



Map 38b. Modelled potential distribution of subterranean clover cultivars in Western Australia.

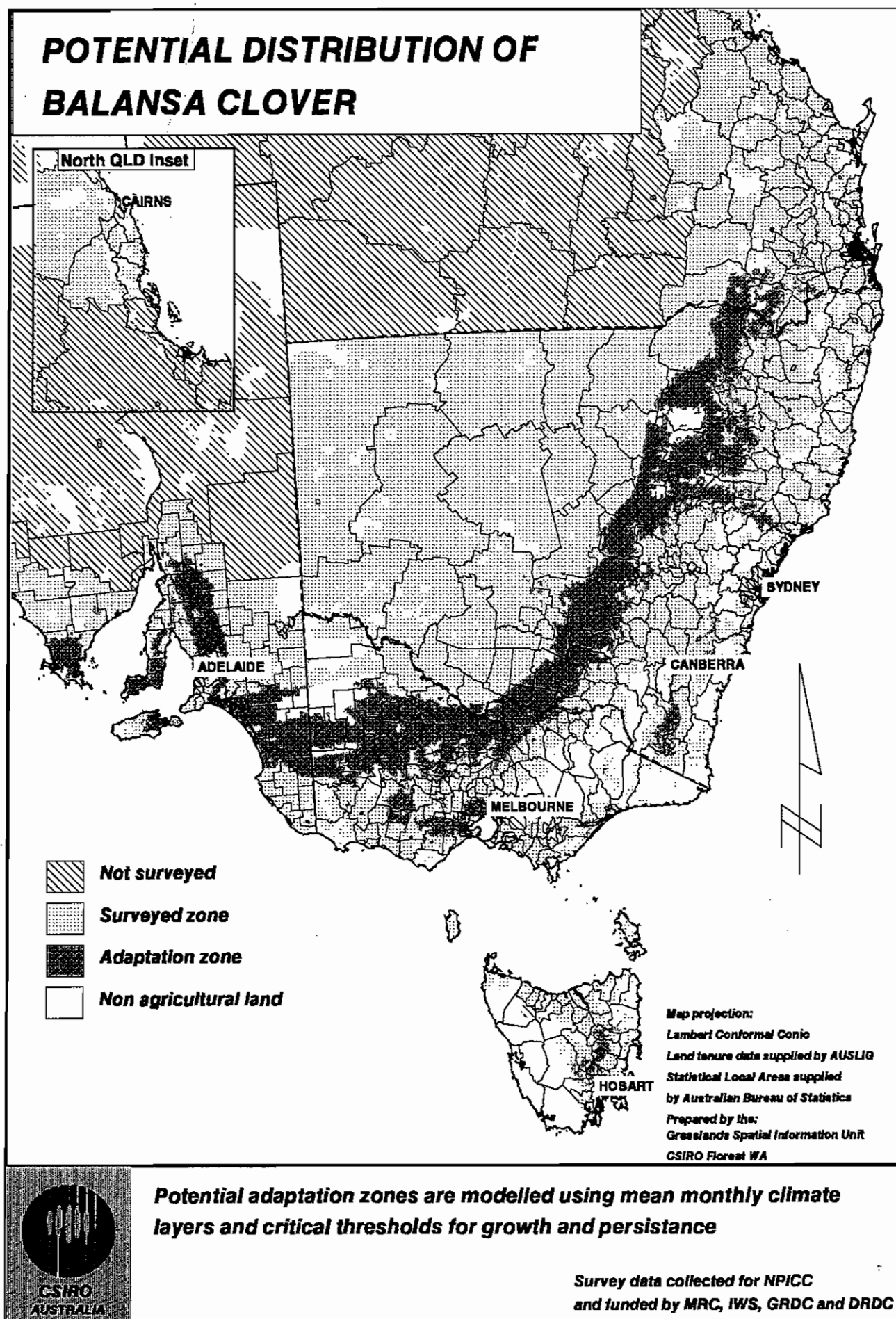
POTENTIAL DISTRIBUTION OF SUBTERRANEAN CLOVER CULTIVARS



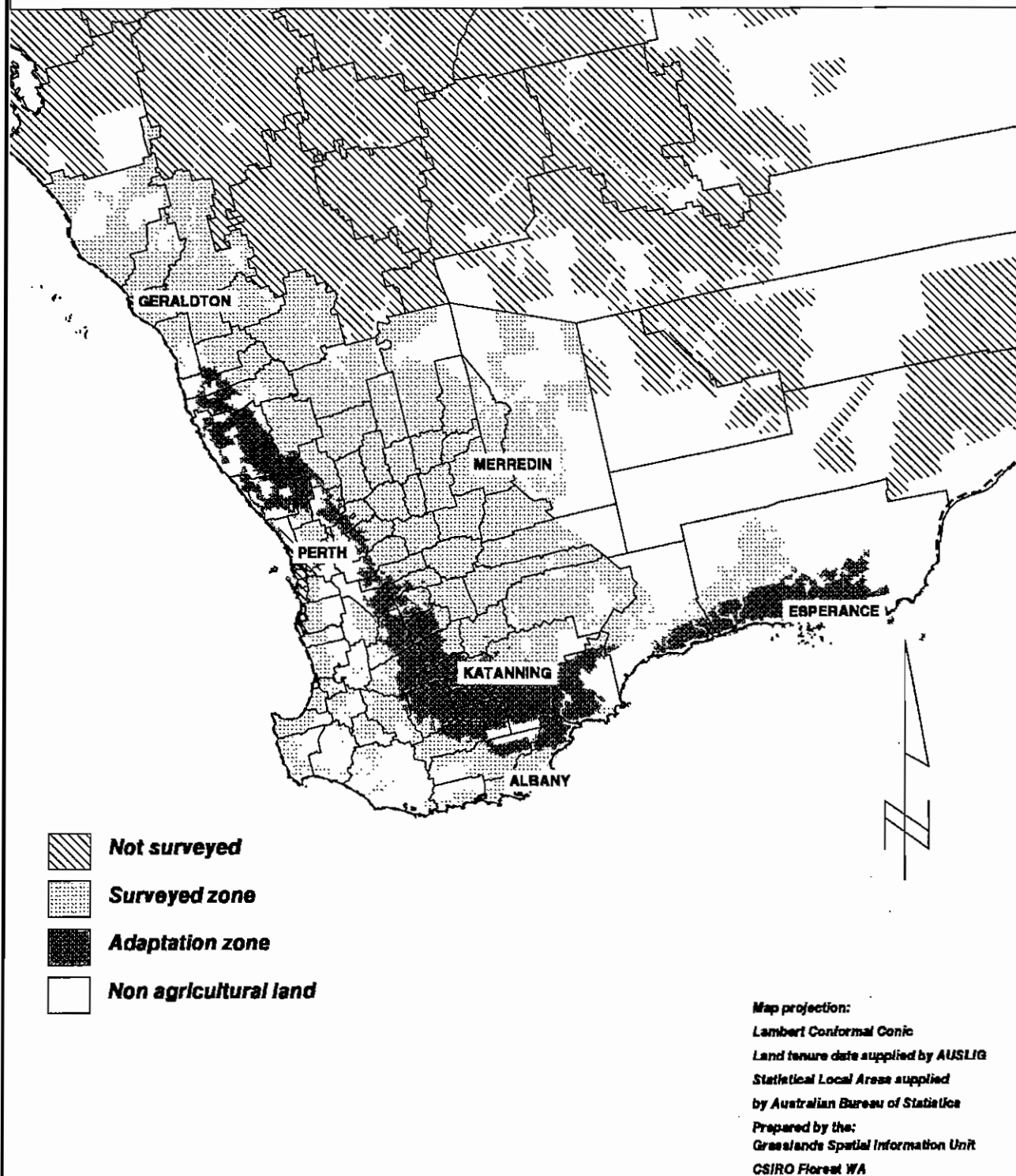
Potential adaptation zones are modelled using mean monthly climate layers and critical thresholds for growth and persistence;
legend indicates broad maturity groupings

Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC

Map 39a. Modelled potential distribution of balansa clover
in SE Australia.



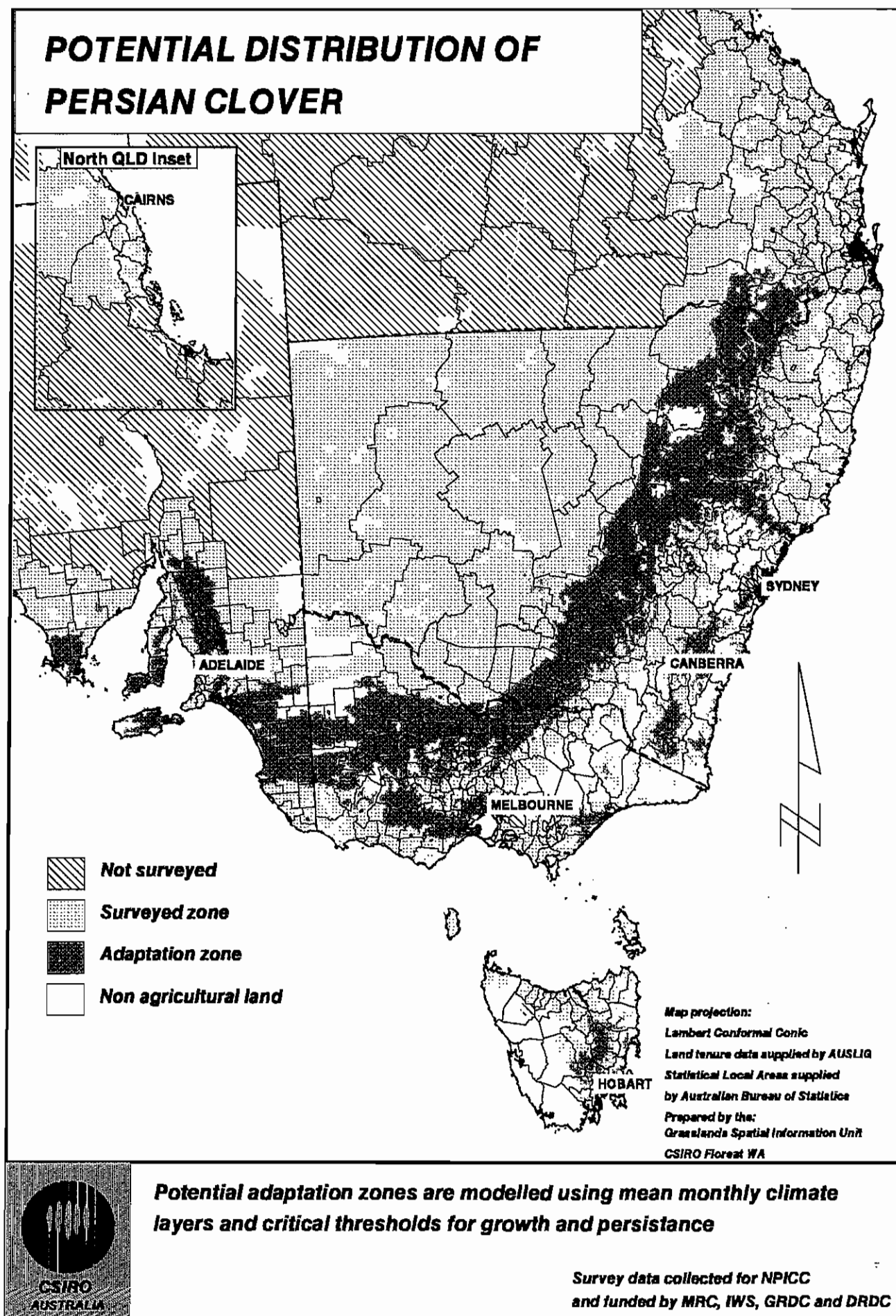
POTENTIAL DISTRIBUTION OF BALANSA CLOVER



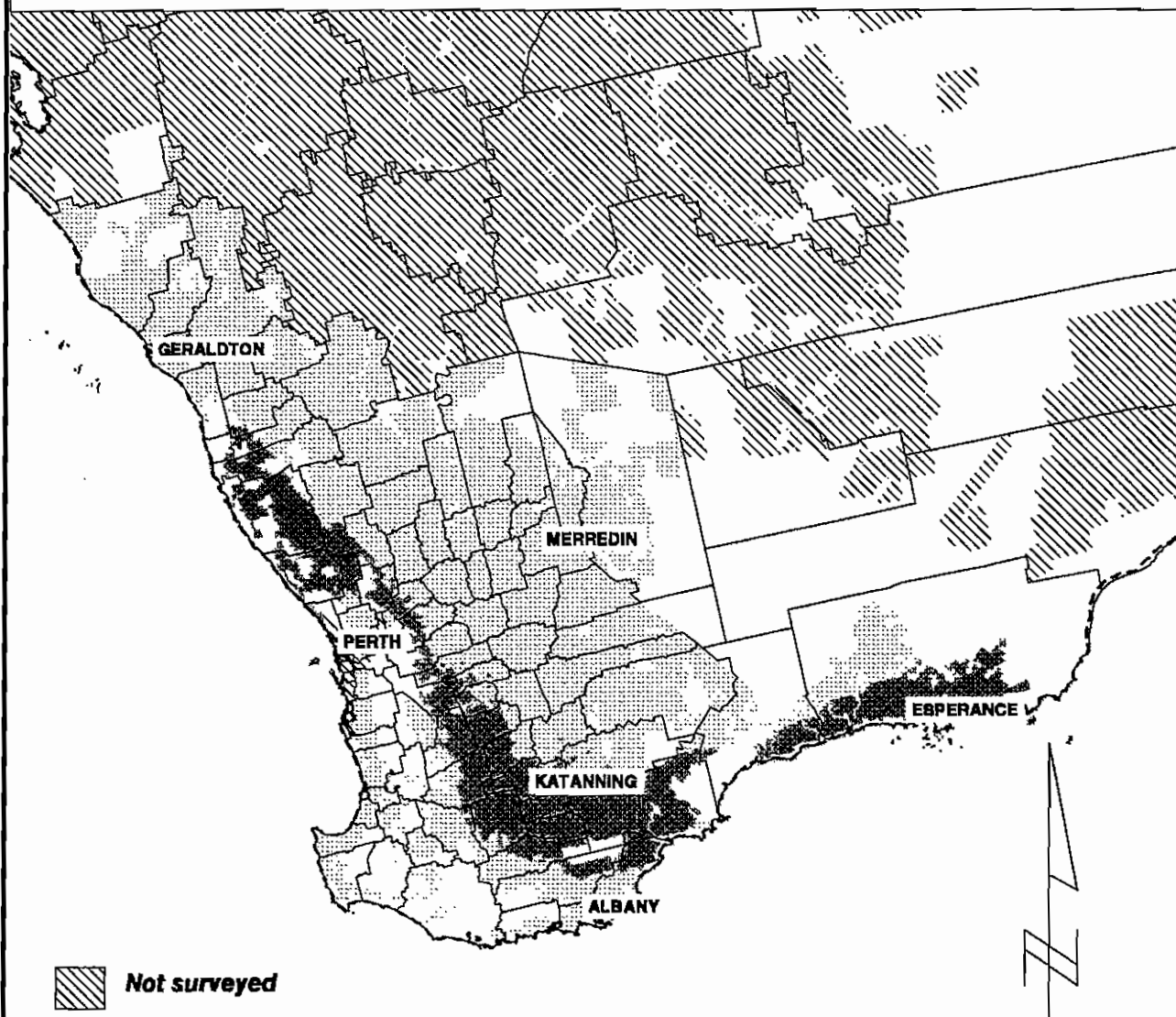
**Potential adaptation zones are modelled using mean monthly climate
layers and critical thresholds for growth and persistence**

**Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC**

Map 40a. Modelled potential distribution of Persian clover
in SE Australia.



POTENTIAL DISTRIBUTION OF PERSIAN CLOVER



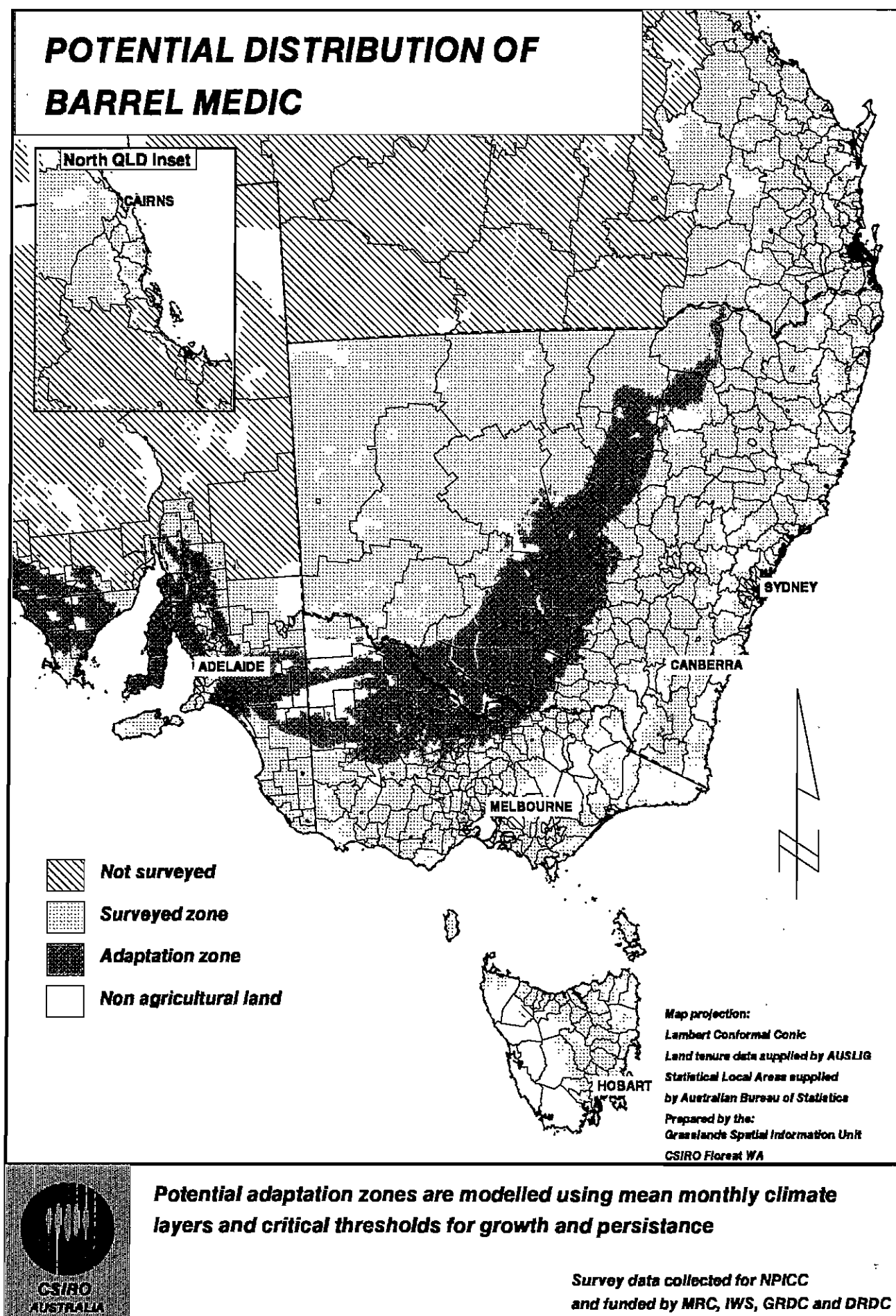
-  **Not surveyed**
-  **Surveyed zone**
-  **Adaptation zone**
-  **Non agricultural land**

Map projection:
Lambert Conformal Conic
Land tenure data supplied by AUSLIG
Statistical Local Areas supplied
by Australian Bureau of Statistics
Prepared by the:
Grasslands Spatial Information Unit
CSIRO Forest WA



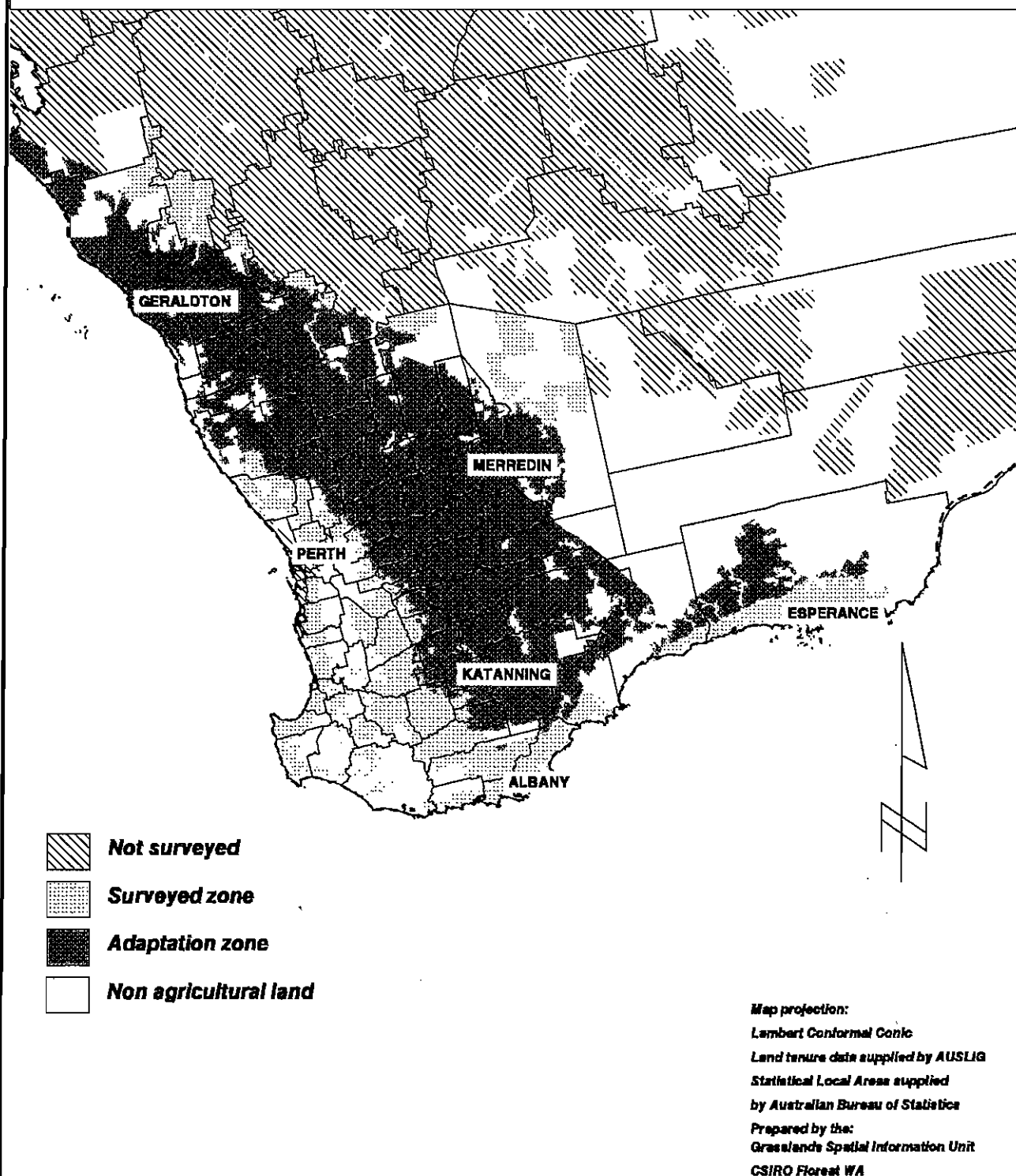
**Potential adaptation zones are modelled using mean monthly climate
layers and critical thresholds for growth and persistence**

Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC



Map 41b. Modelled potential distribution of barrel medic in Western Australia.

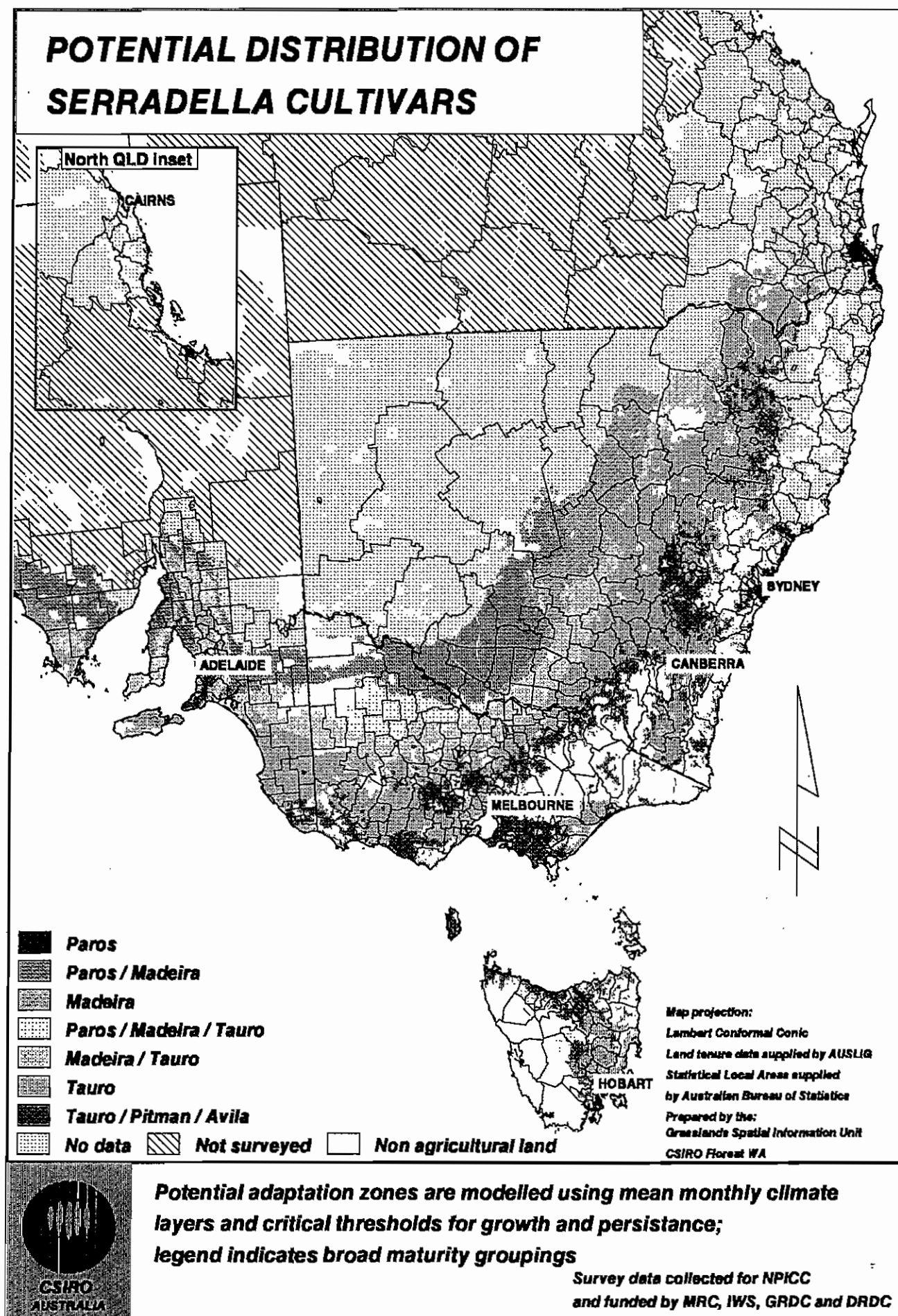
POTENTIAL DISTRIBUTION OF BARREL MEDIC



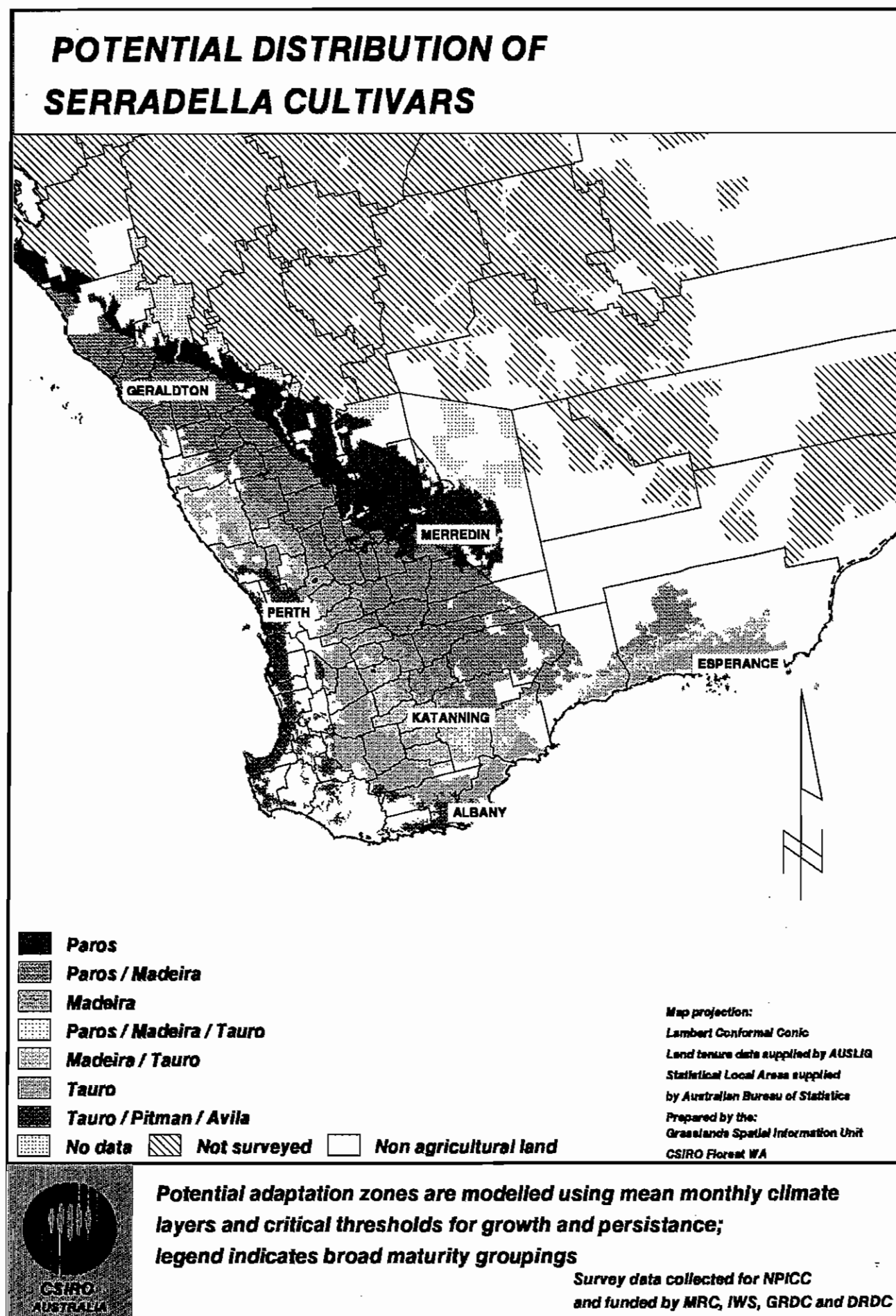
Potential adaptation zones are modelled using mean monthly climate layers and critical thresholds for growth and persistence

**Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC**

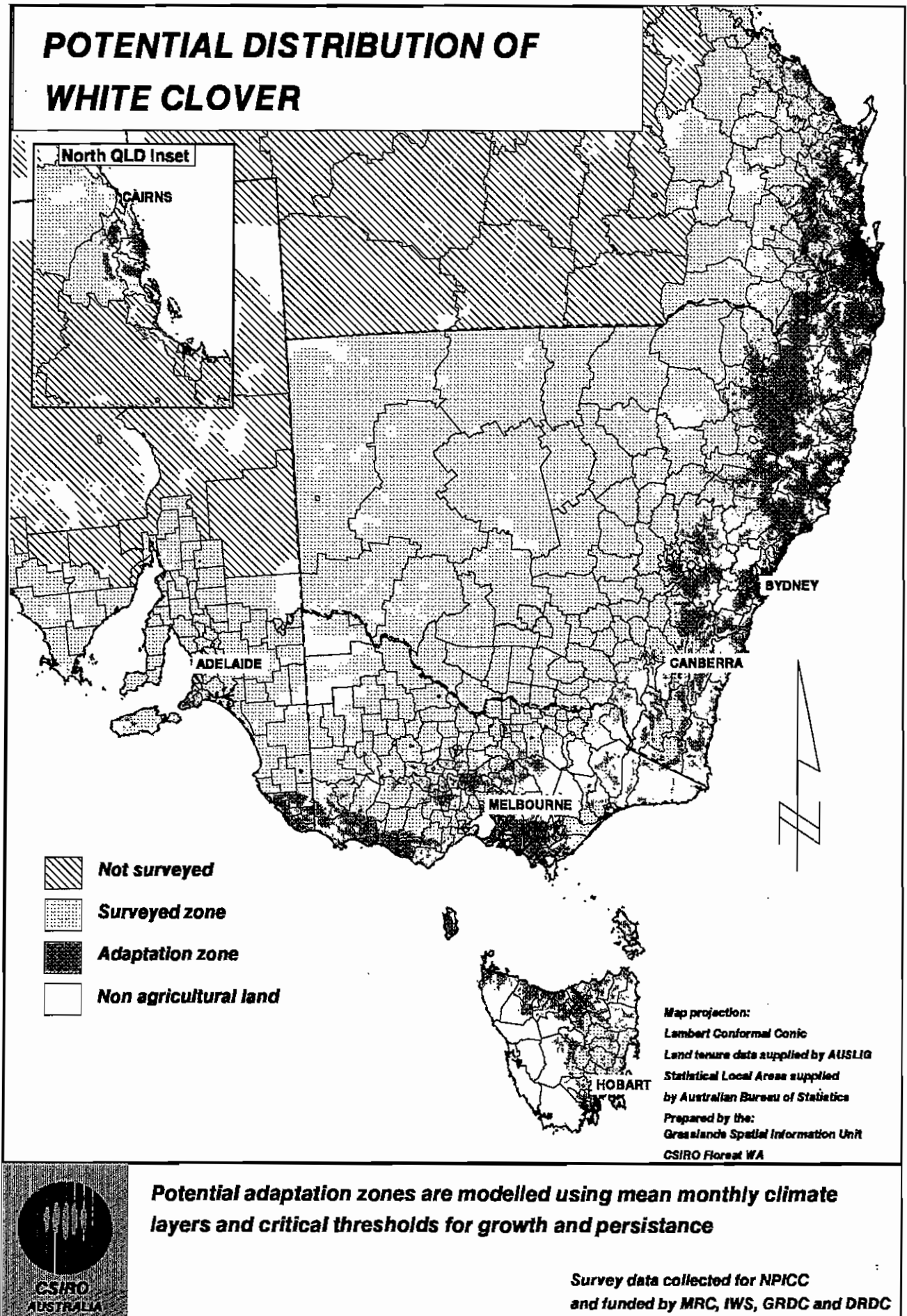
Map 42a. Modelled potential distribution of yellow serradella cultivars in SE Australia.



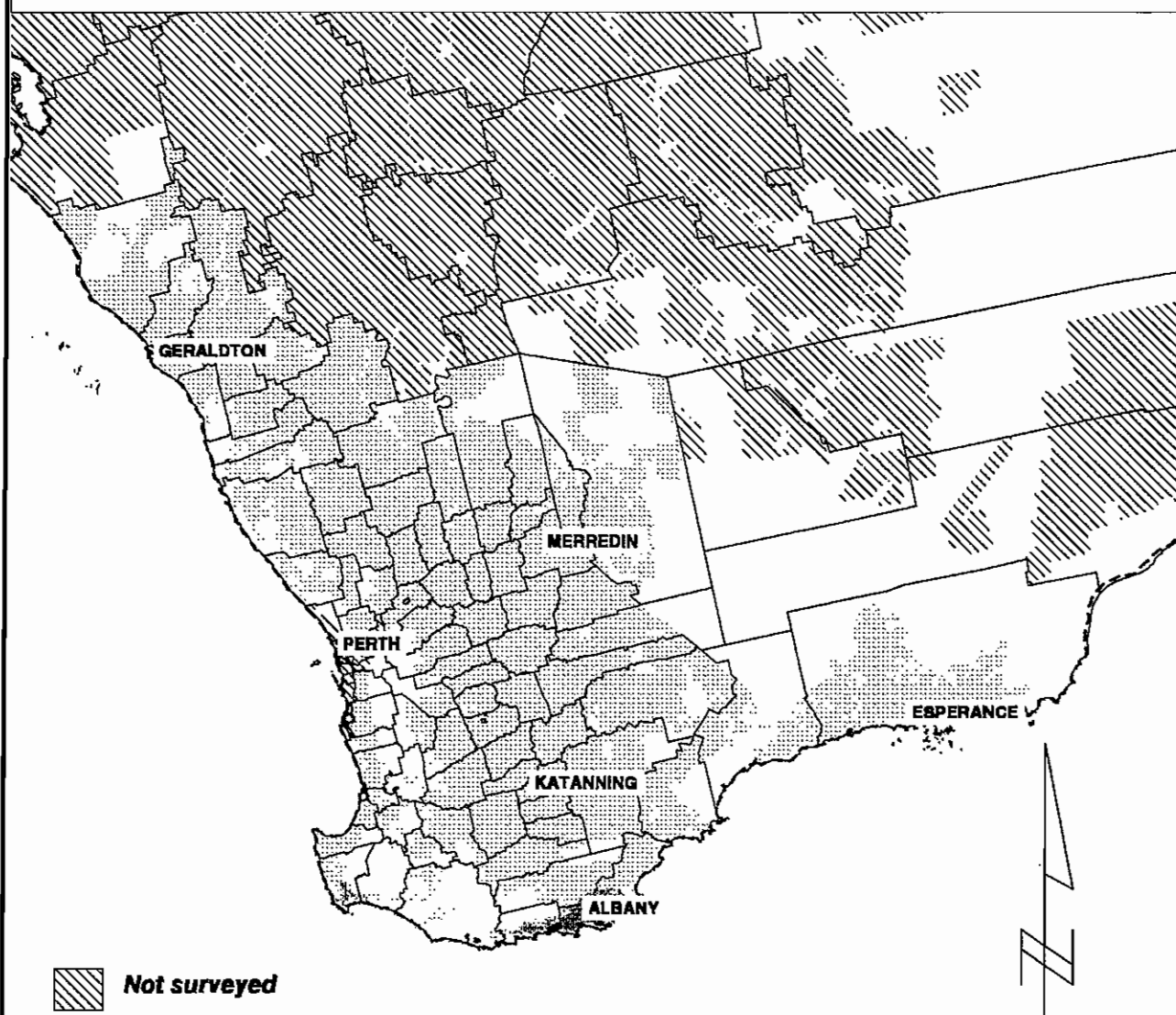
Map 42b. Modelled potential distribution of yellow serradella cultivars in Western Australia.



Map 43a. Modelled potential distribution of white clover in Eastern Australia.



POTENTIAL DISTRIBUTION OF WHITE CLOVER



-  **Not surveyed**
-  **Surveyed zone**
-  **Adaptation zone**
-  **Non agricultural land**

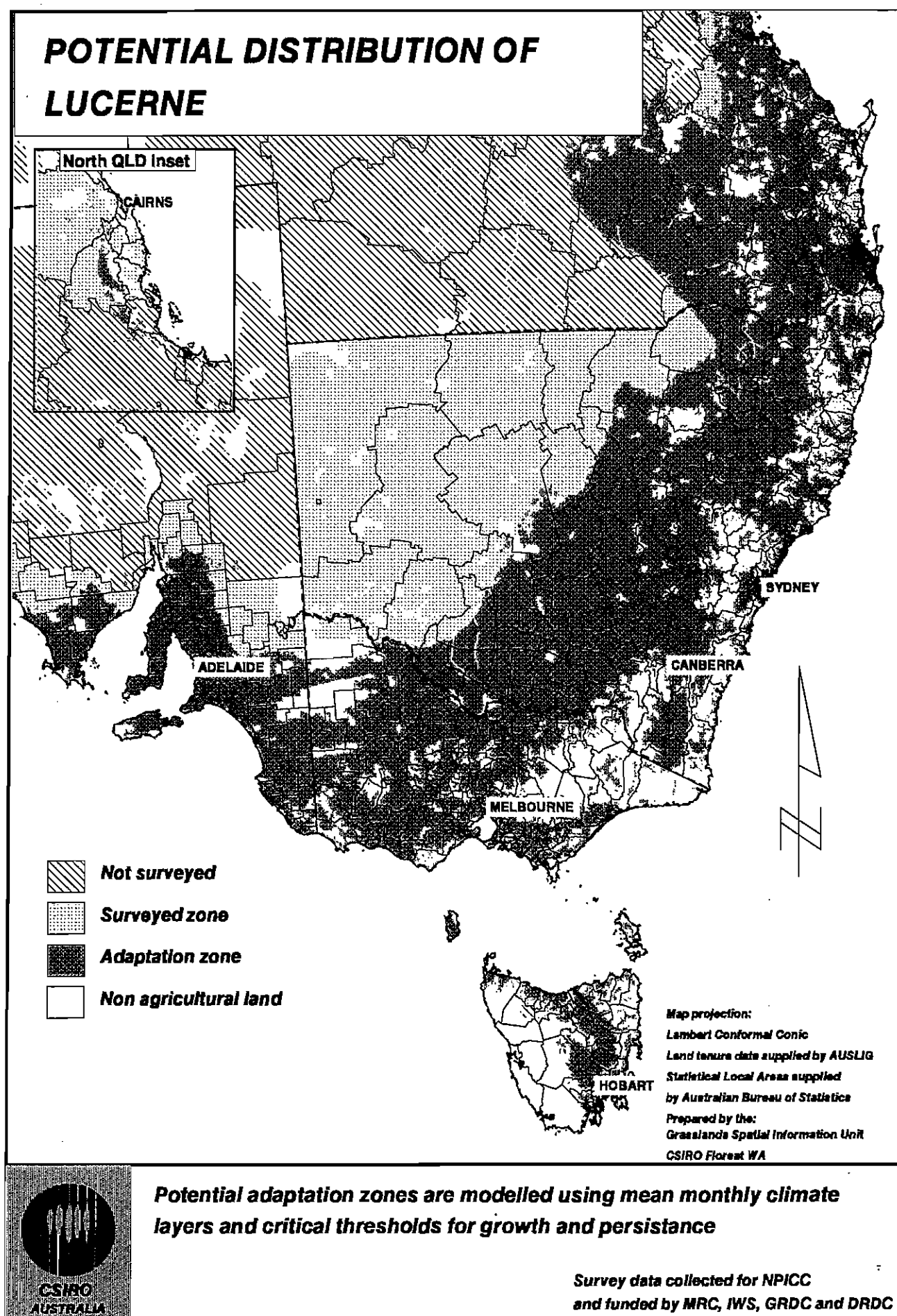
Map projection:
Lambert Conformal Conic
Land tenure data supplied by AUSLIG
Statistical Local Areas supplied
by Australian Bureau of Statistics
Prepared by the:
Grasslands Spatial Information Unit
CSIRO Forest WA



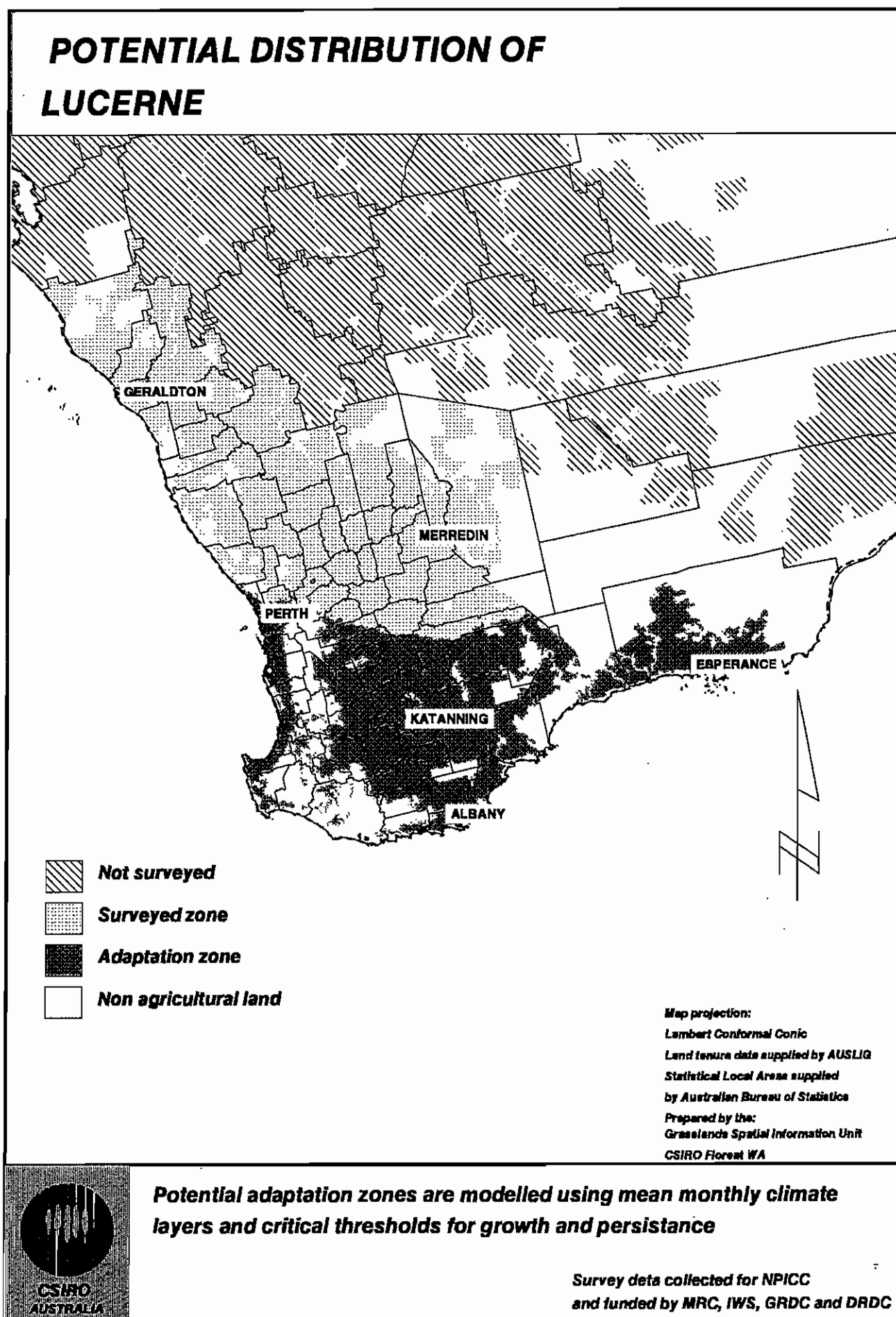
Potential adaptation zones are modelled using mean monthly climate layers and critical thresholds for growth and persistence

**Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC**

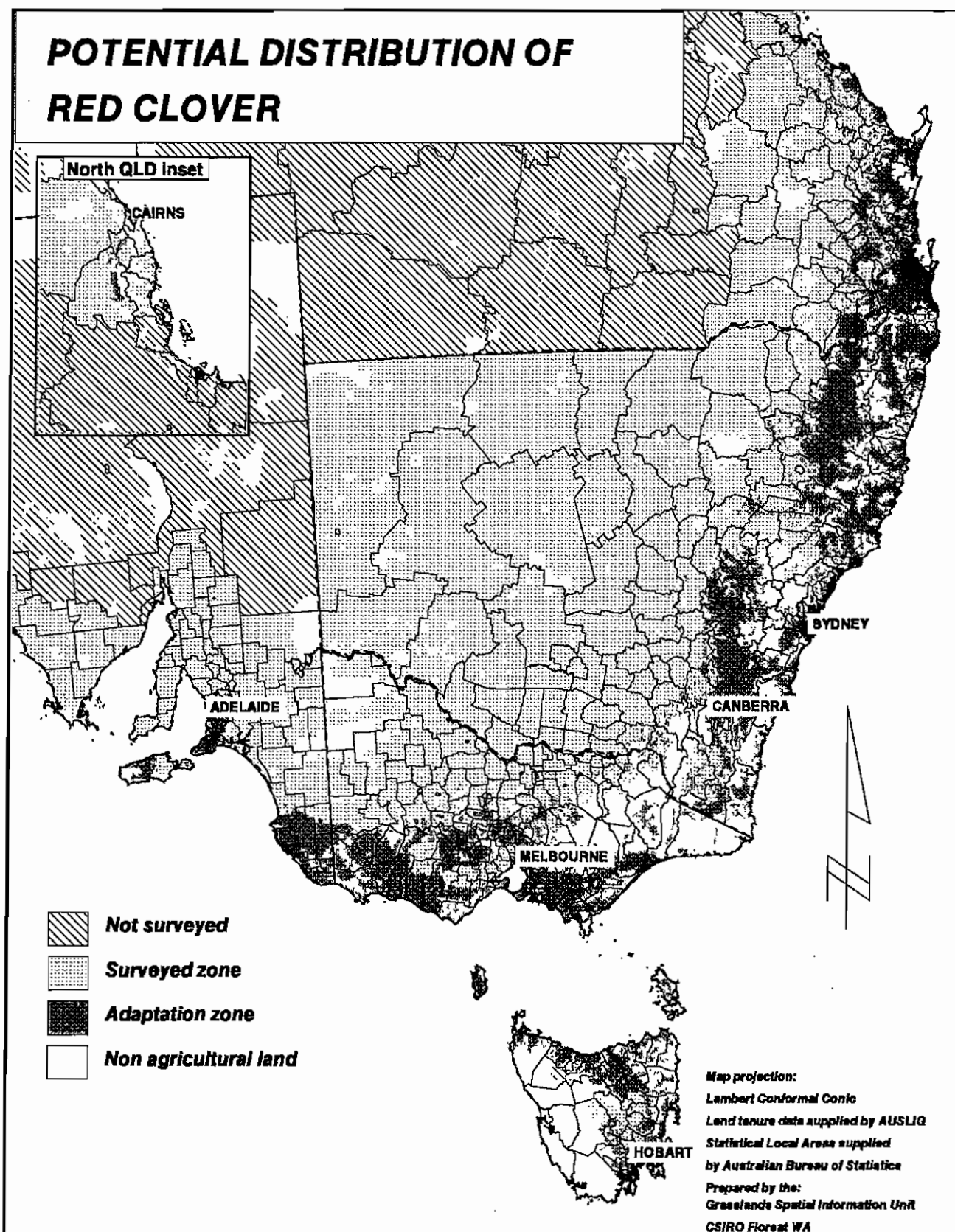
Map 44a. Modelled potential distribution of lucerne in Eastern Australia.



Map 44b. Modelled potential distribution of lucerne in Western Australia.



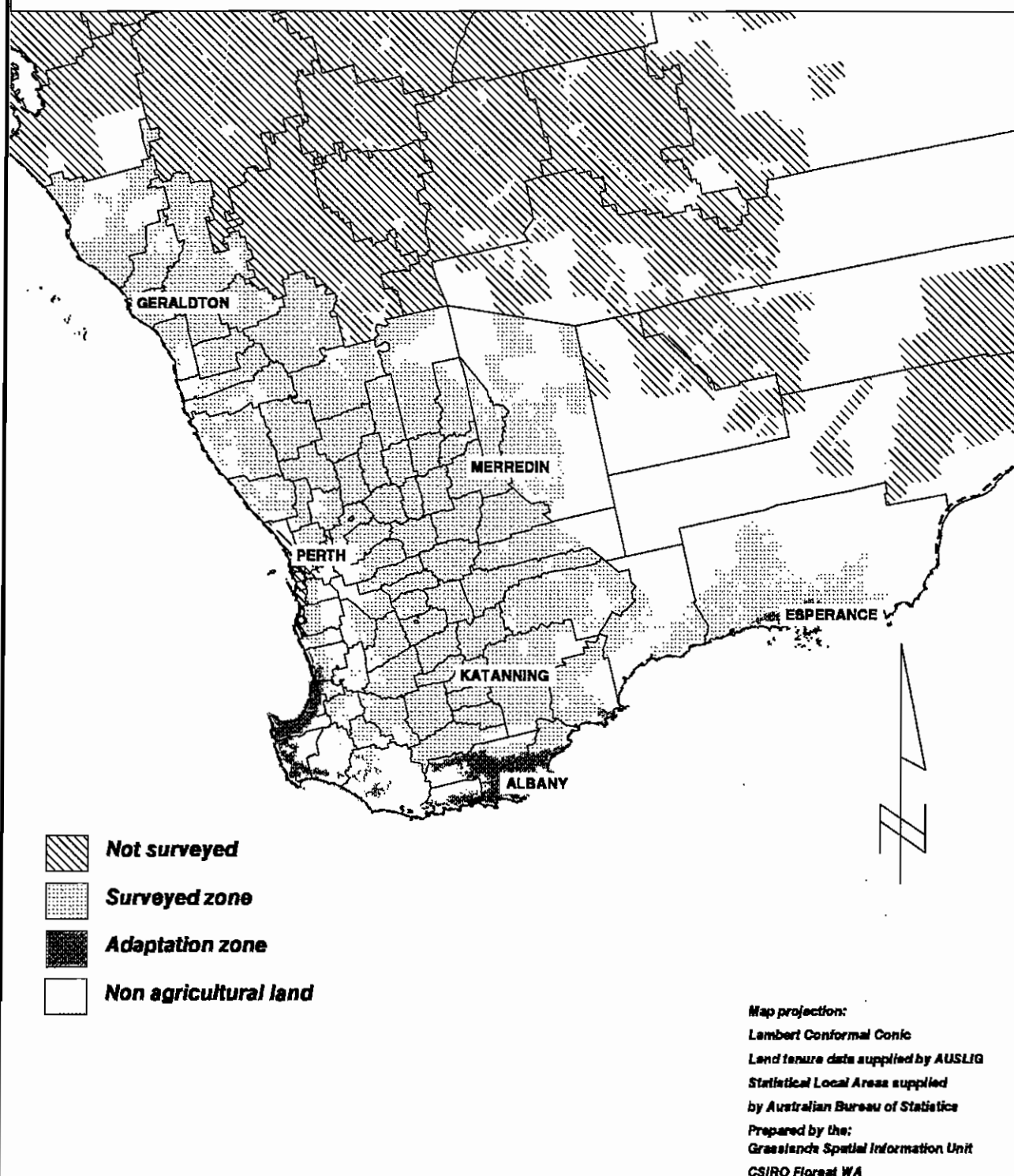
Map 45a. Modelled potential distribution of red clover in Eastern Australia.



Potential adaptation zones are modelled using mean monthly climate layers and critical thresholds for growth and persistence

Survey data collected for NPICC
 and funded by MRC, IWS, GRDC and DRDC

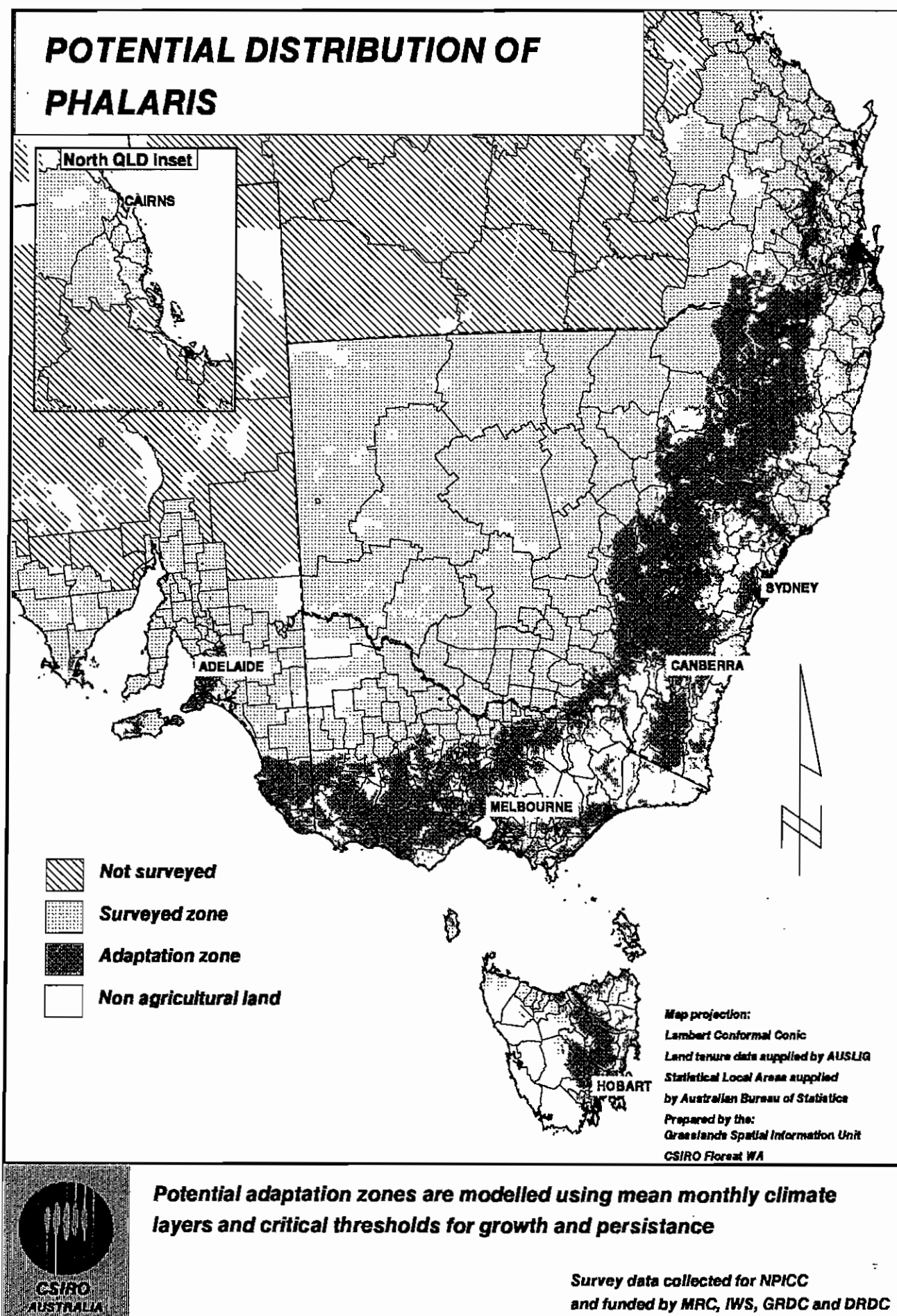
POTENTIAL DISTRIBUTION OF RED CLOVER



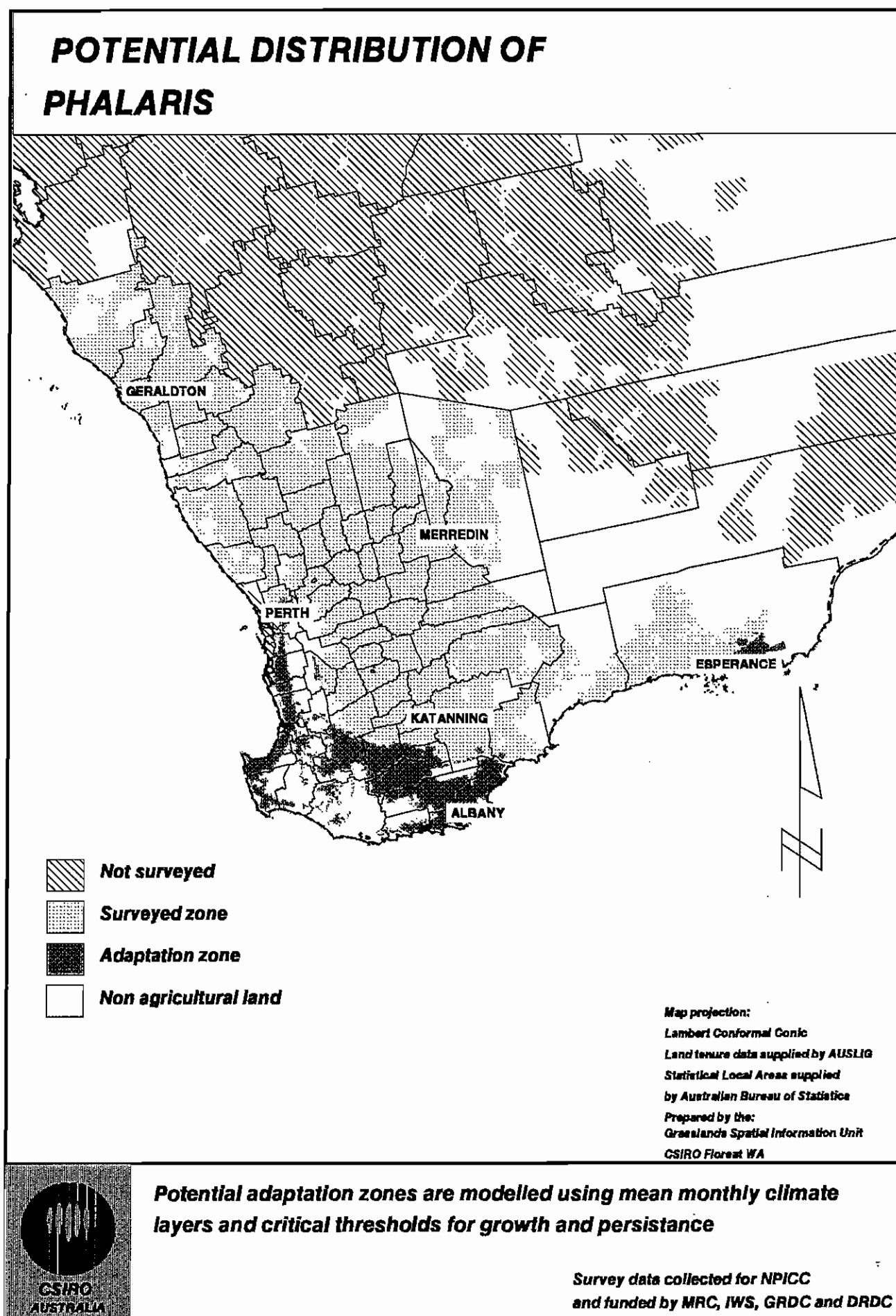
Potential adaptation zones are modelled using mean monthly climate layers and critical thresholds for growth and persistence

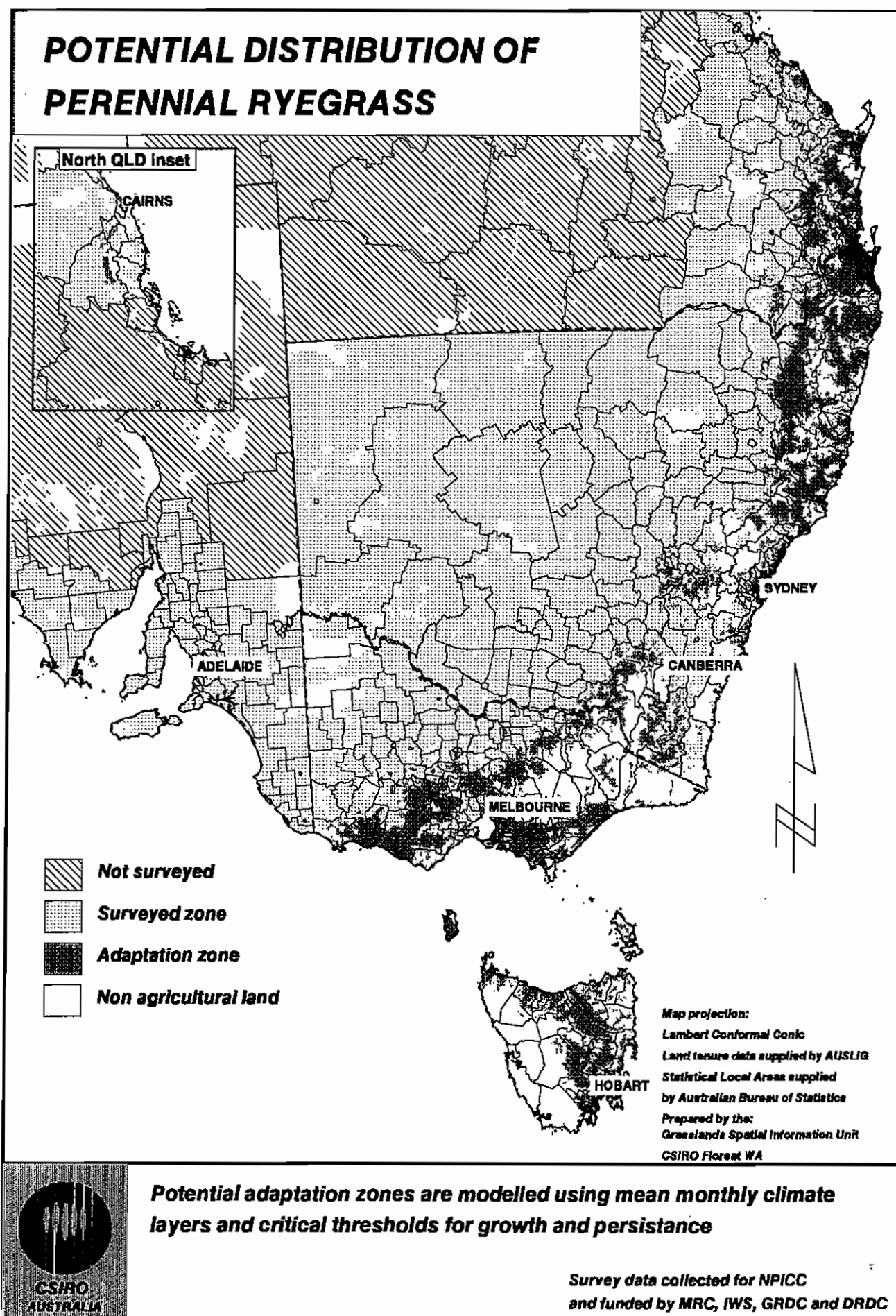
Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC

Map 46a. Modelled potential distribution of phalaris in Eastern Australia.

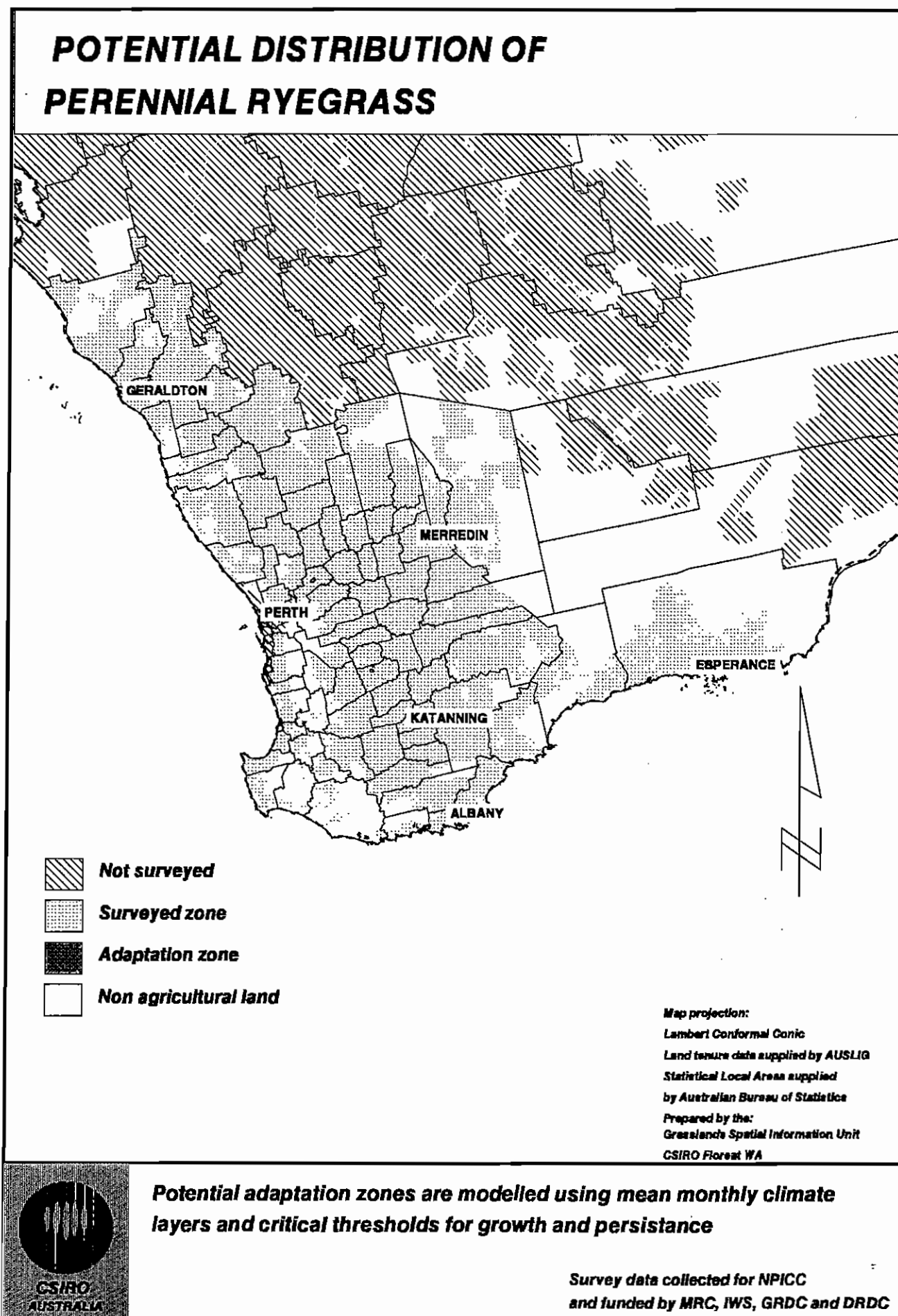


Map 46b. Modelled potential distribution of phalaris in Western Australia.

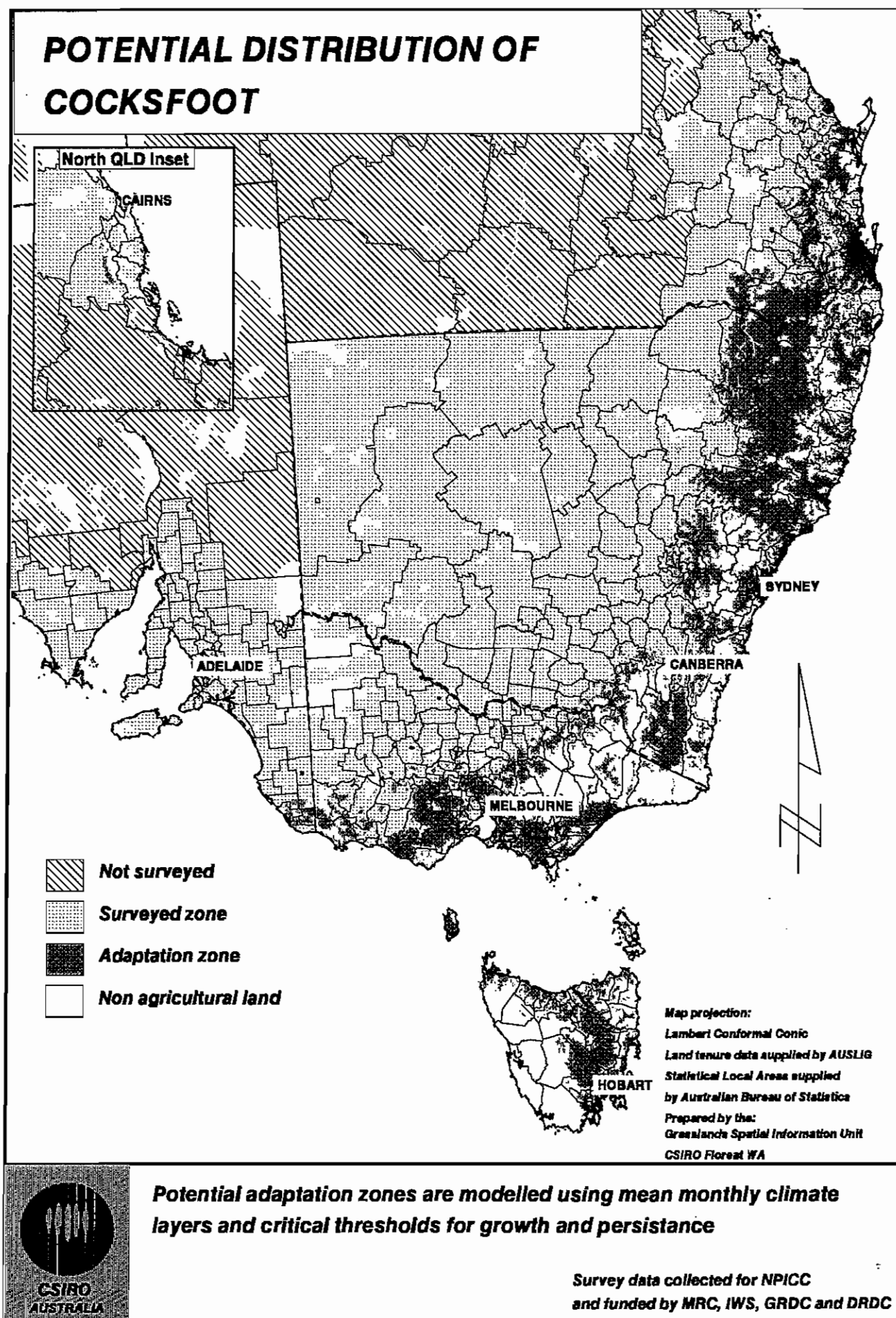




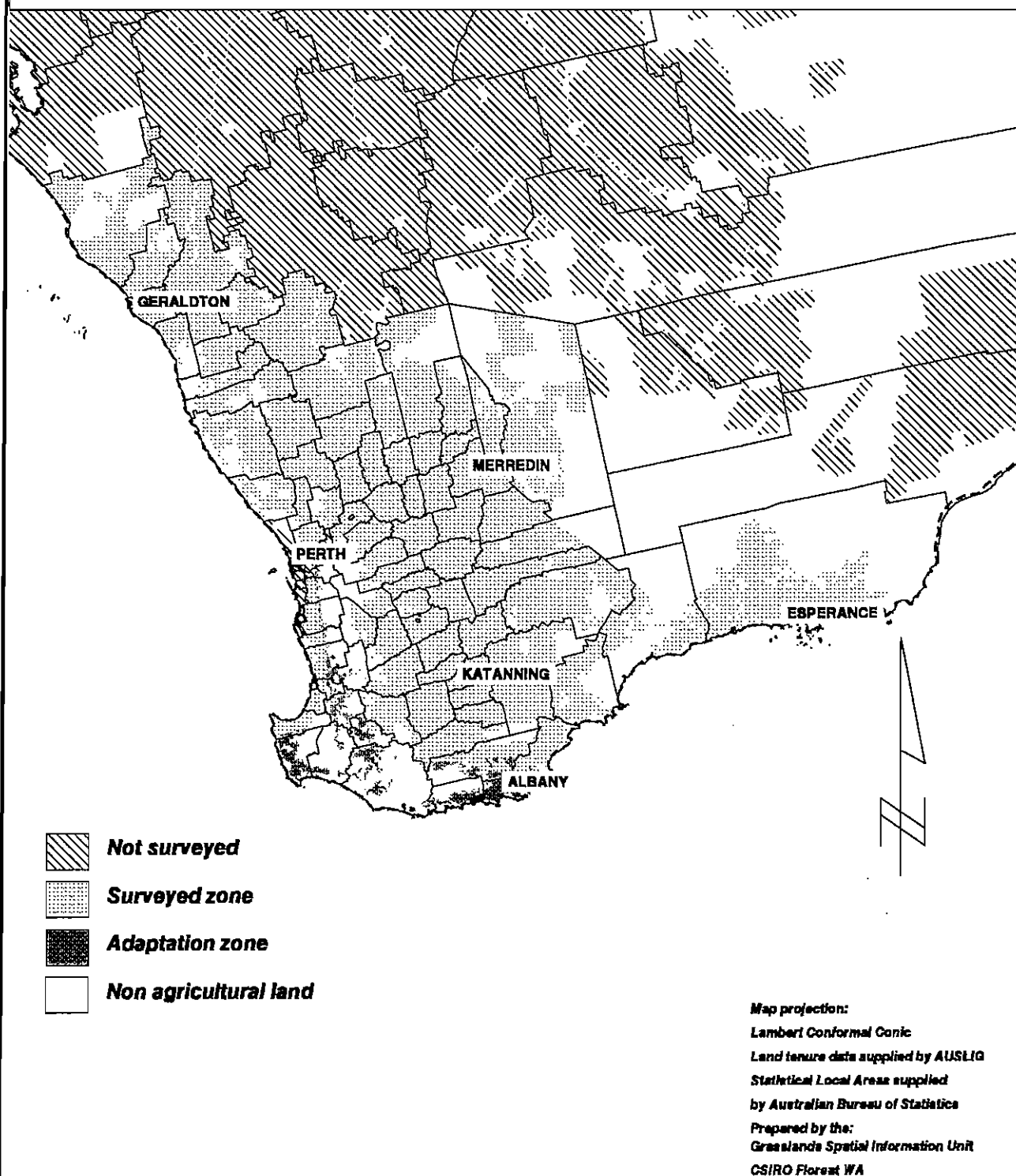
Map 47b. Modelled potential distribution of perennial ryegrass in Western Australia.



Map 48a. Modelled potential distribution of cocksfoot in Eastern Australia.



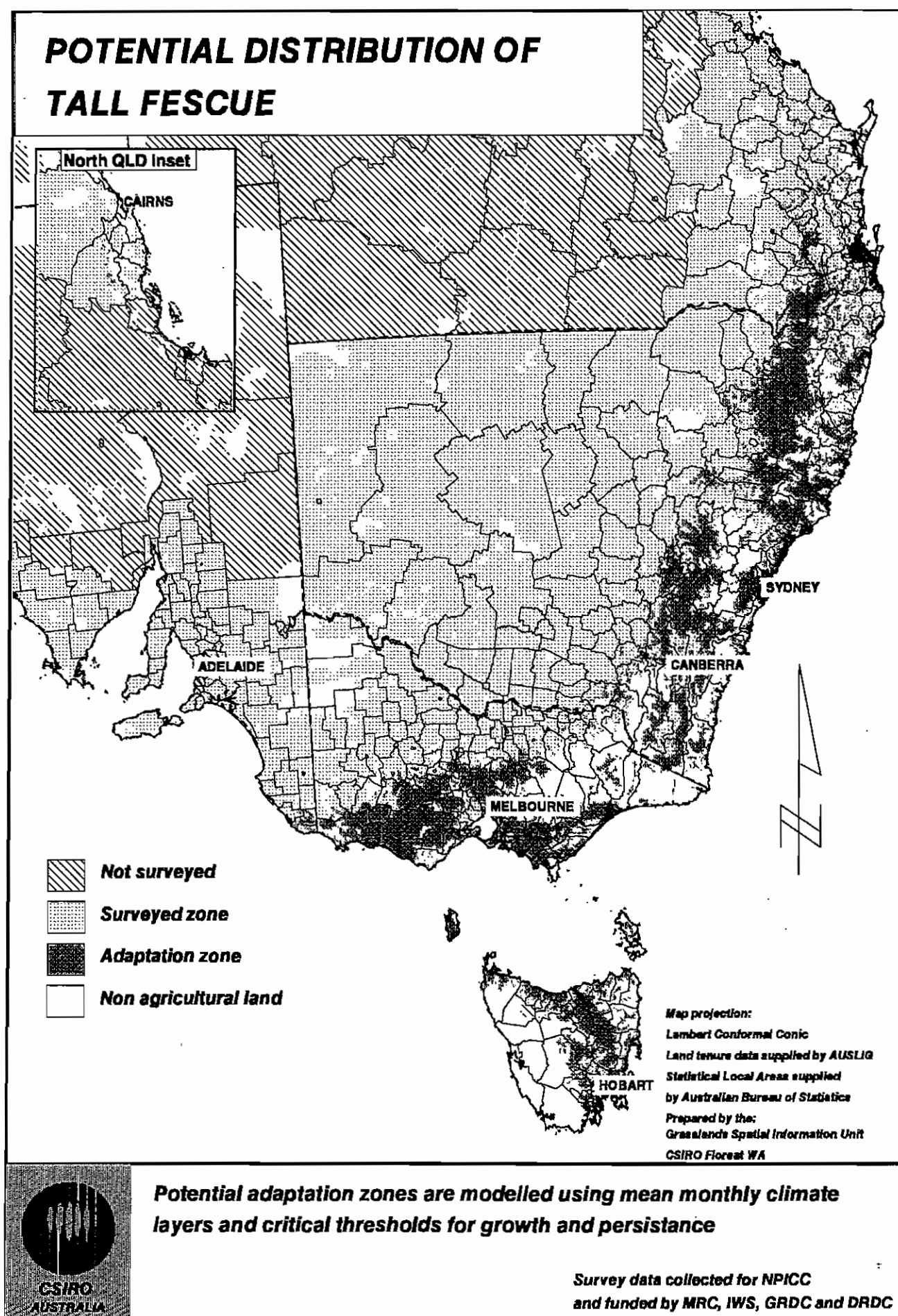
POTENTIAL DISTRIBUTION OF COCKSFOOT



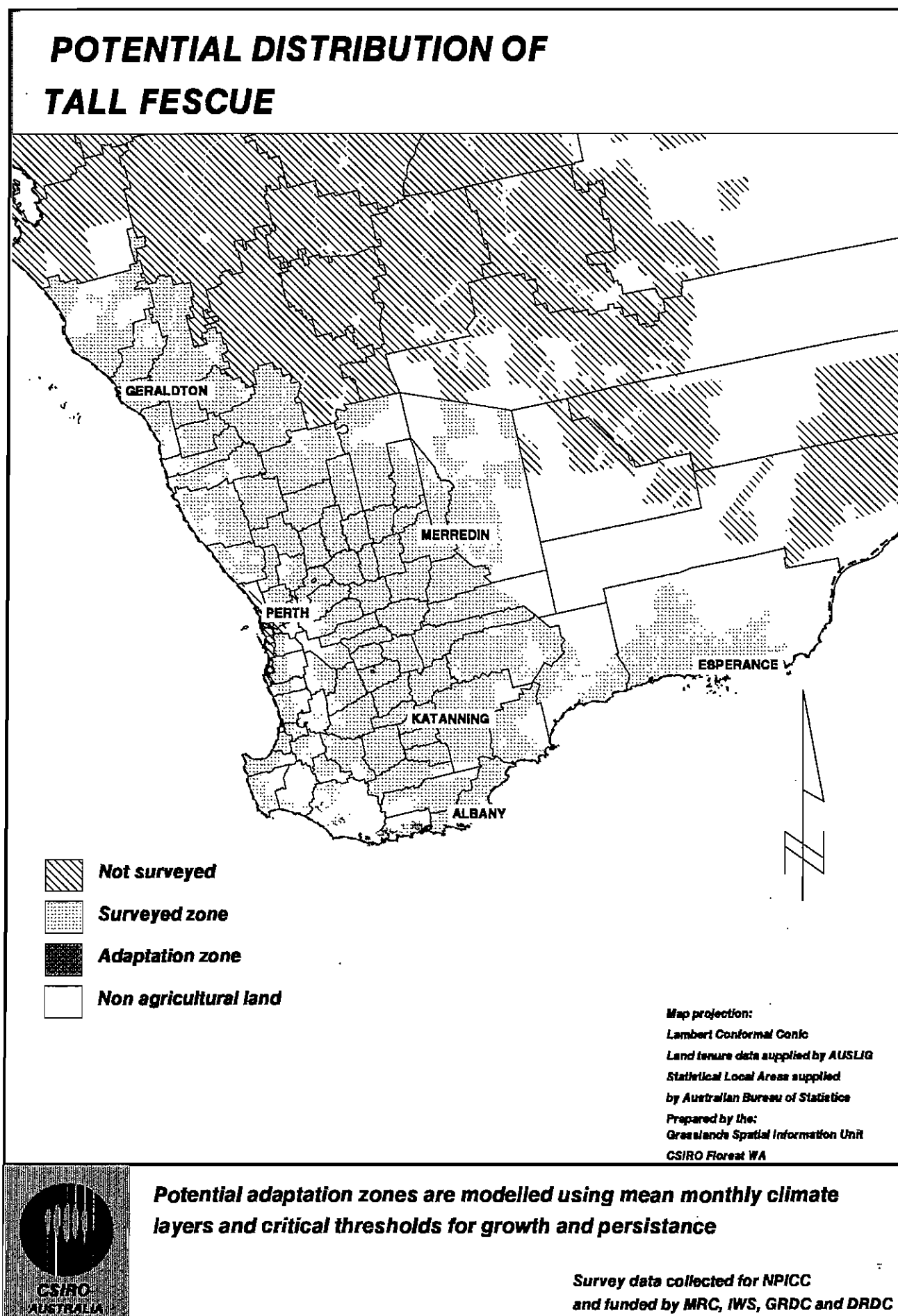
Potential adaptation zones are modelled using mean monthly climate layers and critical thresholds for growth and persistence

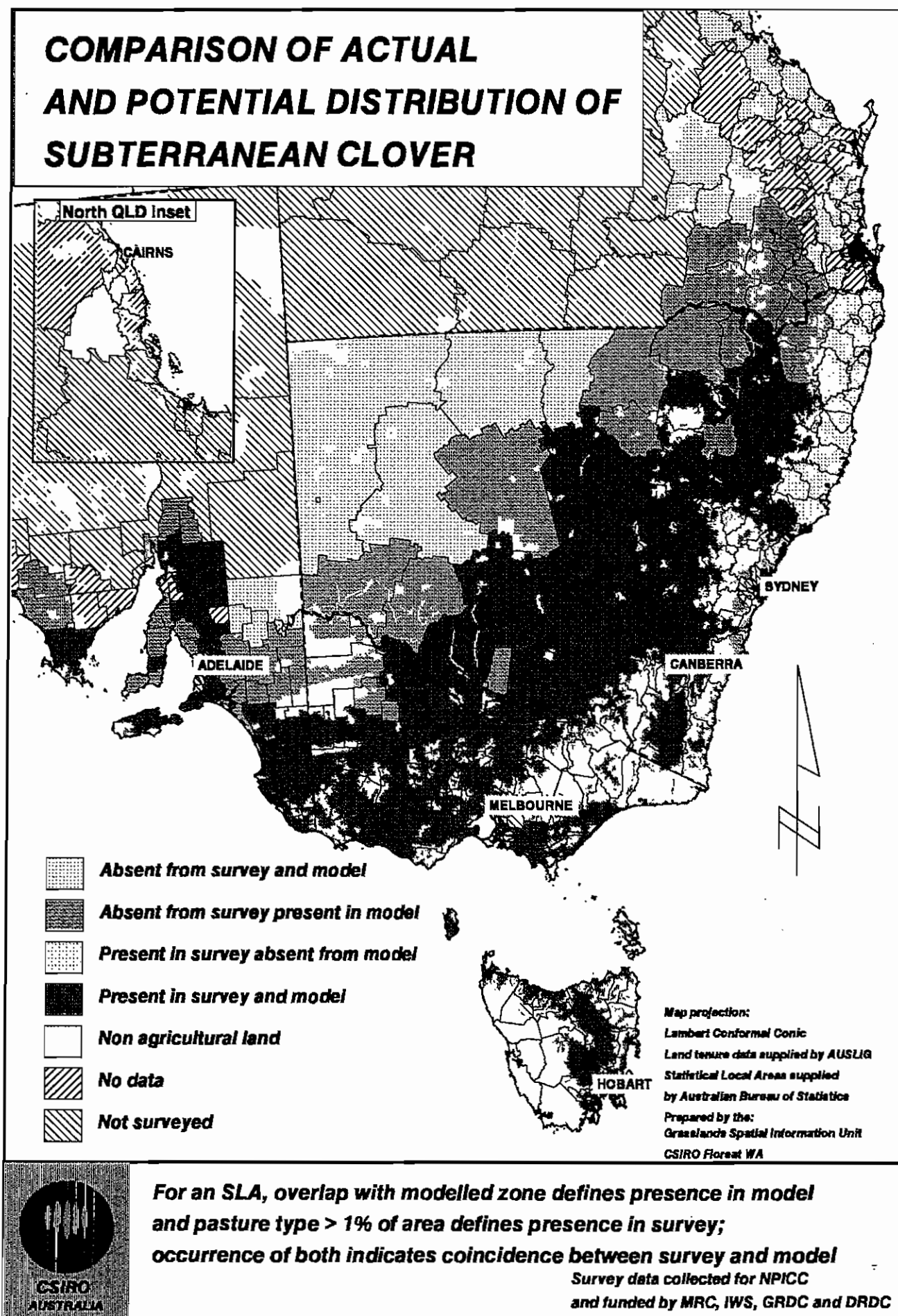
Survey data collected for NPICC and funded by MRC, IWS, GRDC and DRDC

Map 49a. Modelled potential distribution of tall fescue in Eastern Australia.

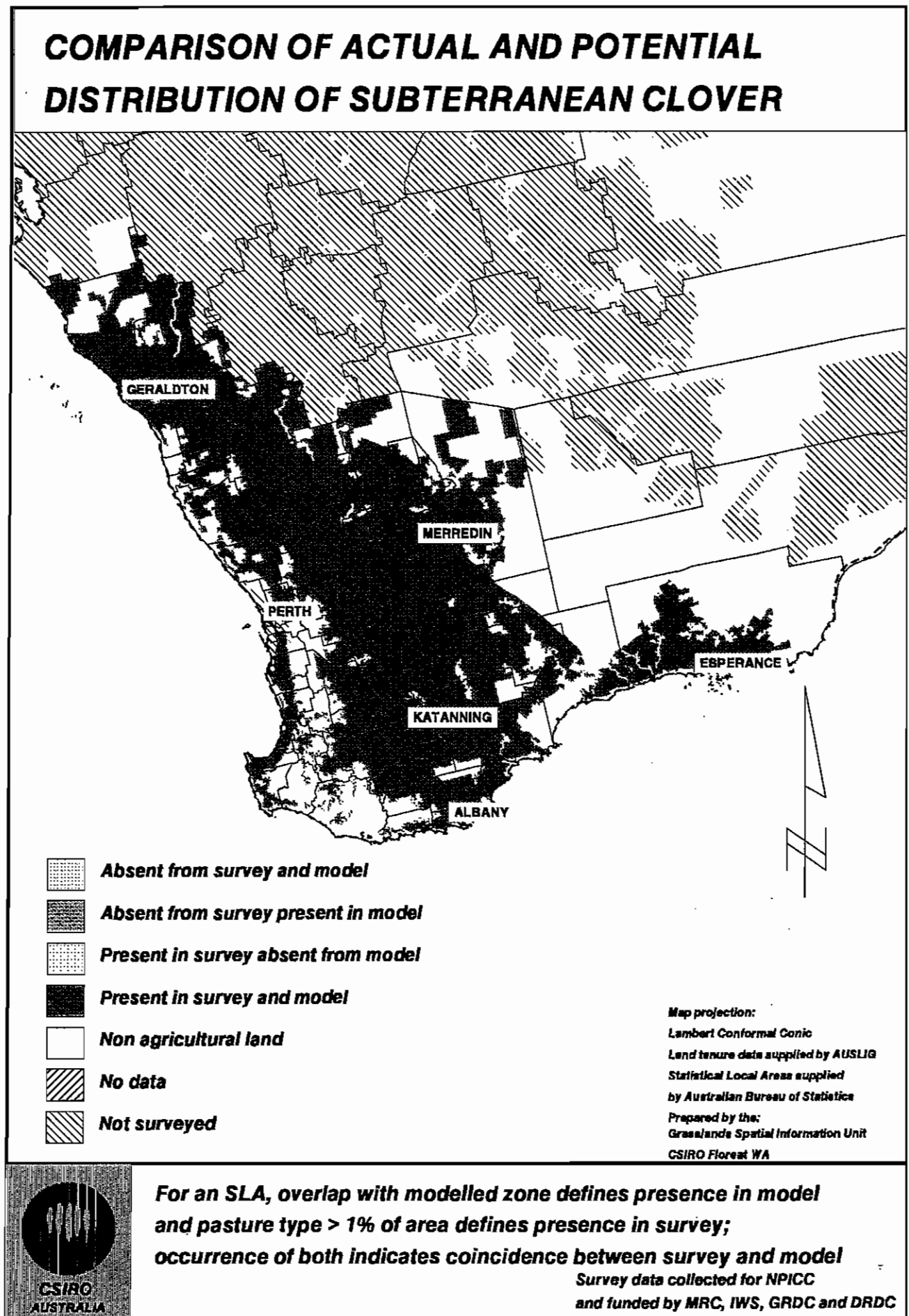


Map 49b. Modelled potential distribution of tall fescue in Western Australia.

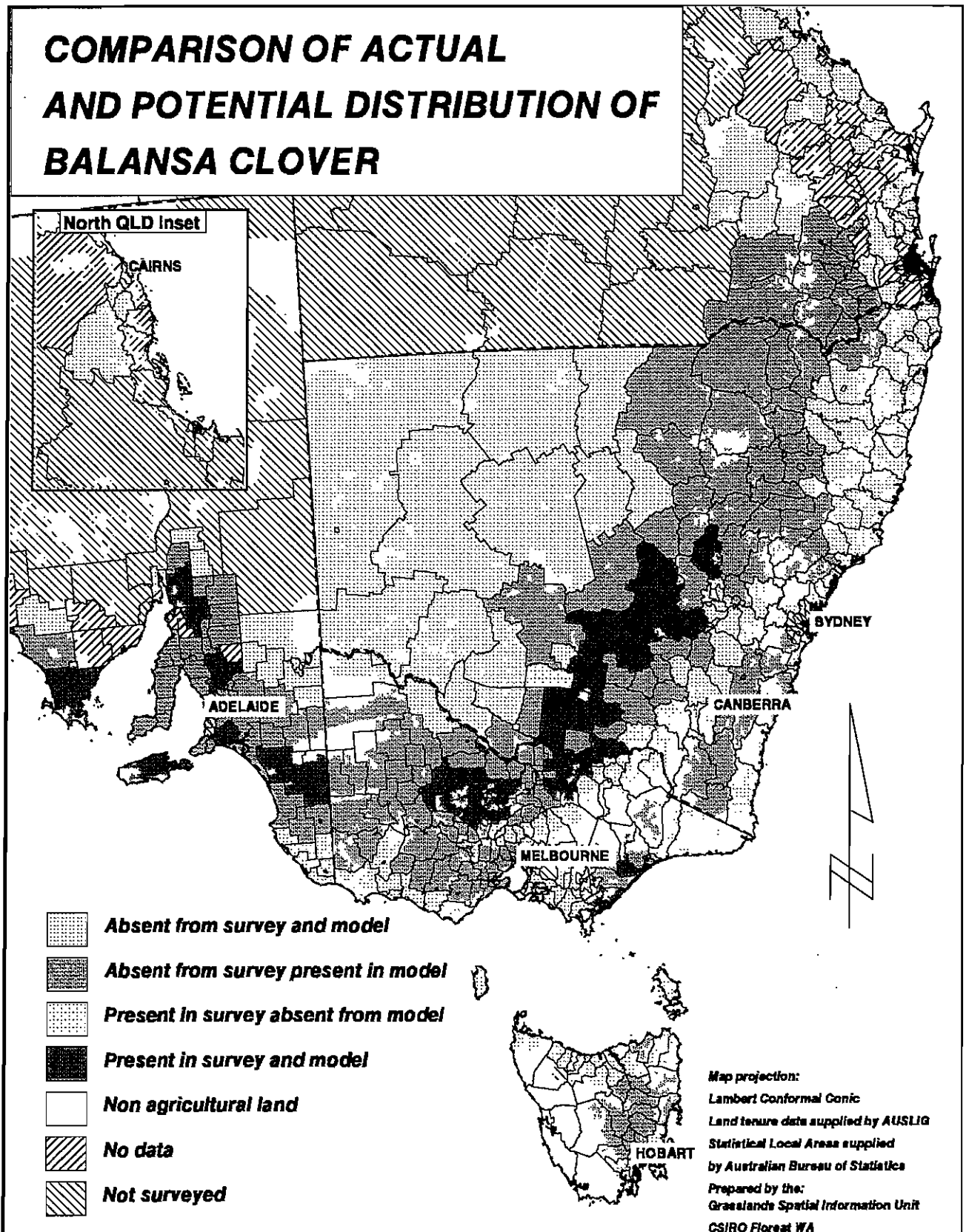




Map 50b. Comparison of potential and actual distribution for subterranean clover in Western Australia.



Map 51a. Comparison of potential and actual distribution
for balansa clover in Eastern Australia.

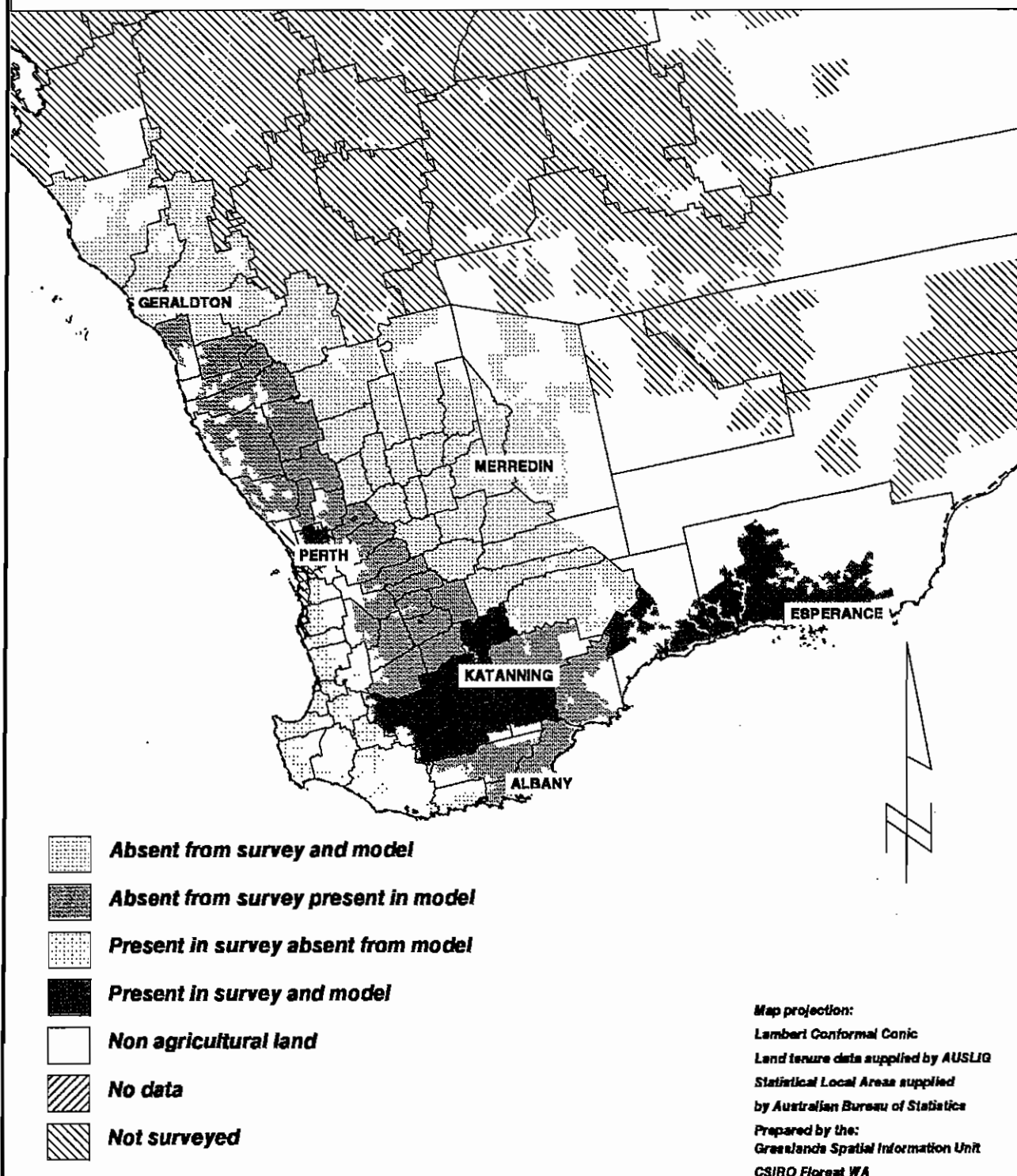


**For an SLA, overlap with modelled zone defines presence in model
and pasture type > 1% of area defines presence in survey;
occurrence of both indicates coincidence between survey and model**

**Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC**

Map 51b. Comparison of potential and actual distribution for balansa clover in Western Australia.

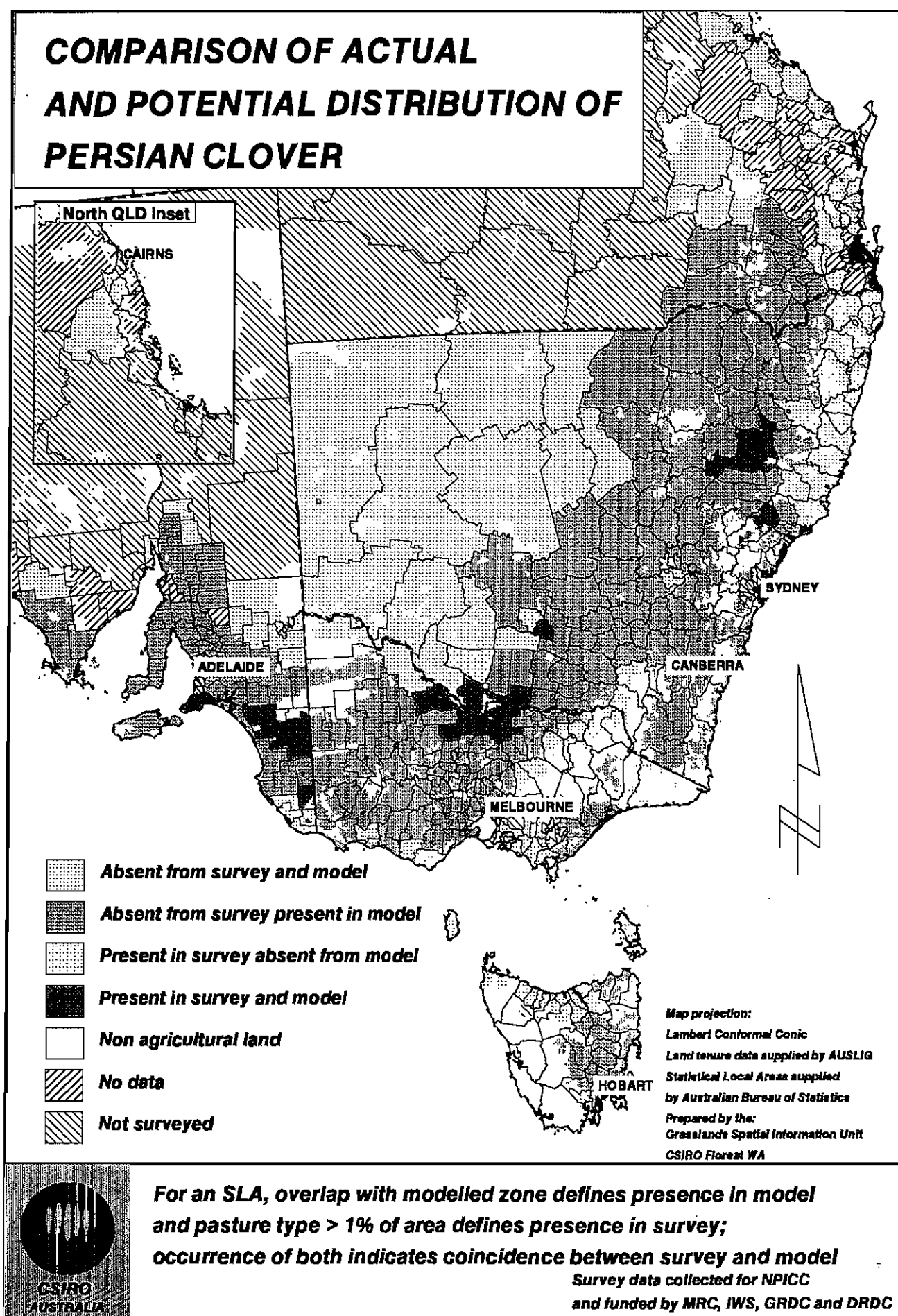
COMPARISON OF ACTUAL AND POTENTIAL DISTRIBUTION OF BALANSA CLOVER



For an SLA, overlap with modelled zone defines presence in model and pasture type > 1% of area defines presence in survey; occurrence of both indicates coincidence between survey and model

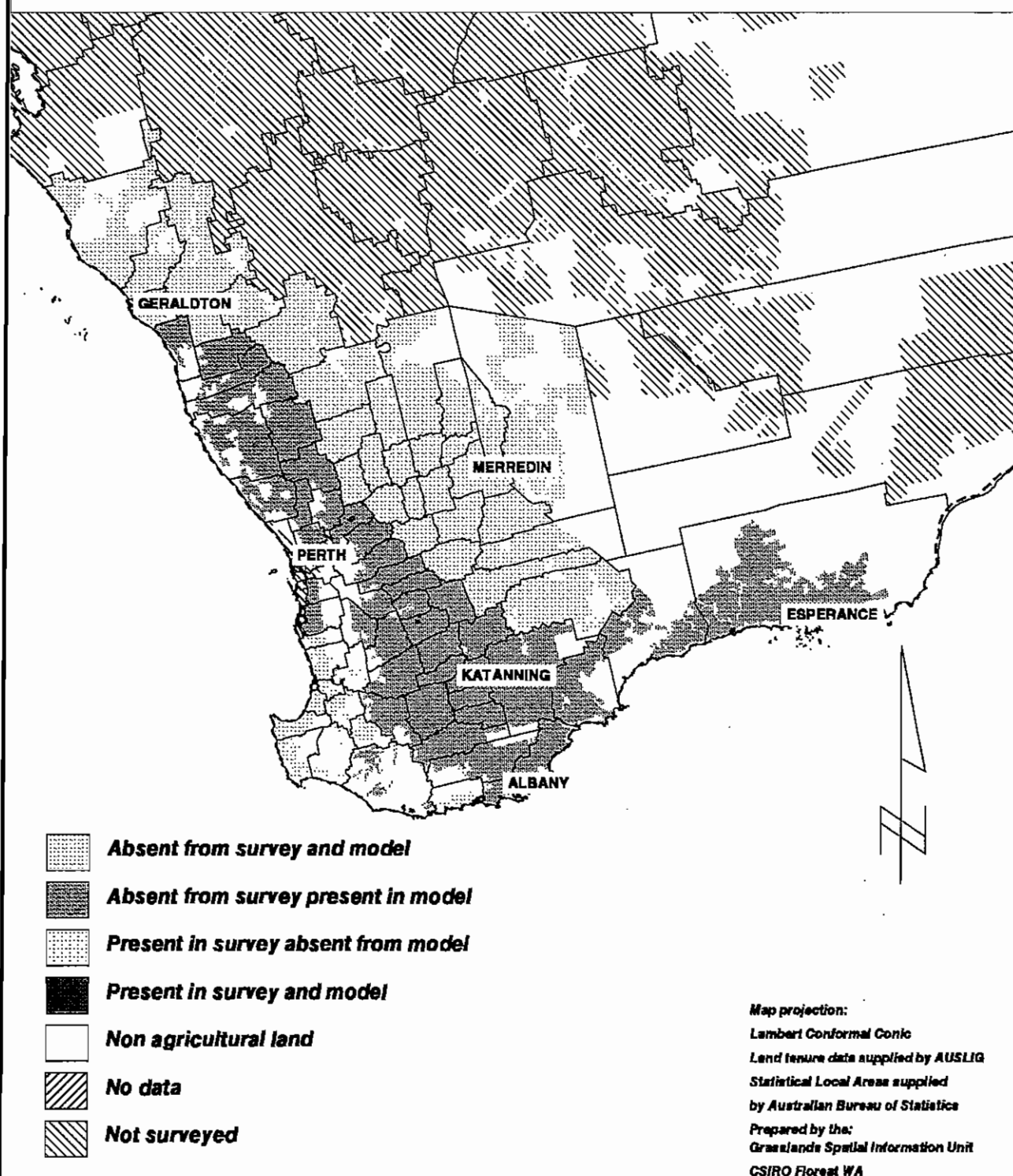
Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC

Map 52a. Comparison of potential and actual distribution
for Persian clover in Eastern Australia.



Map 52b. Comparison of potential and actual distribution
for Persian clover in Western Australia.

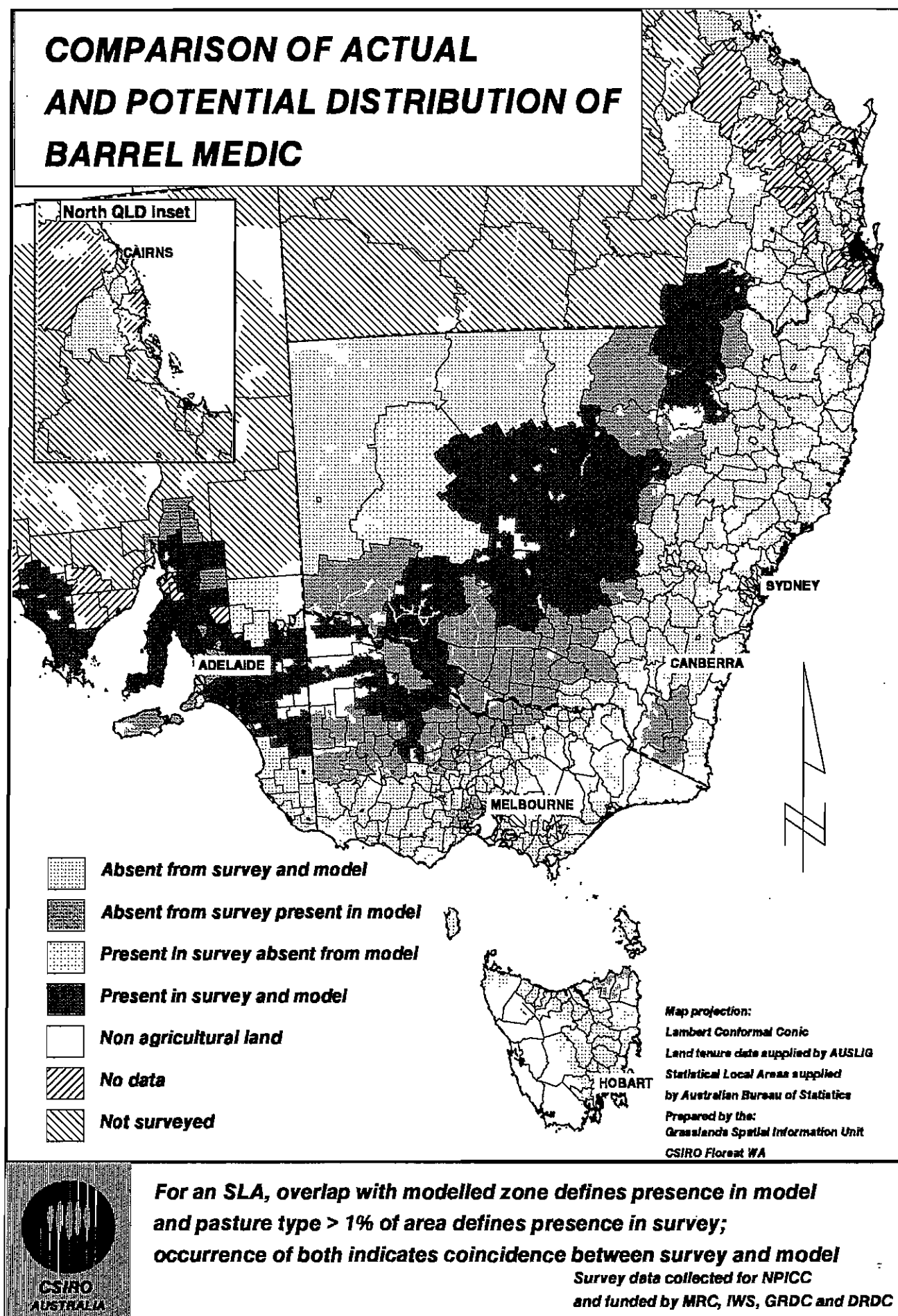
COMPARISON OF ACTUAL AND POTENTIAL DISTRIBUTION OF PERSIAN CLOVER



**For an SLA, overlap with modelled zone defines presence in model
and pasture type > 1% of area defines presence in survey;
occurrence of both indicates coincidence between survey and model**

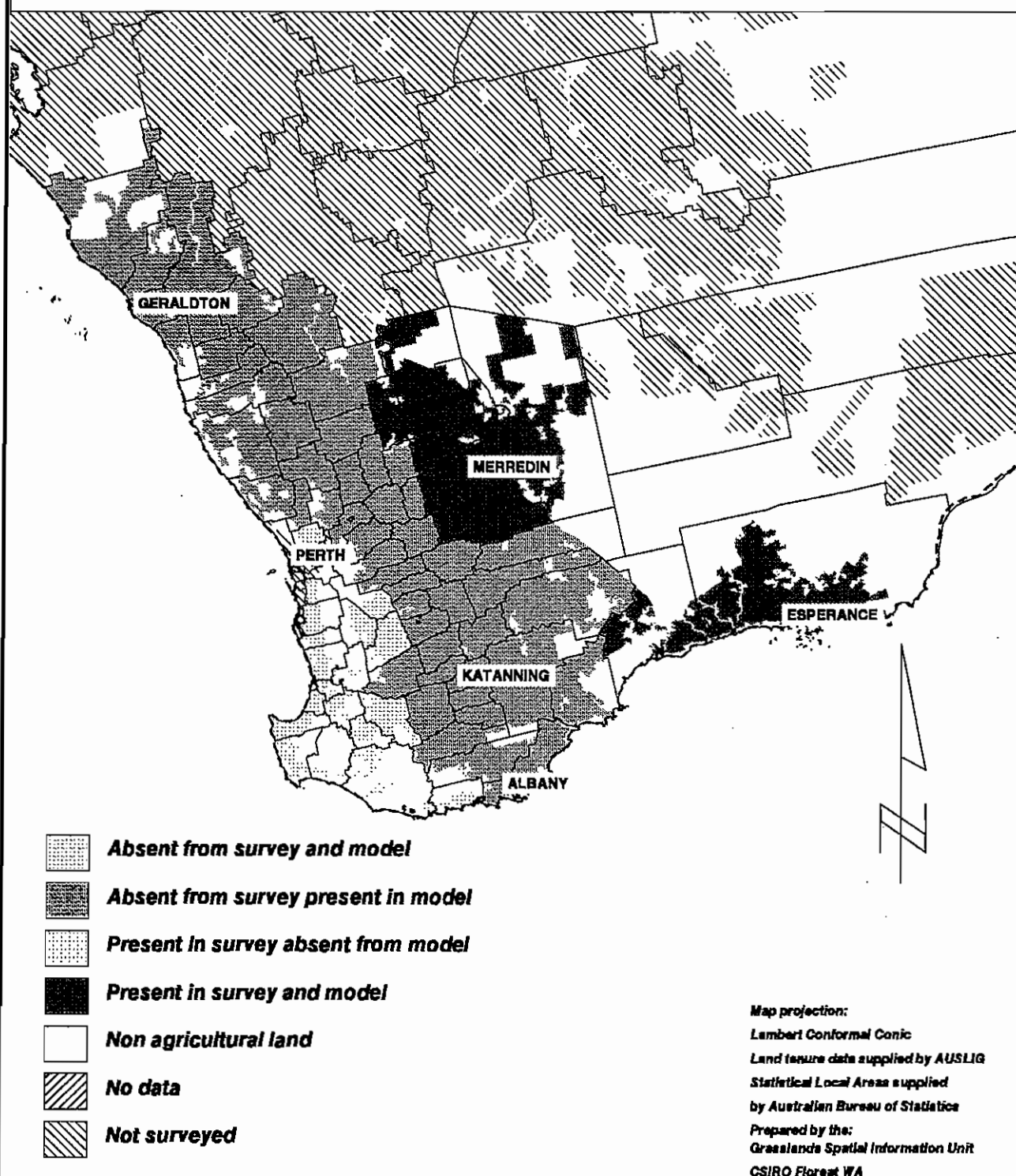
Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC

Map 53a. Comparison of potential and actual distribution for barrel medic in Eastern Australia.



Map 53b. Comparison of potential and actual distribution
for barrel medic in Western Australia.

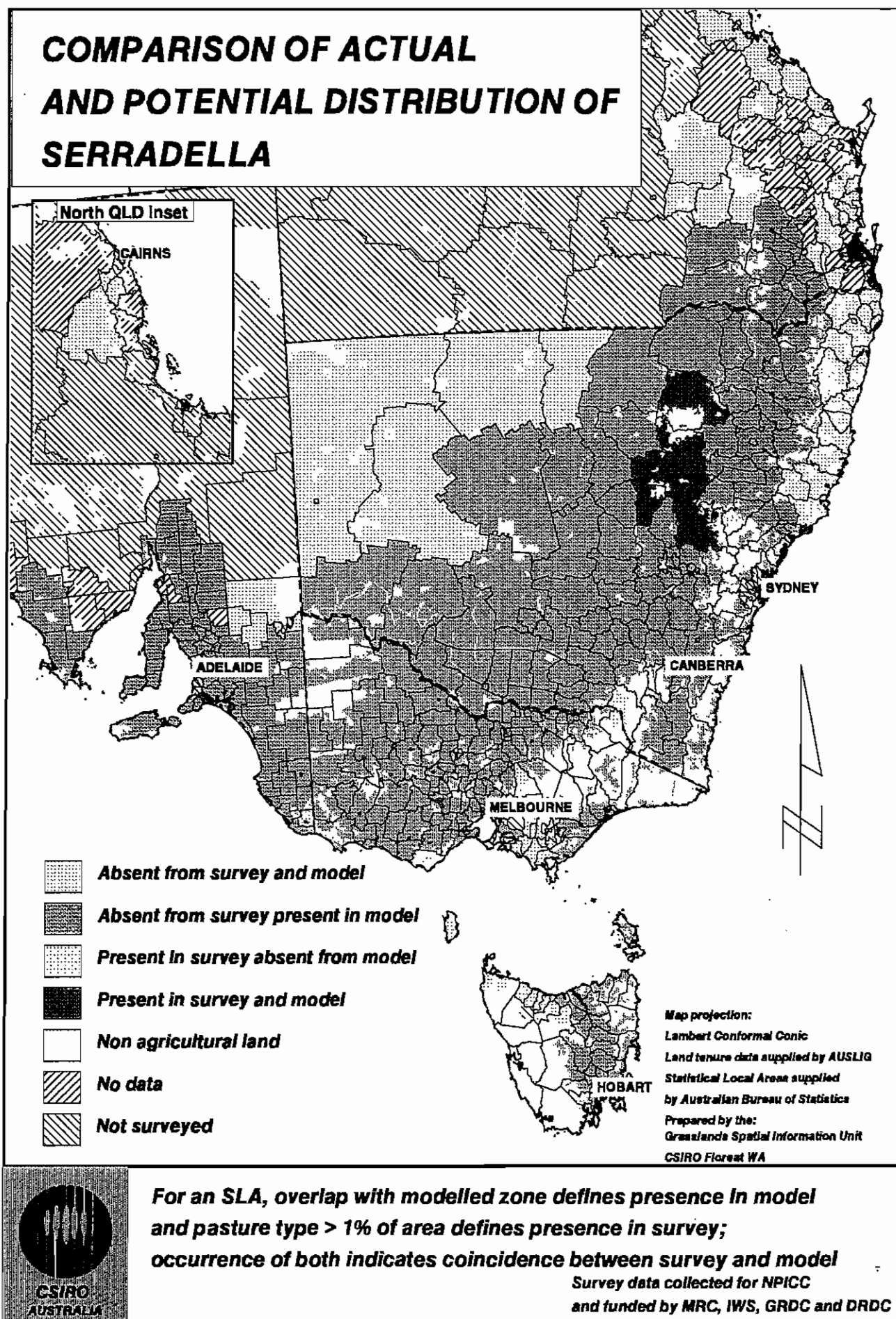
COMPARISON OF ACTUAL AND POTENTIAL DISTRIBUTION OF BARREL MEDIC



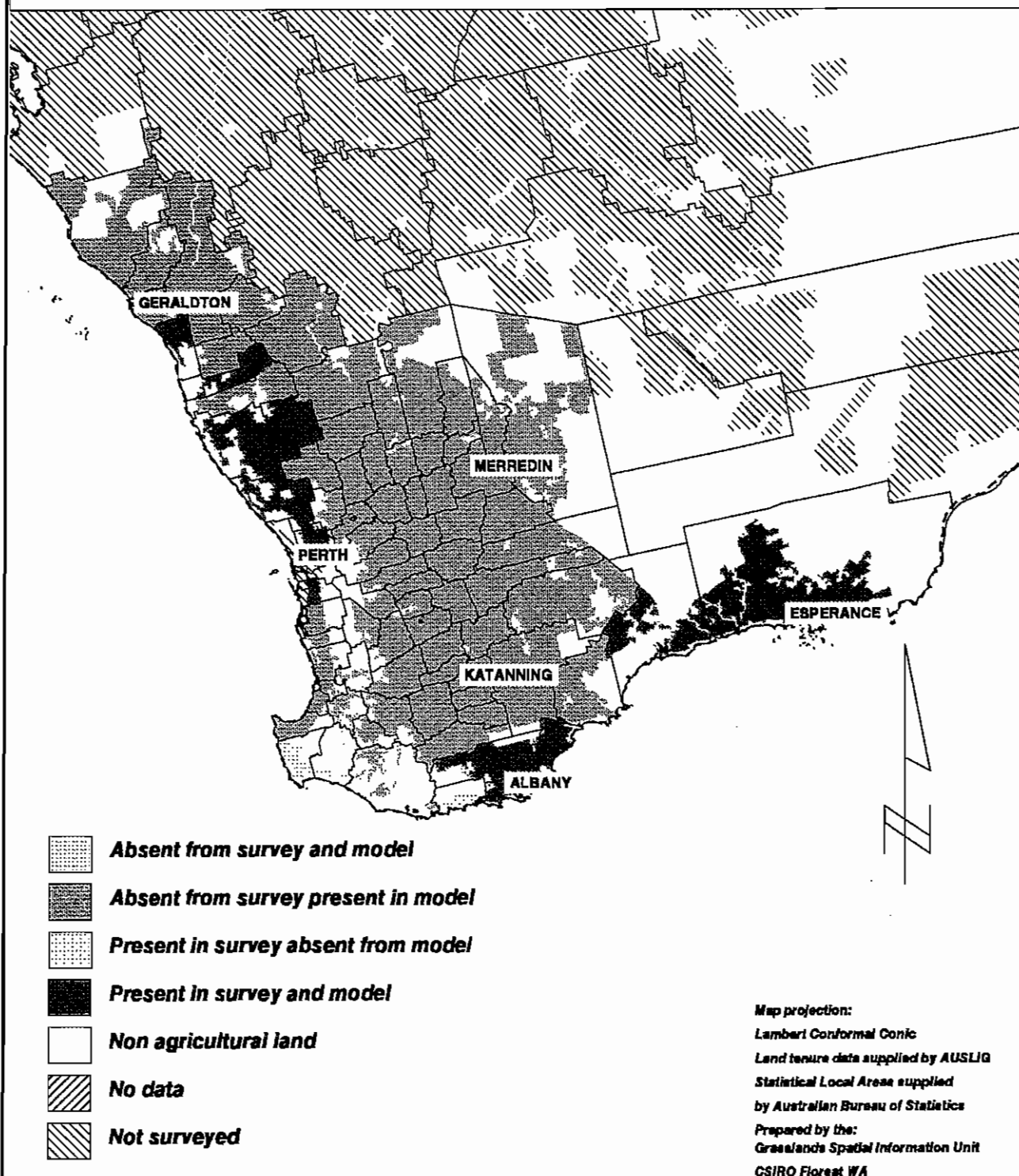
**For an SLA, overlap with modelled zone defines presence in model
and pasture type > 1% of area defines presence in survey;
occurrence of both indicates coincidence between survey and model**

**Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC**

Map 54a. Comparison of potential and actual distribution for yellow serradella in Eastern Australia.



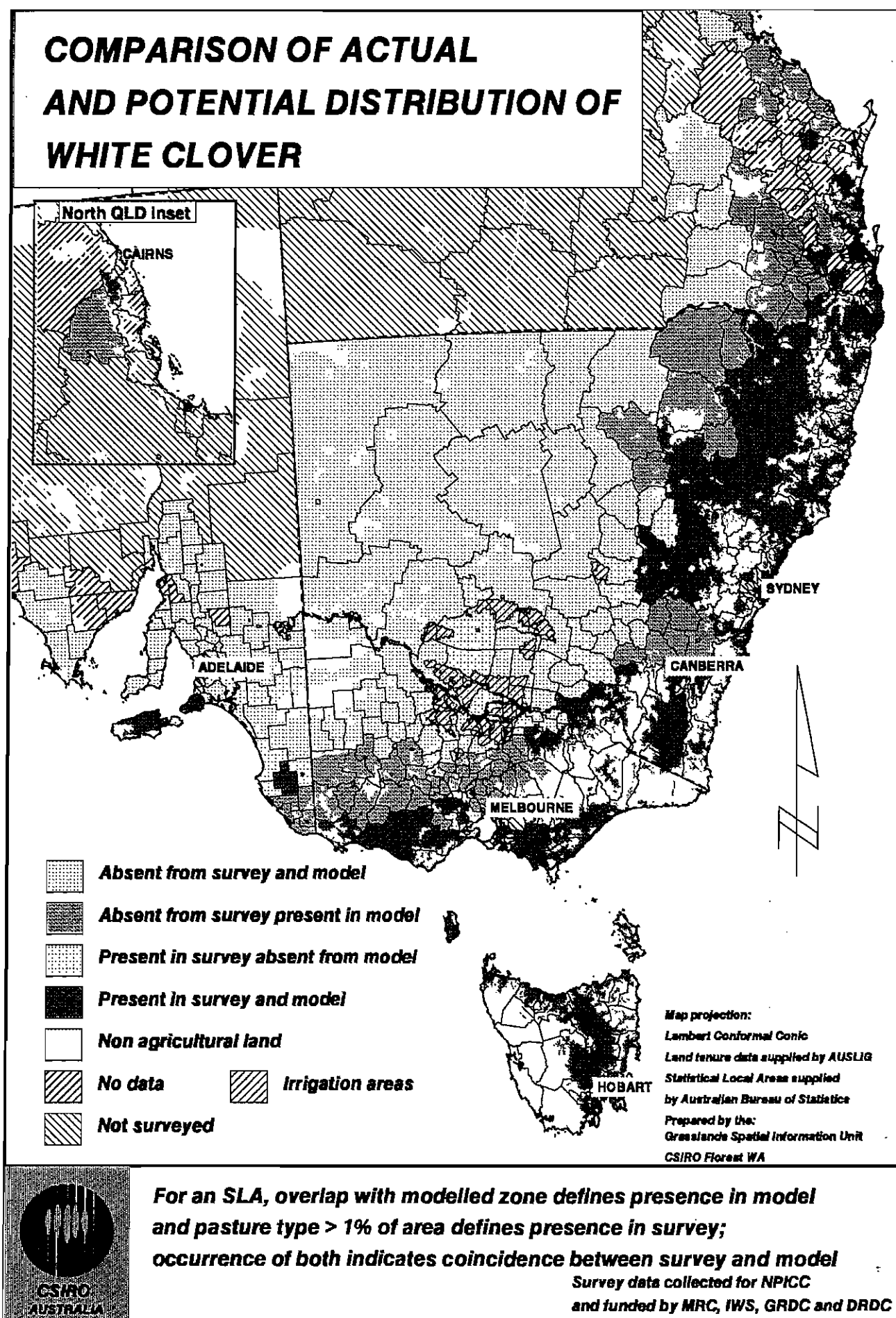
COMPARISON OF ACTUAL AND POTENTIAL DISTRIBUTION OF SERRADELLA



**For an SLA, overlap with modelled zone defines presence in model
and pasture type > 1% of area defines presence in survey;
occurrence of both indicates coincidence between survey and model**

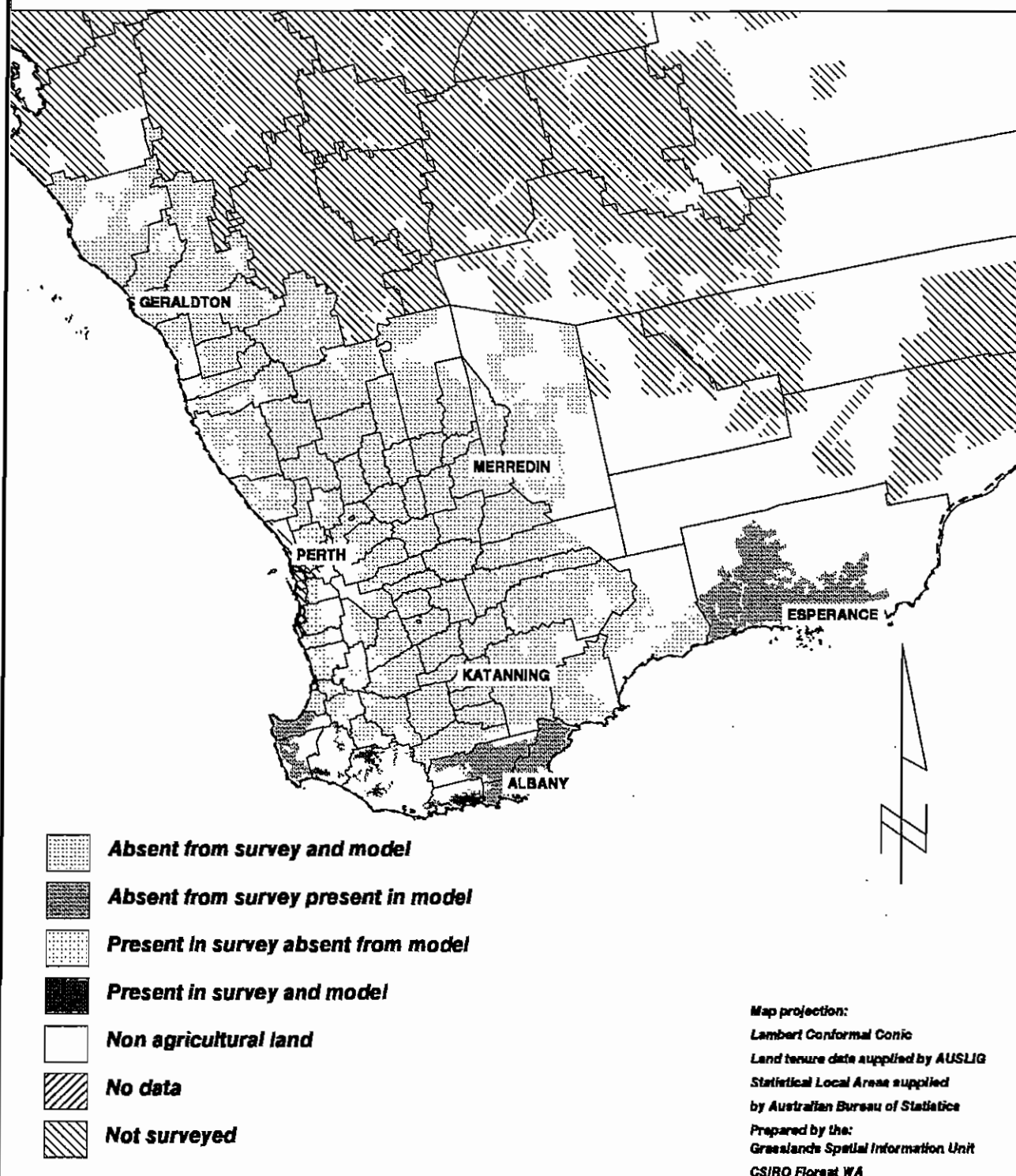
**Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC**

Map 55a. Comparison of potential and actual distribution for white clover in Eastern Australia.



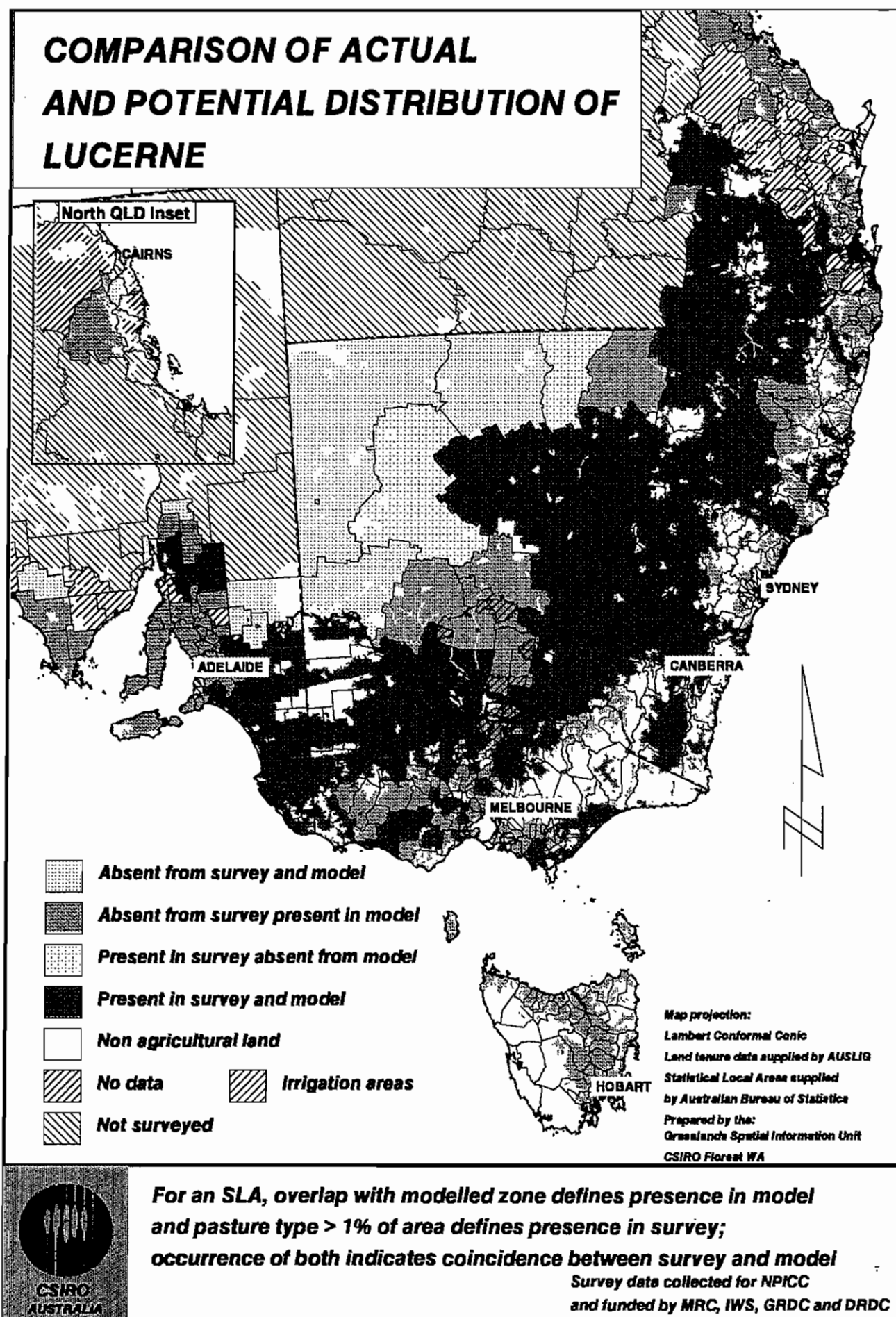
Map 55b. Comparison of potential and actual distribution
for white clover in Western Australia.

COMPARISON OF ACTUAL AND POTENTIAL DISTRIBUTION OF WHITE CLOVER



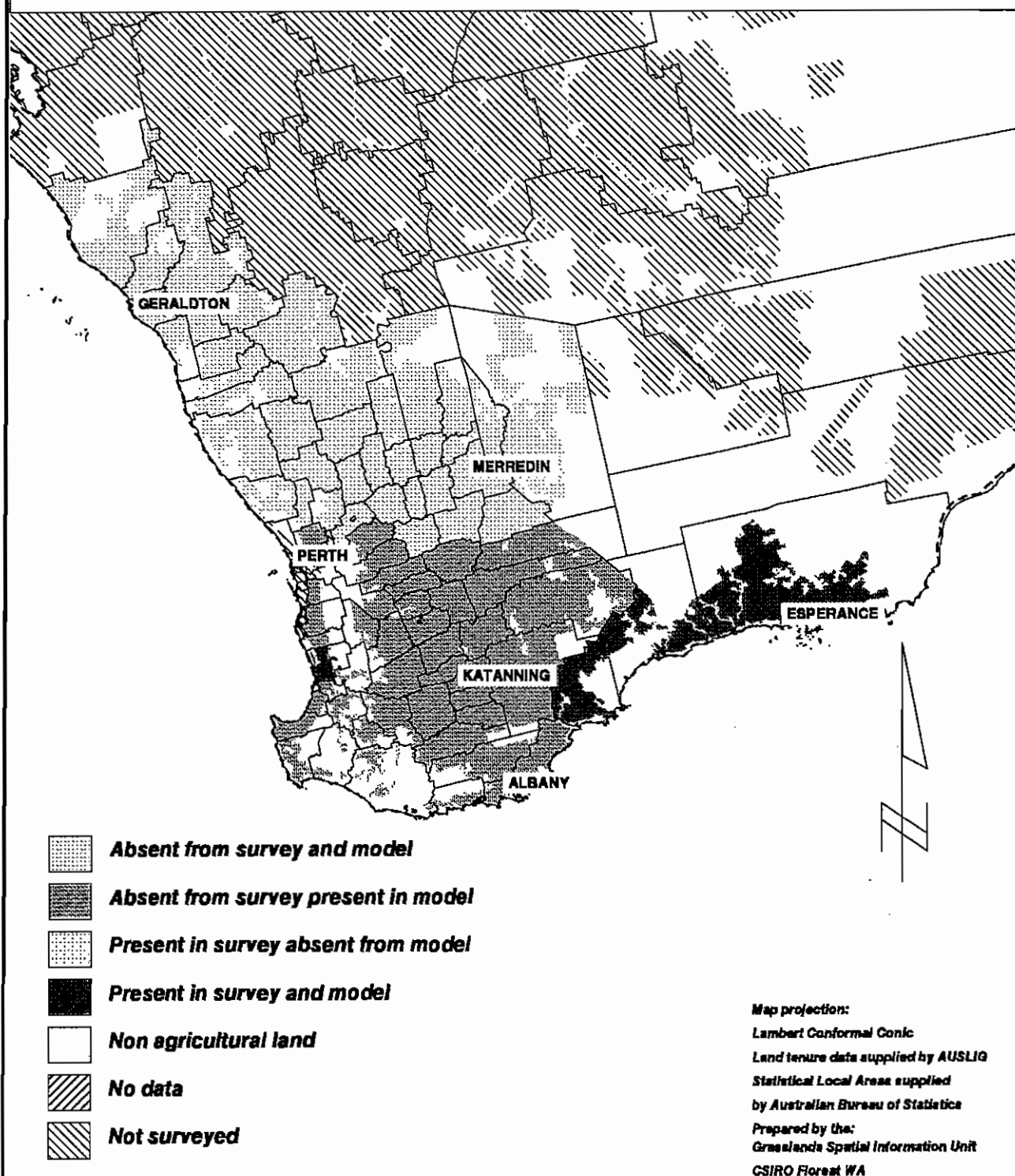
**For an SLA, overlap with modelled zone defines presence in model
and pasture type > 1% of area defines presence in survey;
occurrence of both indicates coincidence between survey and model**

**Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC**



Map 56b. Comparison of potential and actual distribution for lucerne in Western Australia.

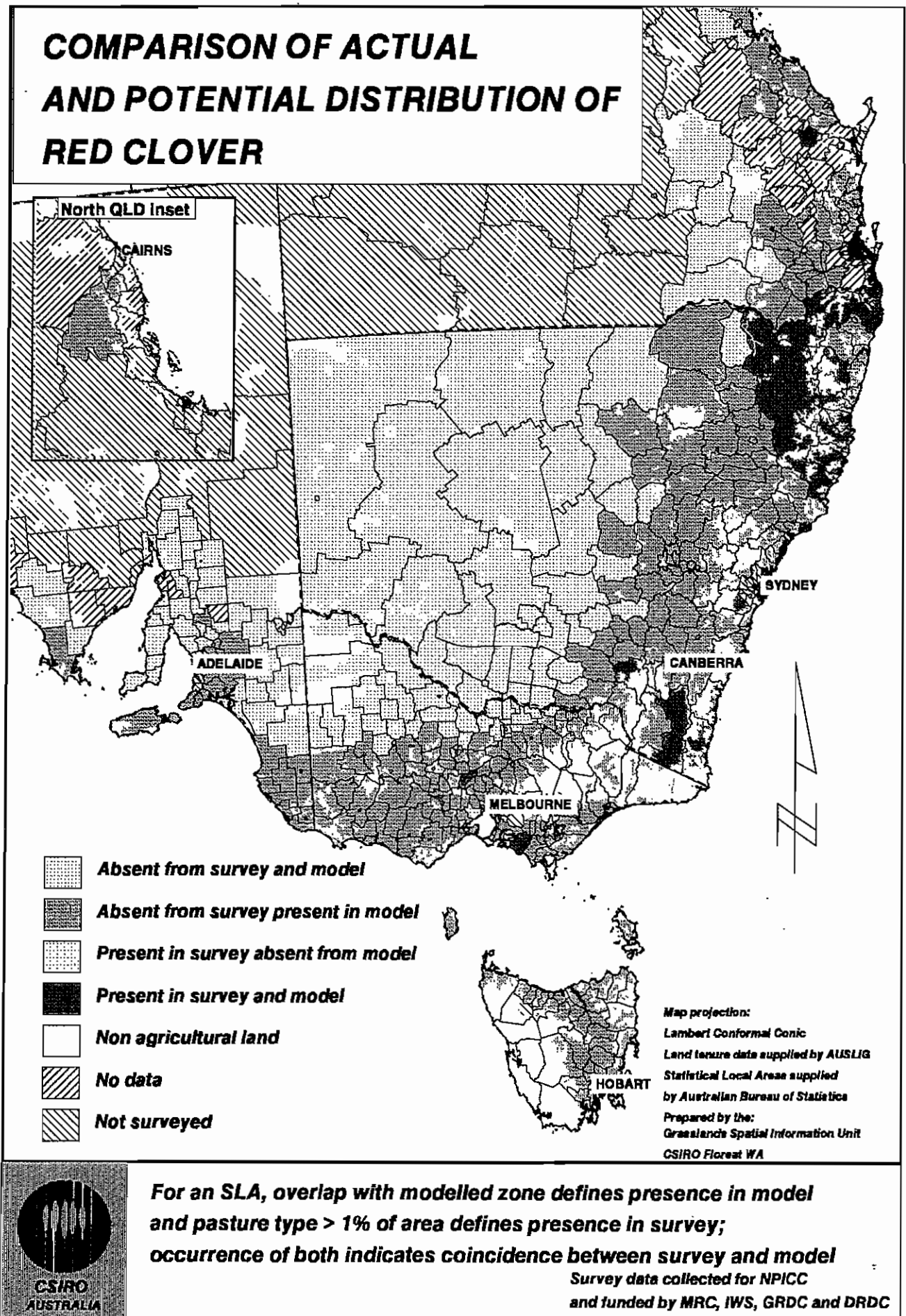
COMPARISON OF ACTUAL AND POTENTIAL DISTRIBUTION OF LUCERNE



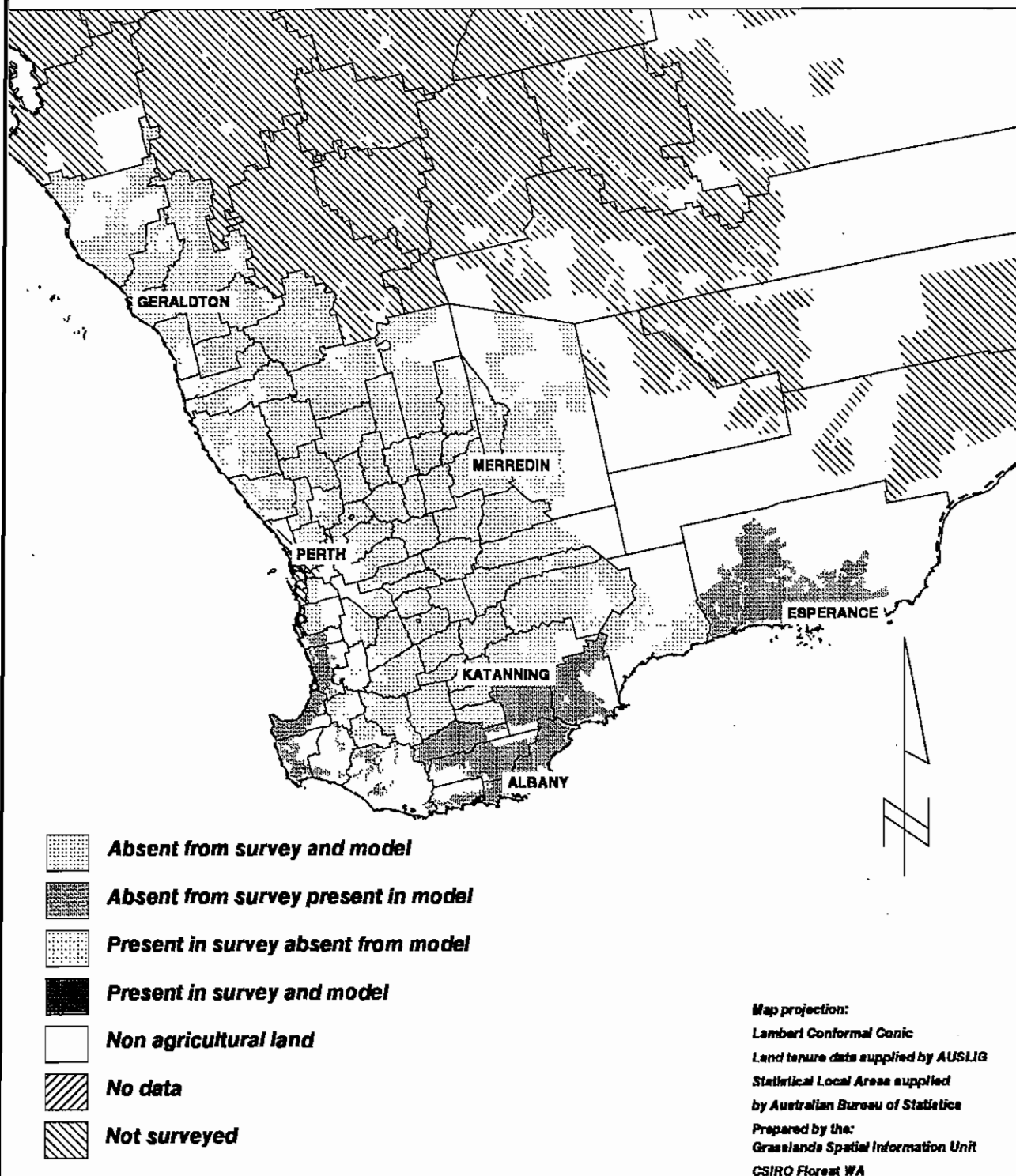
For an SLA, overlap with modelled zone defines presence in model and pasture type > 1% of area defines presence in survey; occurrence of both indicates coincidence between survey and model

Survey data collected for NPICC and funded by MRC, IWS, GRDC and DRDC

Map 57a. Comparison of potential and actual distribution
for red clover in Eastern Anstralia.



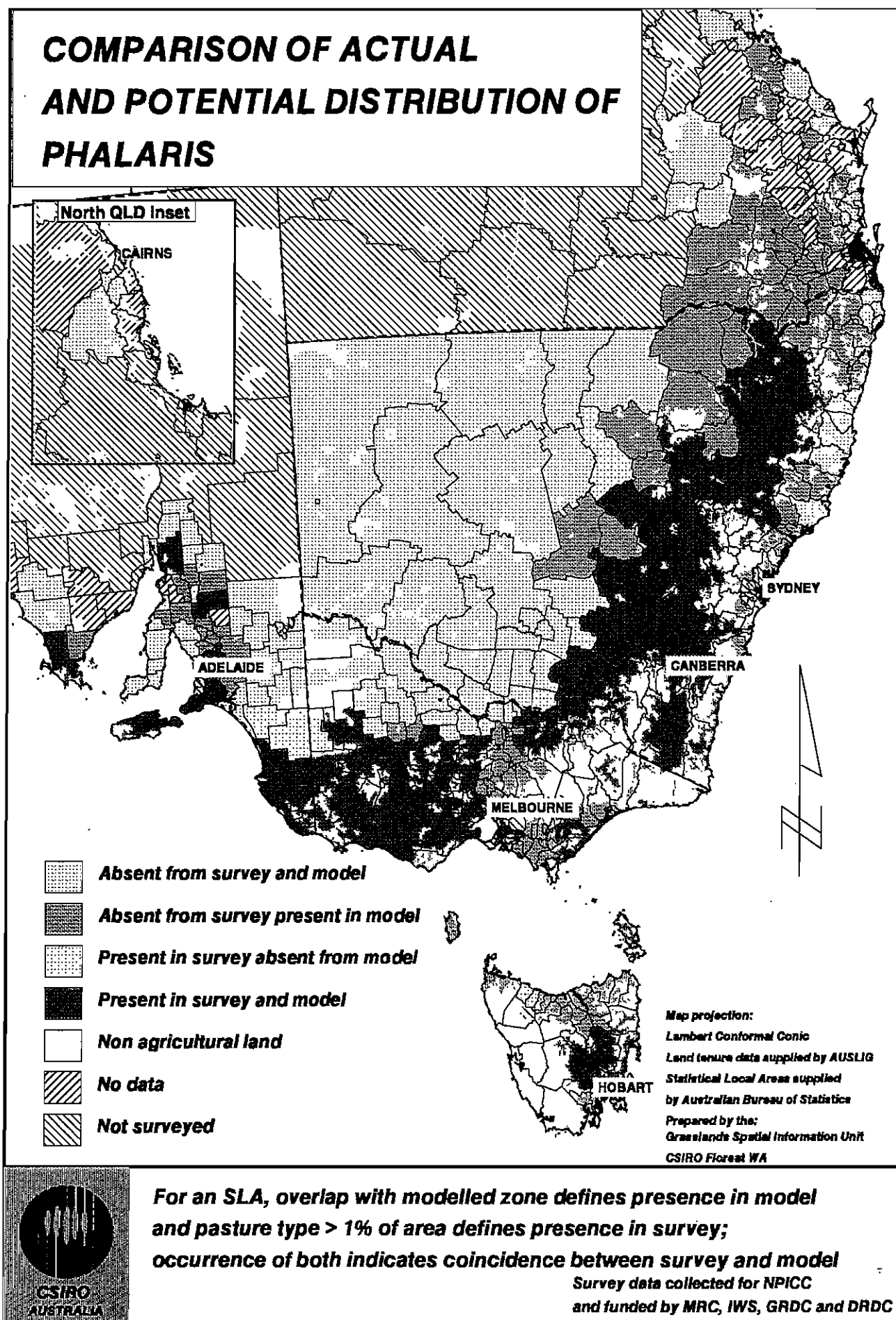
COMPARISON OF ACTUAL AND POTENTIAL DISTRIBUTION OF RED CLOVER



**For an SLA, overlap with modelled zone defines presence in model
and pasture type > 1% of area defines presence in survey;
occurrence of both indicates coincidence between survey and model**

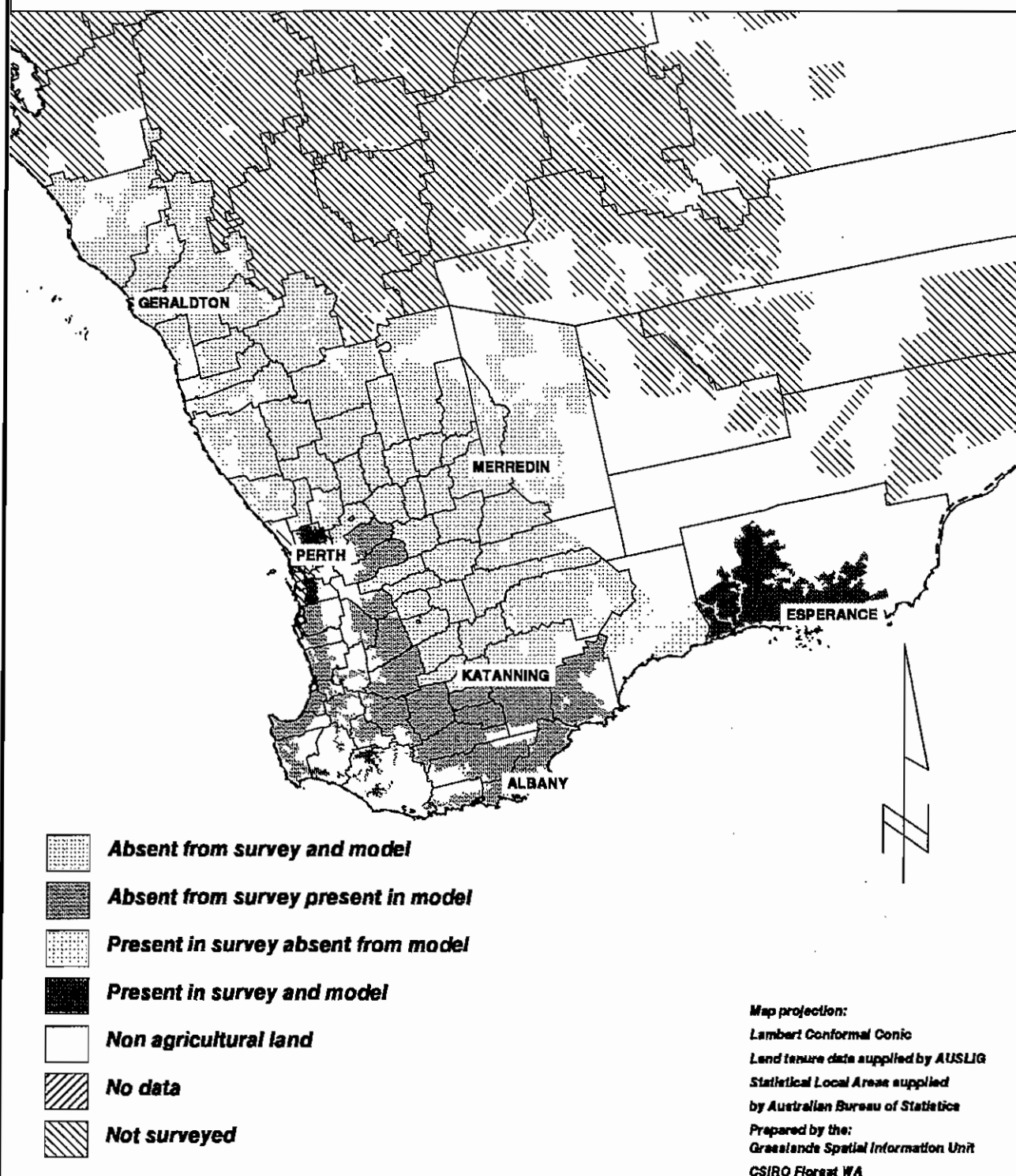
*Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC*

Map 58a. Comparison of potential and actual distribution for phalaris in Eastern Australia.



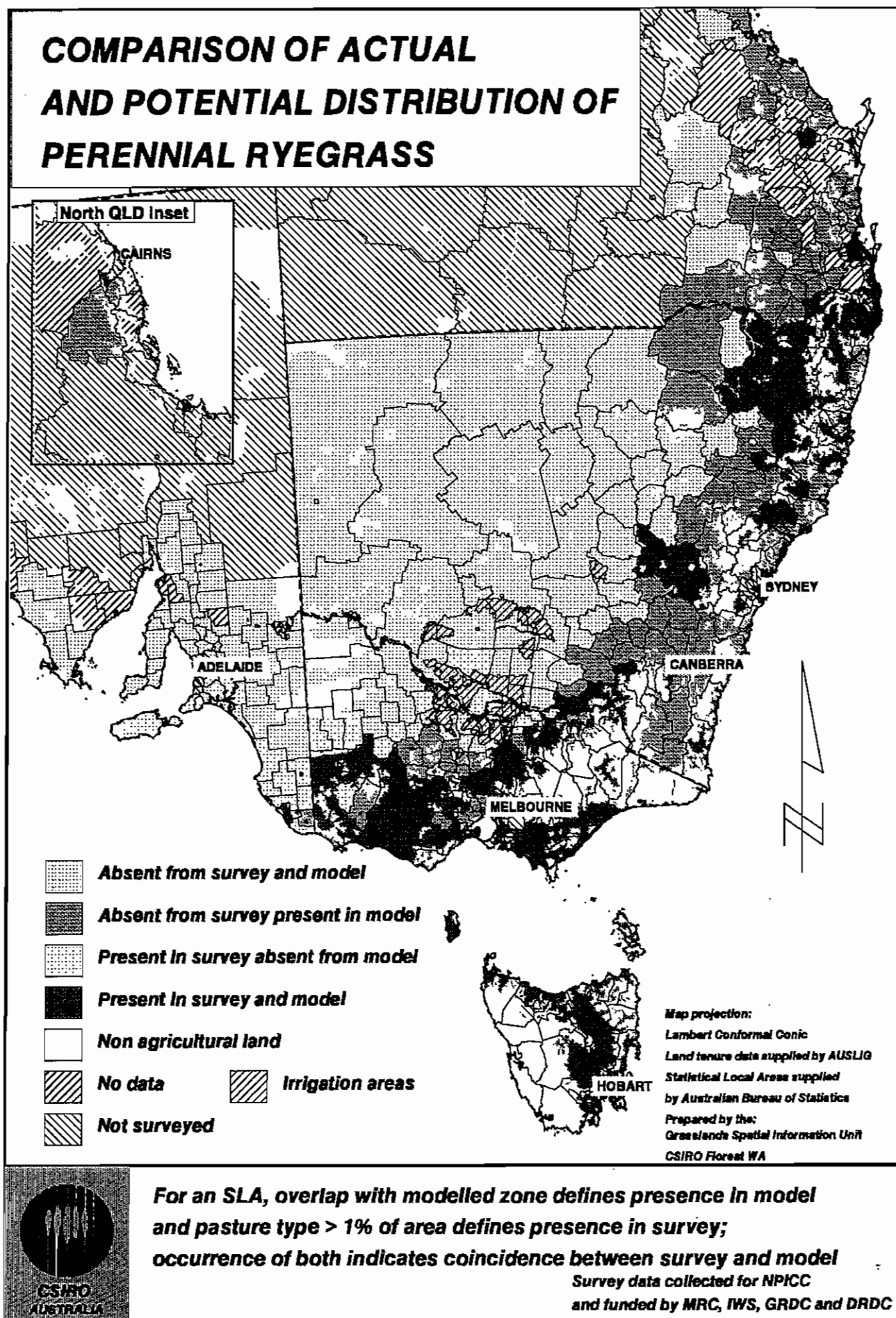
Map 58b. Comparison of potential and actual distribution for phalaris in Western Australia.

COMPARISON OF ACTUAL AND POTENTIAL DISTRIBUTION OF PHALARIS



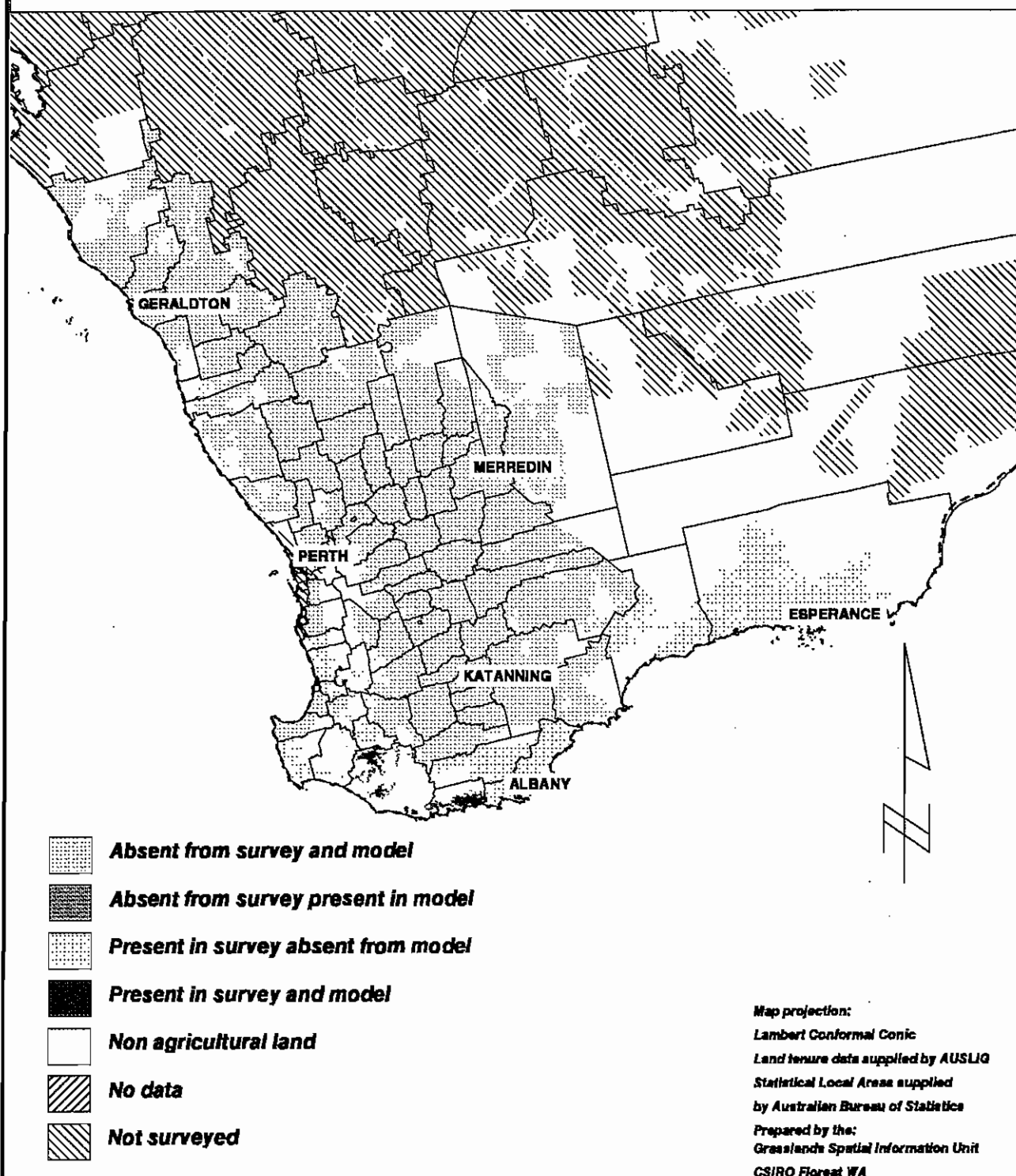
For an SLA, overlap with modelled zone defines presence in model and pasture type > 1% of area defines presence in survey; occurrence of both indicates coincidence between survey and model

Survey data collected for NPICC and funded by MRC, IWS, GRDC and DRDC



Map 59b. Comparison of potential and actual distribution
for perennial ryegrass in Western Australia.

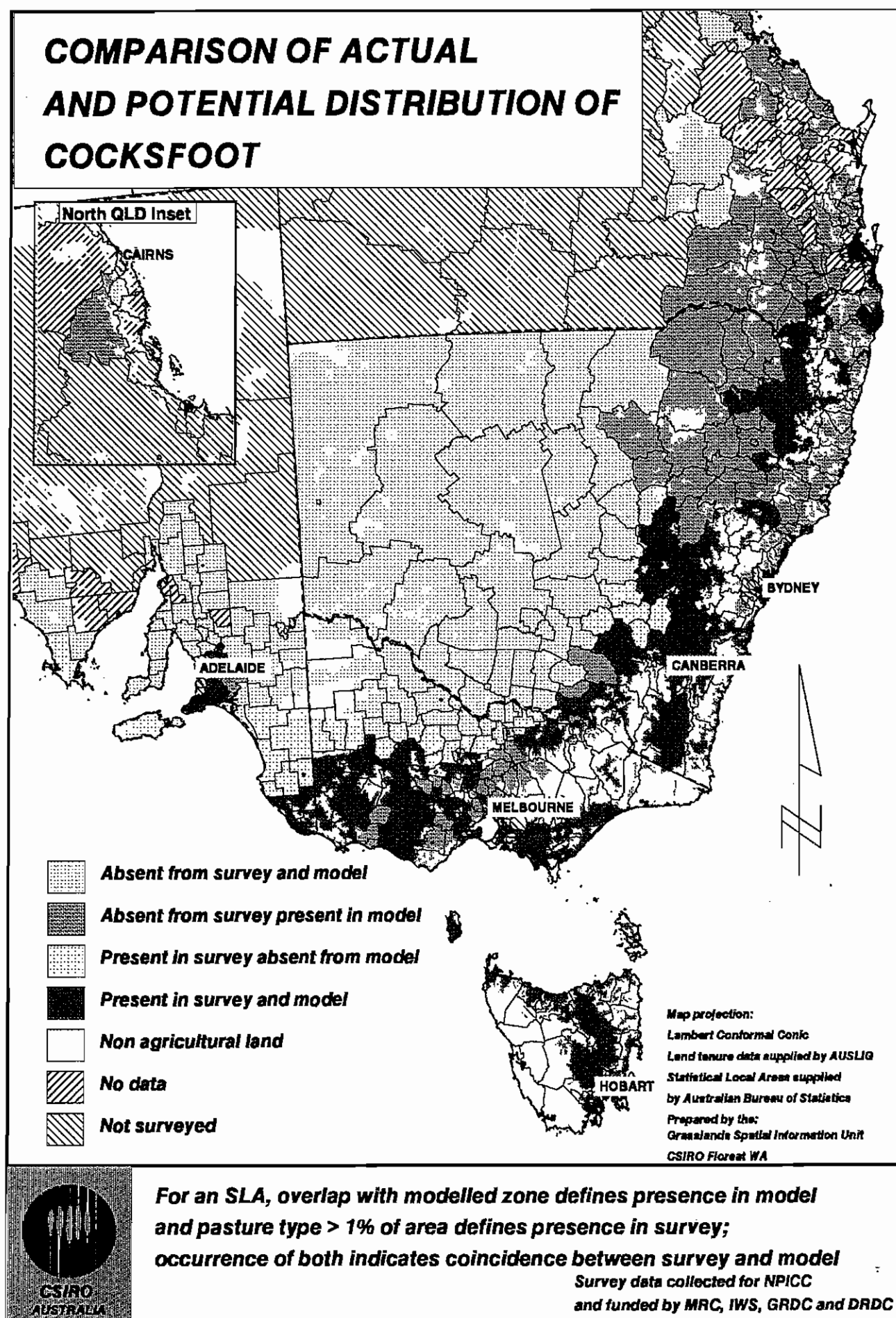
COMPARISON OF ACTUAL AND POTENTIAL DISTRIBUTION OF PERENNIAL RYEGRASS



**For an SLA, overlap with modelled zone defines presence in model
and pasture type > 1% of area defines presence in survey;
occurrence of both indicates coincidence between survey and model**

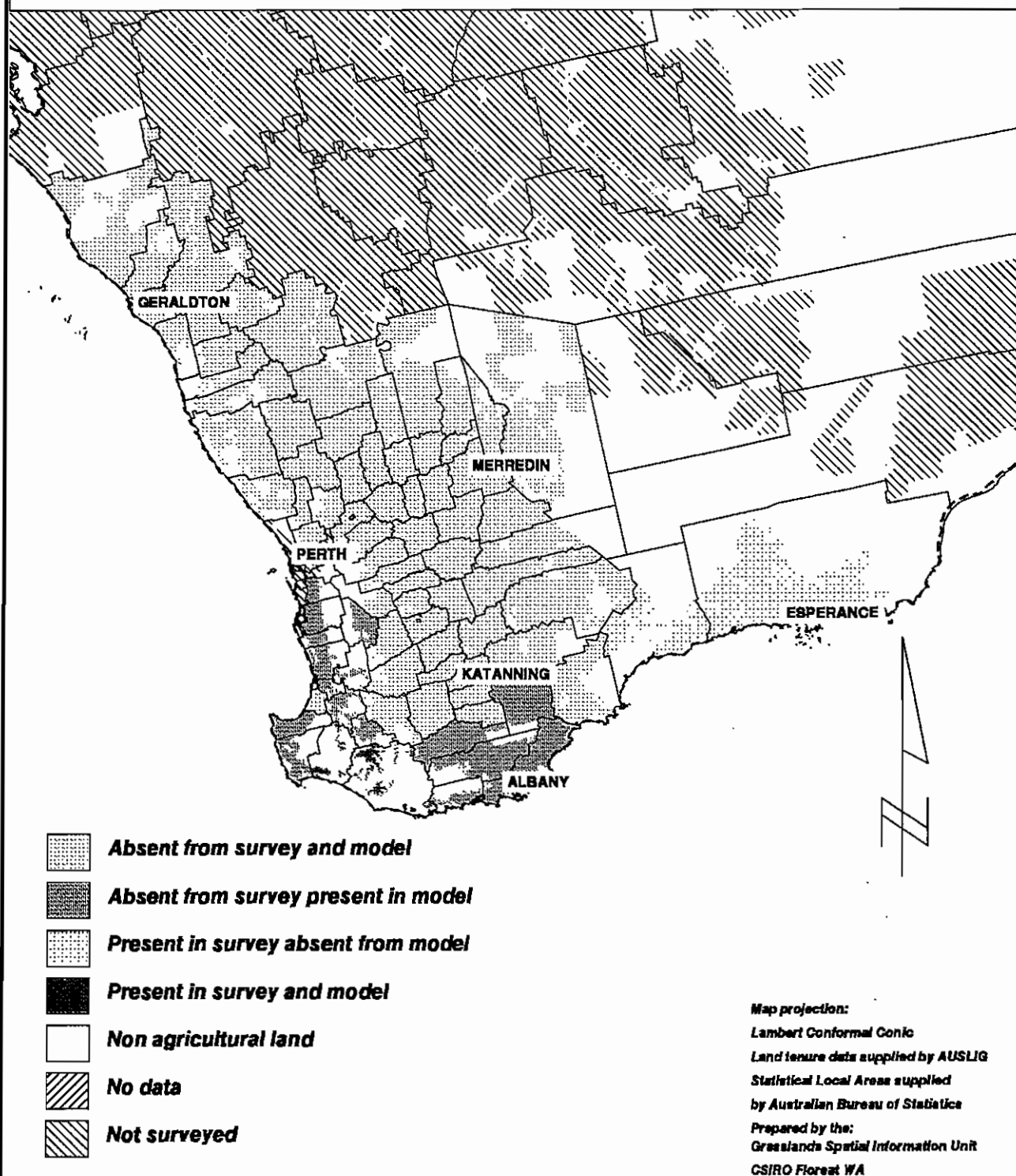
**Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC**

Map 60a. Comparison of potential and actual distribution for cocksfoot in Eastern Australia.



Map 60b. Comparison of potential and actual distribution for cocksfoot in Western Australia.

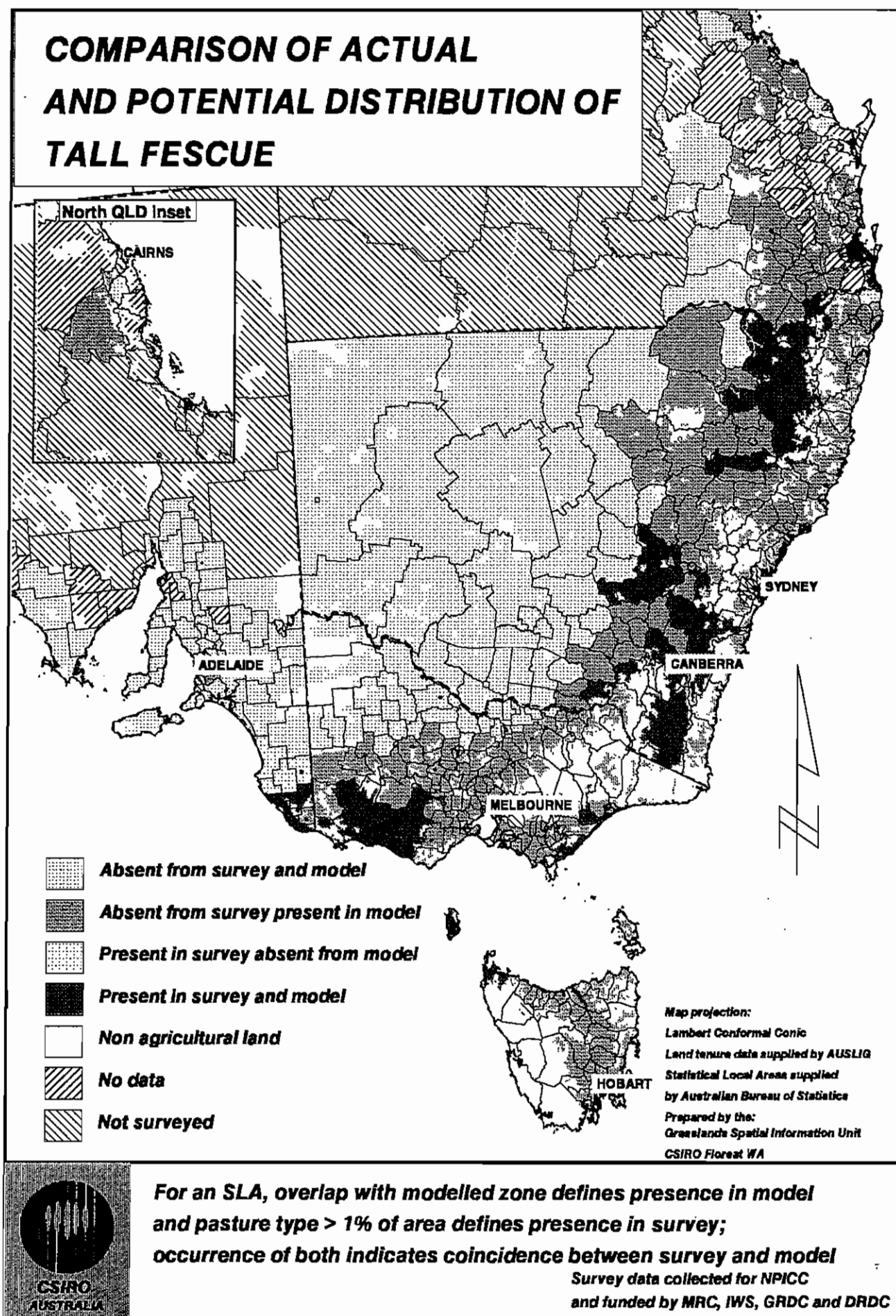
COMPARISON OF ACTUAL AND POTENTIAL DISTRIBUTION OF COCKSFOOT



For an SLA, overlap with modelled zone defines presence in model and pasture type > 1% of area defines presence in survey; occurrence of both indicates coincidence between survey and model

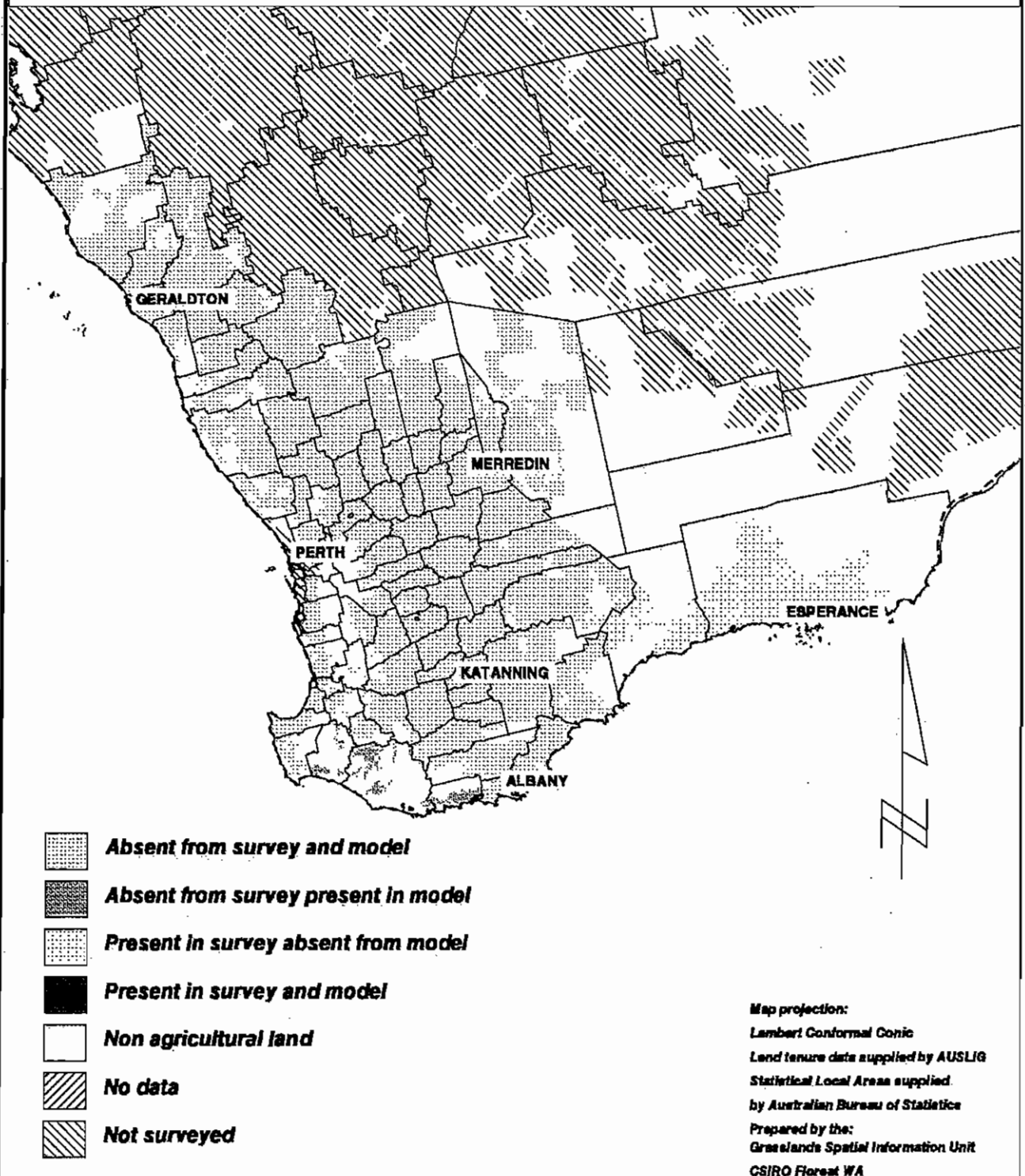
Survey data collected for NPICC and funded by MRC, IWS, GRDC and DRDC

Map 61a. Comparison of potential and actual distribution for tall fescue in Eastern Australia.



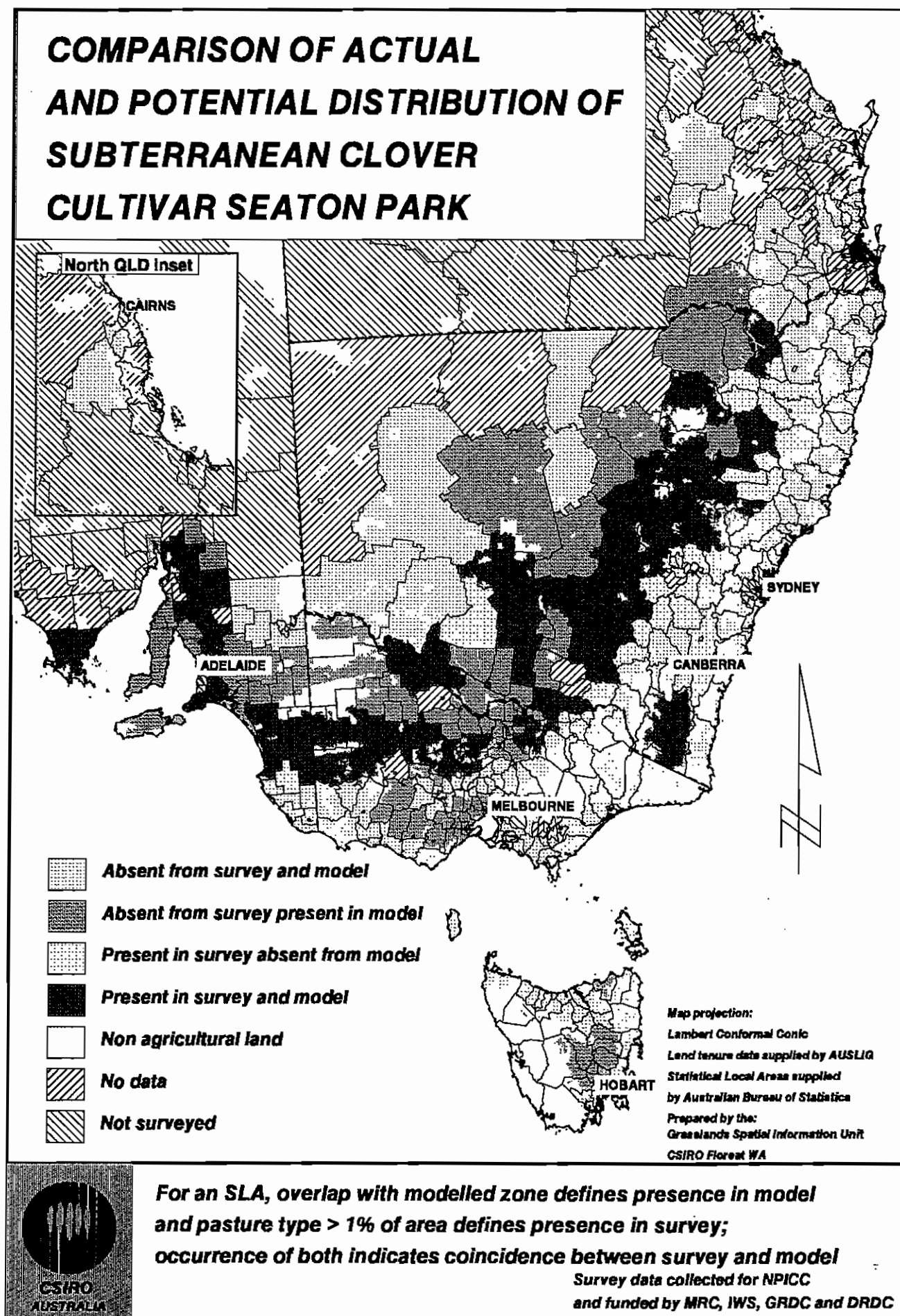
Map 61b. Comparison of potential and actual distribution for tall fescue in Western Australia.

COMPARISON OF ACTUAL AND POTENTIAL DISTRIBUTION OF TALL FESCUE



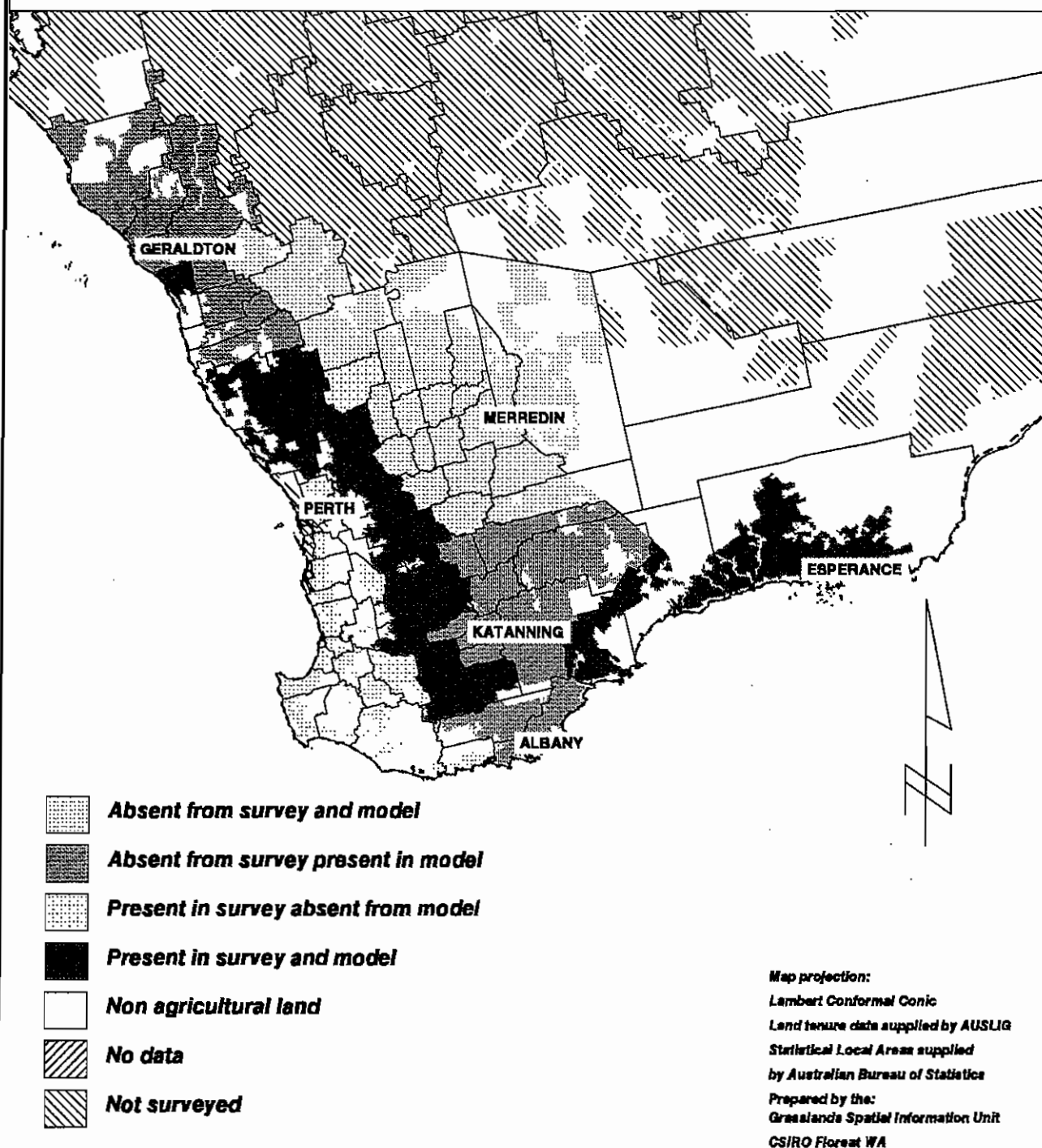
For an SLA, overlap with modelled zone defines presence in model and pasture type > 1% of area defines presence in survey; occurrence of both indicates coincidence between survey and model

Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC



Map 62b. Comparison of potential and actual distribution
for Seaton Park subterranean clover in Western Australia.

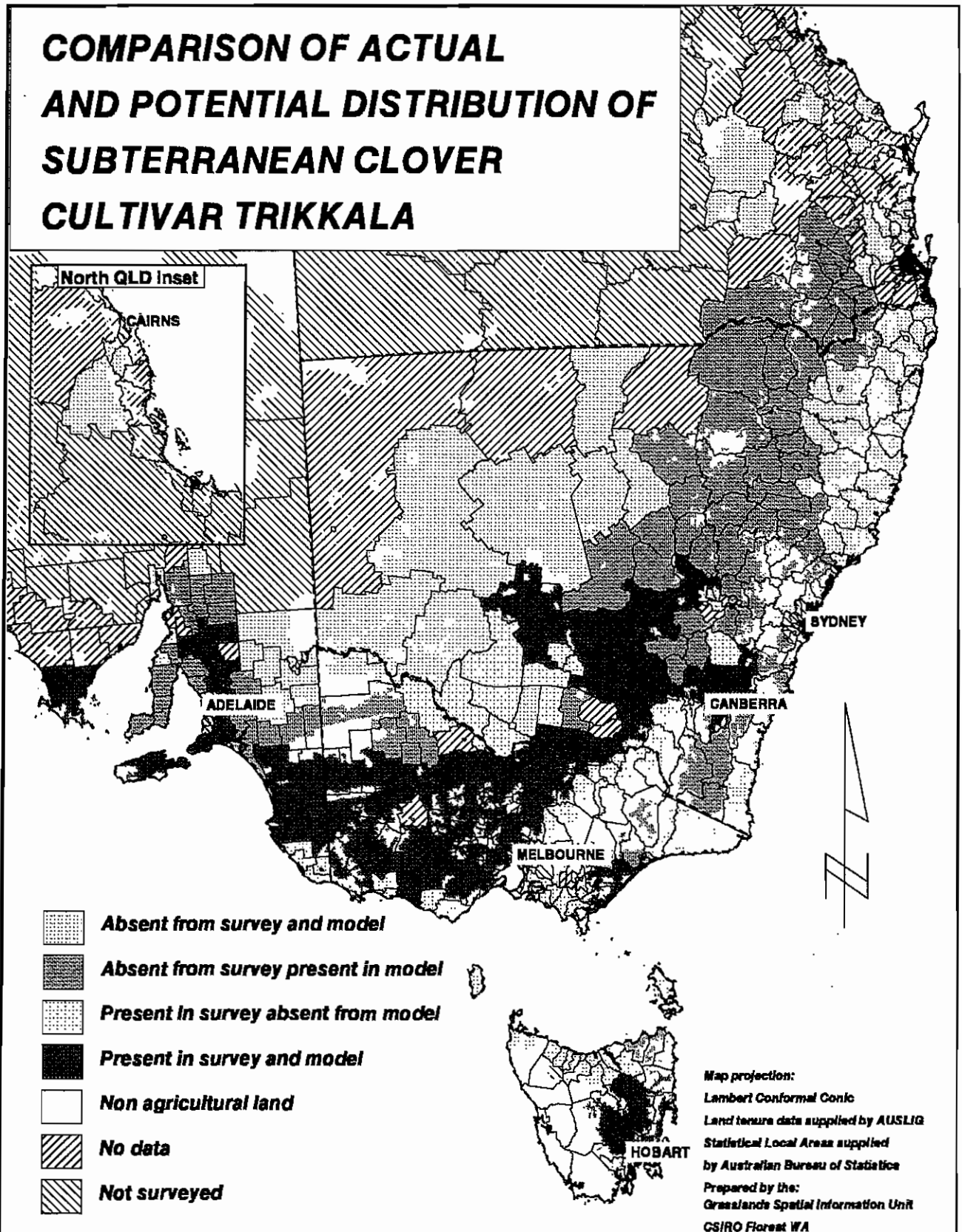
COMPARISON OF ACTUAL AND POTENTIAL DISTRIBUTION OF SUBTERRANEAN CLOVER CULTIVAR SEATON PARK



**For an SLA, overlap with modelled zone defines presence in model
and pasture type > 1% of area defines presence in survey;
occurrence of both indicates coincidence between survey and model**

**Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC**

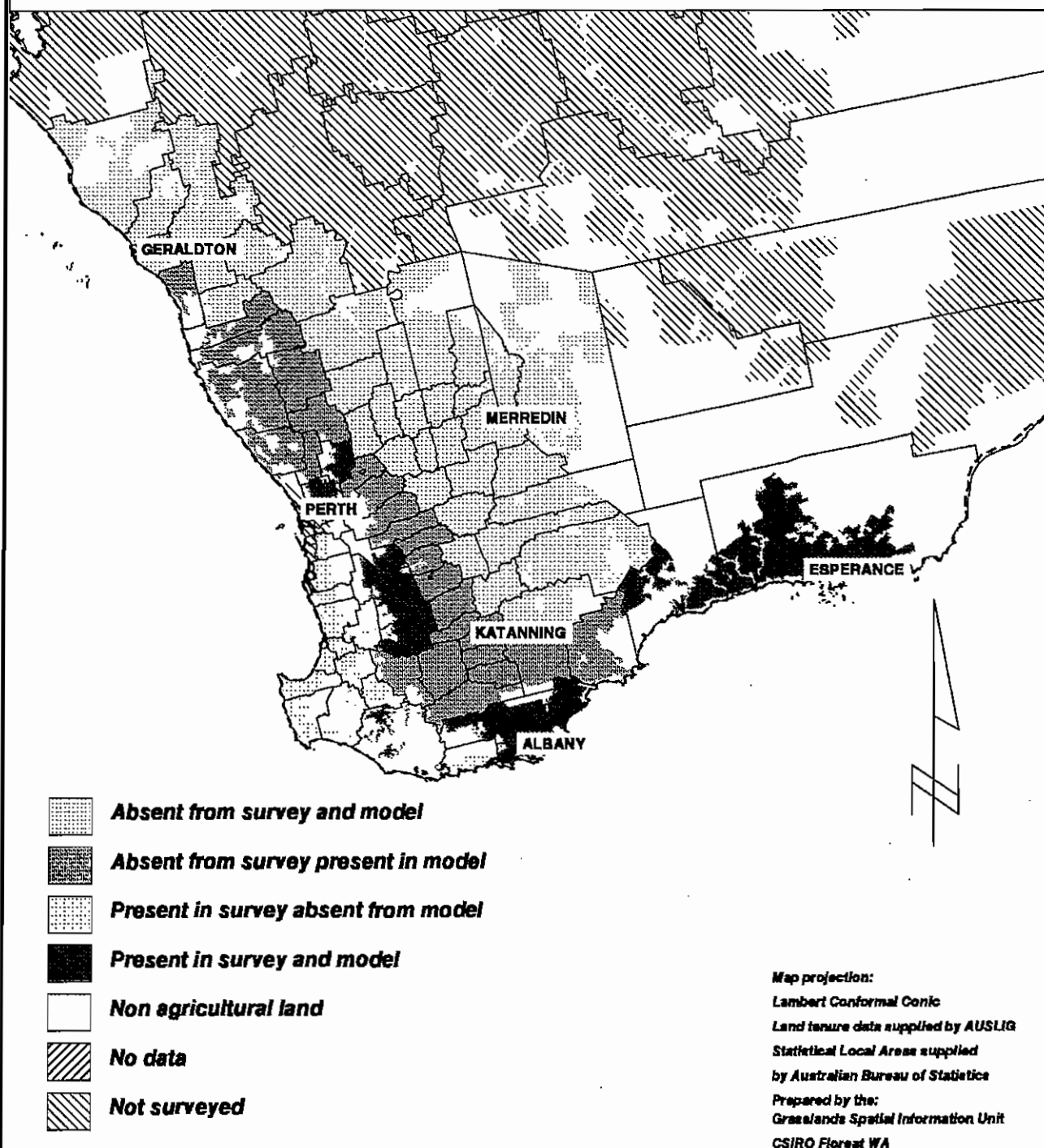
Map 63a. Comparison of potential and actual distribution for Trikkala subterranean clover in Eastern Australia.



**For an SLA, overlap with modelled zone defines presence in model
and pasture type > 1% of area defines presence in survey;
occurrence of both indicates coincidence between survey and model**

**Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC**

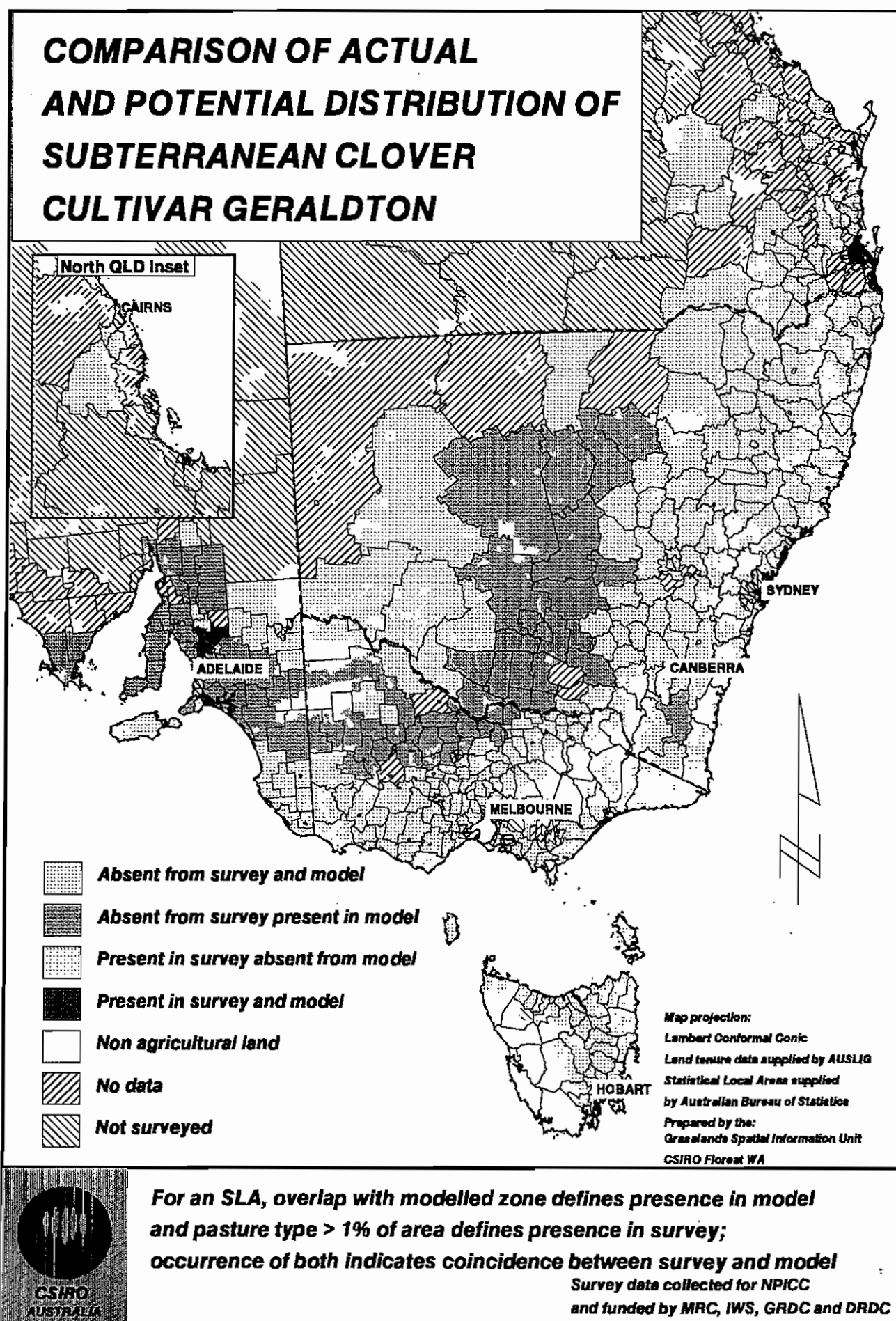
COMPARISON OF ACTUAL AND POTENTIAL DISTRIBUTION OF SUBTERRANEAN CLOVER CULTIVAR TRIKKALA



**For an SLA, overlap with modelled zone defines presence in model
and pasture type > 1% of area defines presence in survey;
occurrence of both indicates coincidence between survey and model**

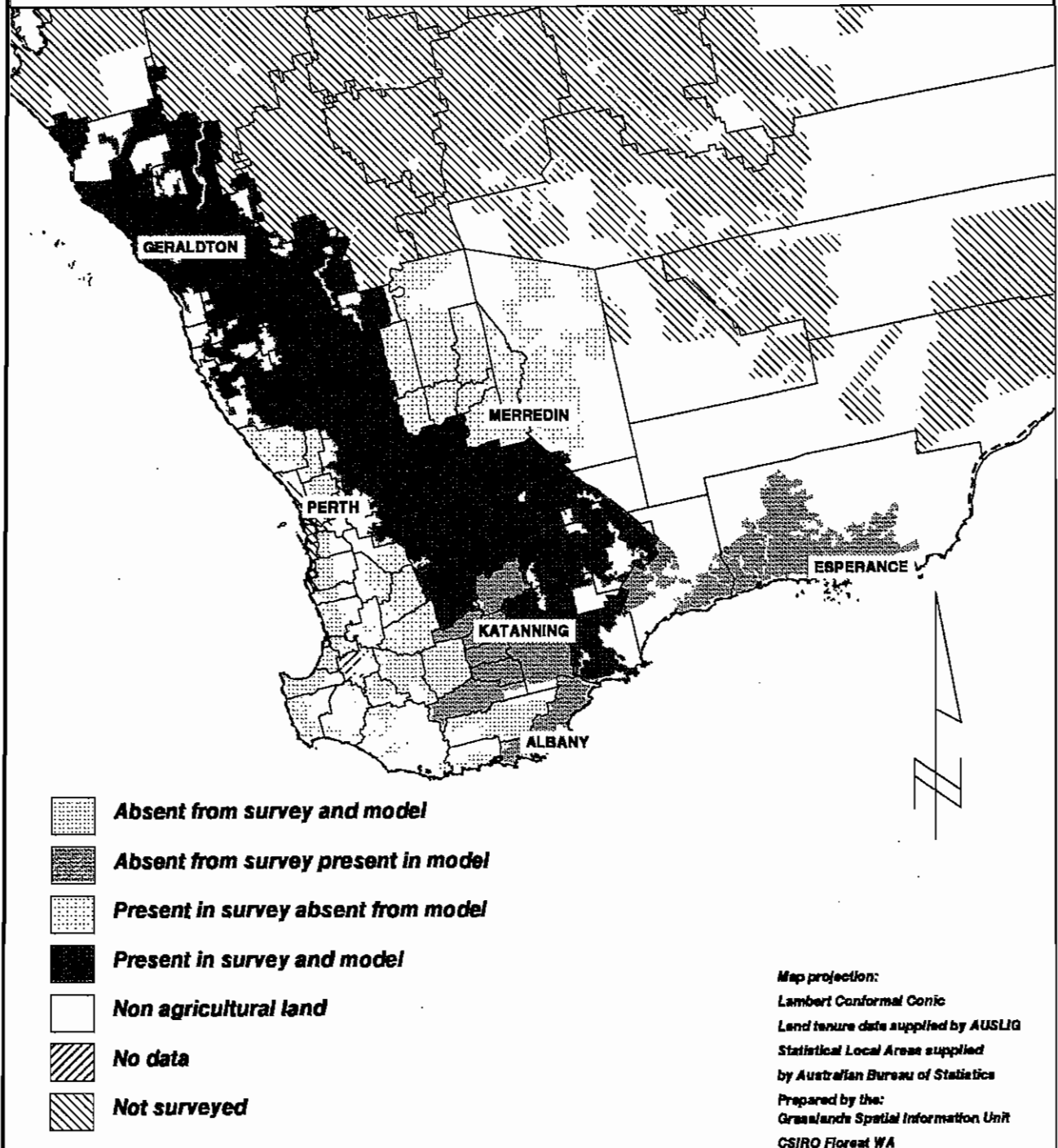
**Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC**

Map 64a. Comparison of potential and actual distribution for Geraldton subterranean clover in Eastern Australia.



Map 64b. Comparison of potential and actual distribution for Geraldton subterranean clover in Western Australia.

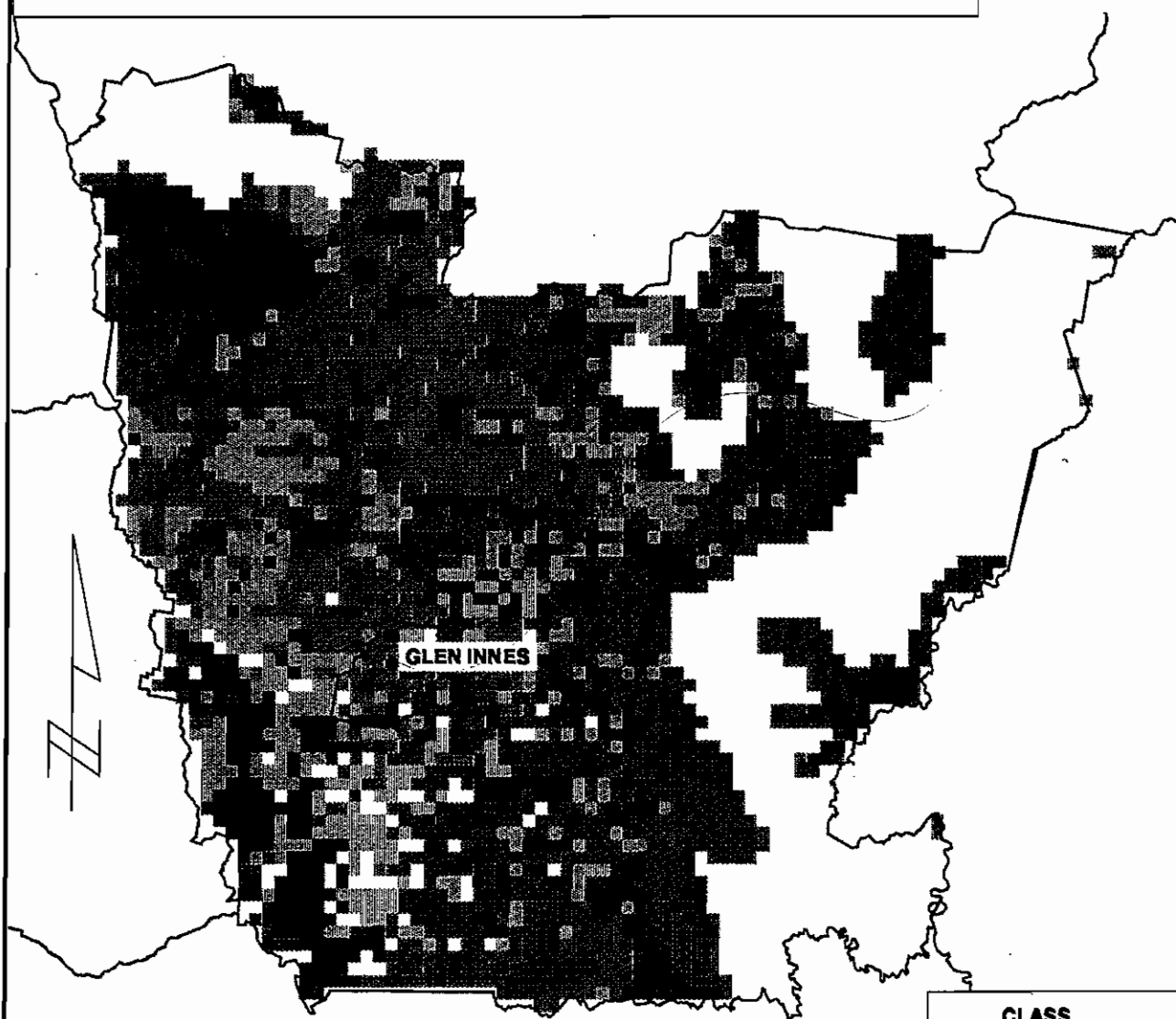
COMPARISON OF ACTUAL AND POTENTIAL DISTRIBUTION OF SUBTERRANEAN CLOVER CULTIVAR GERALDTON



For an SLA, overlap with modelled zone defines presence in model and pasture type > 1% of area defines presence in survey; occurrence of both indicates coincidence between survey and model

Survey data collected for NPICC and funded by MRC, IWS, GRDC and DRDC

SEVERN SLA VEGETATION CLASSES



Map projection:
Lambert Conformal Conic
Land tenure data supplied by AUSLIG
Statistical Local Areas supplied
by Australian Bureau of Statistics
Prepared by the:
Grasslands Spatial Information Unit
CSIRO Forest WA

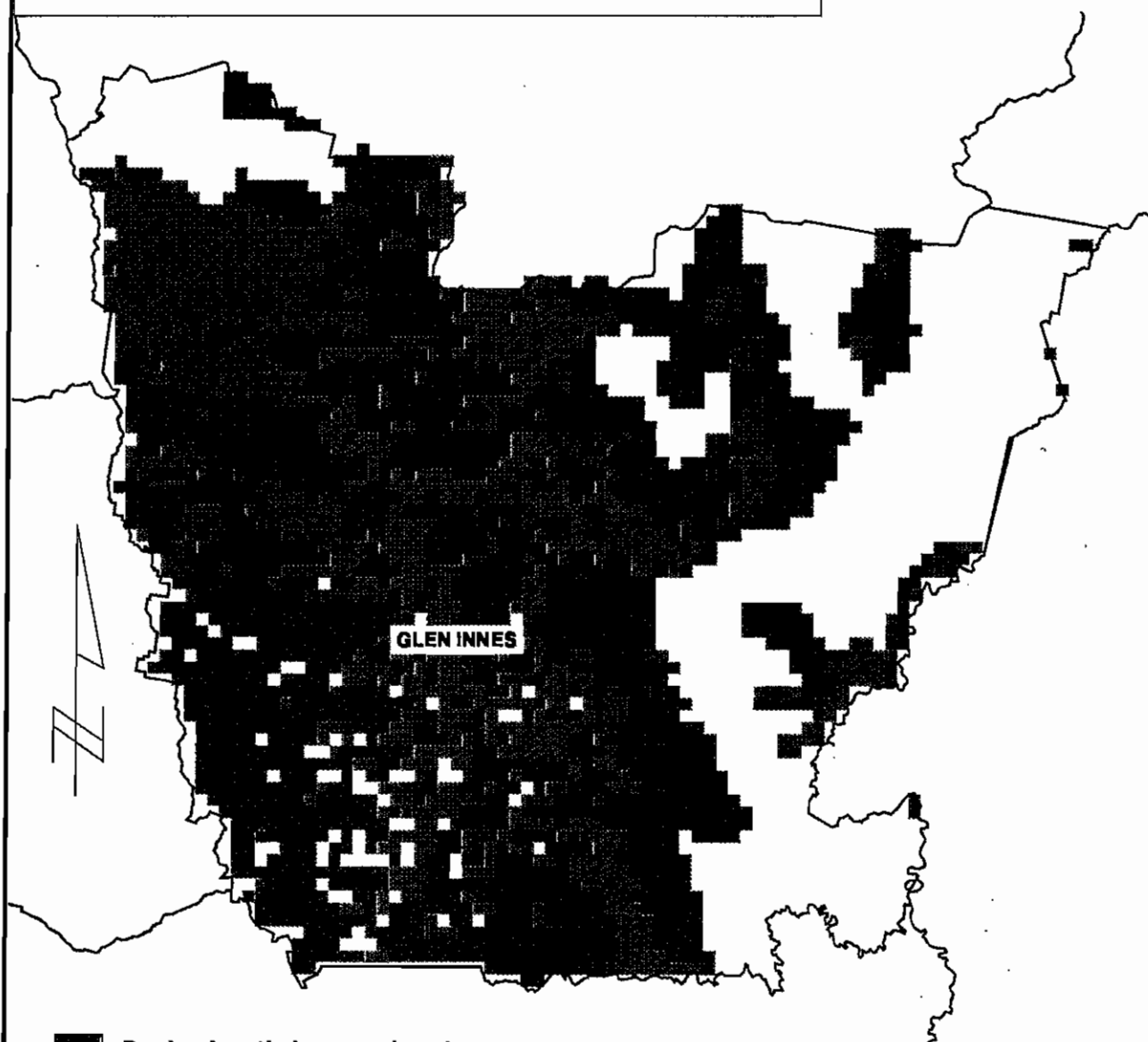
CLASS

	O		R
	Q		A
	P		U
	N		D
	K		S
	M		B
	L		F
	T		C
	I		H
	G		J
	E		



Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC

SEVERN SLA PASTURE ZONES



-  Predominantly improved pasture
-  Predominantly native pasture and woods
-  Predominantly forest
-  Non agricultural land or cloud

Map projection:
Lambert Conformal Conic
Land tenure data supplied by AUSLIG
Statistical Local Areas supplied
by Australian Bureau of Statistics
Prepared by the:
Grasslands Spatial Information Unit
CSIRO Forest WA



Survey data collected for NPICC
and funded by MRC, IWS, GRDC and DRDC

12. APPENDICES.

12.1 Survey form

NPICC

**Please read this before starting
to fill out the computer spreadsheet or manual forms...**

The survey has been designed largely by Drs Ken Archer (NSW Agriculture), Craig Pearson (Greenwich Group & NPICC Coordinator) and Bill Collins (WADA & NPICC Coordinator) with input from many others. It has been trialled in the field before reaching you. If you need to discuss any points, your key contacts are listed below. They will be pleased to assist you:

Departmental contact persons:

NSW: Ken Archer, telephone 062-913152
Queensland: Kevin Lowe, 07-2801726
South Australia: Andrew Lake, 08-2668333
Tasmania: Rosanne Coombes, 003-365415
Victoria: Ken Bishop, 053-336784
Western Australia: Bill Collins, 09-3683596

NPICC Coordinators:

Craig Pearson, 02-4394275
Bill Collins, 09-3683596
Rob Brown, 03-8747462

Form A Help!

1. This is the total area of improved (sown), native (unsown) and pastures-for-hay, from ABS statistics, which we have provided. Consider it as a percentage of total farm area: is it reasonable for a "typical" farm? Comment, if you wish, on form C.
2. If there are not enough rows for pasture types relevant to your area, please over-write some rows which are irrelevant.
3. Examples of additional types are: rose clover; vetch etc.
4. If it is a mix of annual and perennial legumes, include it here if the annual is more important, e.g. sub clover/ lucerne, or include it in section 2 if the perennial is more important, e.g. lucerne/ sub clover.
5. An example of additional pasture types is: caucasian clover.
6. Examples of additional pasture types are: paspalum/subclover; tall wheatgrass/ strawberry clover ; sown lovegrass/ sub clover etc. Do *not* include pastures based on short-lived ryegrasses or bromus: these are in section 4. Do *not* include pastures based on unsown grasses: these are in section 5.
7. Examples of additional types are: phalaris/cockfoot (no legume); perennial ryegrass/fescue/ subclover etc.
8. An example of additional pasture types is: prairie grass.
- 9 Please (1) check that each column adds to 100% and (2) check that your percentage estimates are reasonable when multiplied by the total pasture area of your district.

Now, please fill in a Form B for *each* pasture type within each LGA.

Notes to assist you with Form B are on the other side of this sheet.

FORM A: PERCENTAGE OF PASTURE TYPES IN EACH LGA

Your Name:	LGA 1	LGA 2	LGA 3
LOCAL GOVERNMENT AREA			
TOTAL AREA OF PASTURE (See Help Point 1)			
1. Annual legume based pastures with or without annual grasses & broadleaf species (2)			
1.1 Sub clover (T. subterraneum)			
1.2 Sub clover (T. brachycalycinum or yanninicum - specify)			
1.3 Annual medic (specify species)			
1.4 Annual medic (specify species)			
1.5 Serradella			
1.6 Persian clover			
1.7 Balansa clover			
1.8 (3)			
1.9			
Multiple annual legumes (specify) (4)			
1.10 Sub clover/balansa			
1.11			
1.12			
2. Perennial legume based pastures			
2.1 Lucerne			
2.2 White clover			
2.3 Red clover			
2.4 Strawberry clover			
2.5 Lotus			
2.6 (5)			
2.7			
3. Sown perennial grass based pastures based pastures with or without perennial or annual legumes			
3.1 Phalaris/white clover			
3.2 Phalaris/sub clover			
3.3 Fescue/white clover			
3.4 Fescue/sub clover			
3.5 Perennial ryegrass/white clover			
3.6 Perennial ryegrass/sub clover			
3.7 Cocksfoot/white clover			
3.8 Cocksfoot/sub clover			
3.9 Kikuyu/white clover			
3.10 (6)			
3.11			
Above with additional grasses or legumes e.g.			
3.12 Phalaris/socksfoot/sub clover			
3.13 (7)			
3.14			
4. Annual or short-lived grass based pastures			
4.1 Annual or hexaploid ryegrass			
4.2 Annual or hexaploid ryegrass/white clover			
4.3 Barley grass			
4.4 (8)			
4.5			
5. Native or naturalised pastures			
5.1 Unimproved native pasture - perennial dominant			
5.2 Unimproved native pasture - winter annual dominant			
5.3 Fertilised native pasture - perennial dominant			
5.4 Fertilised native pasture - winter annual dominant			
5.5 Fertilised and oversown - perennial native dominant pasture			
5.6			
5.7			
TOTAL (9)	100	100	100

FORM B (See Help Point 10)
PASTURE COMPOSITION, USAGE, CONDITION AND SUSTAINABILITY

Your Name:		Name of LGA(s):(11)	
1. Pasture Type (Enter a code number from Form B)	Enter Code	5. Species Present (Indicate whether sown (S), volunteer (V), or weed (W))	6. Botanical composition Mean % Range: from % to %
Pasture type:.....			
2. Is the role of this pasture: Permanent (P), Temporary (T), or used in crop rotations (C)	Enter P, T or C	7. Main Cultivars Sown	
Role of pasture:.....			
3. If used in crop rotations, give rotation sequence. Years in pasture:.....	Years	8. What is the broad purpose(s) for the pasture (12):	9. If used for Landcare, what is the specific purpose(s):
Years in crop:.....			
4. What is the average (± range) re-sowing interval for this pasture?	Enter Years		
Mean:..... Range:..... To:.....			
14. Computed with the potential for this pasture type, what proportion of this pasture is: (15)	Enter %	10. What is the % use within each type of enterprise (13)	11. Carrying capacity Mean DSE/HA Range: from DSE/HA to DSE/HA
Producing to optimum:..... Below optimum but stable in a state of decline:..... Total 100			
15. If this pasture is below optimum or in decline, rate factors involved from 0 to 3 (3 = greatest effect)	Enter Rating Enter 0 to 3		
Understocking..... Overstocking..... Excessive cropping..... Declining fertility..... Acidity..... Soil salinity..... Weed invasion..... Insects..... Disease..... Drought..... Other (specify).....			
16. To what extent does this pasture type contribute to either land degradation OR Landcare for: (16)	(Rate on a scale: -2 to +2 where: -2 is maximum degradation; +2 is maximum benefit for Landcare)		
Soil erosion/retenion..... Soil structure change..... Soil fertility change..... Groundwater recharge/use Acidification..... Nutrient loss/recycling..... Other.....	Rate from -2 to +2		
17. What nutrients are applied to this pasture (17)	At sowing kg/ha	For molehens- once kg/ha/yr	In crop kg/ha/yr
Phosphorus..... Sulphur..... Potassium..... Nitrogen..... Lime..... Other?			
18. How often are the nutrients applied?	For molehens- once (years)	In crop (years)	
Nutrients applied every 7 years			
13. What is the average (and range) % ground cover in: (14)	Mean %	Range: from % to %	
Early autumn..... Late spring.....			
12. What % of this pasture type is:	%		
Potential.....			
Actual.....			
Dryland..... Impeded.....			

Are there any species currently not grown in your LGA(s) which you consider have potential?

	LGA 1	LGA 2	LGA 3
Name of LGA.....			
Species 1 (enter name).....			
Potential area.....			
Primary purpose.....			
Species 2 (enter name).....			
Potential area.....			
Primary purpose.....			
Species 3 (enter name).....			
Potential area.....			
Primary purpose.....			
Species 4 (enter name).....			
Potential area.....			
Primary purpose.....			

**Are you in broad agreement with the ABS data we have given you?
If not, please indicate your amended values in the appropriate spaces below.**

	LGA 1	LGA 2	LGA 3
Name of LGA.....			
Areas in LGAs of:			
Sown pasture.....			
Native pasture.....			
Pasture for hay.....			
Total pasture			
Crops.....			
Fallow.....			
Unavailable.....			
Total holding			

Do you have any other comments in regard to this survey? Please provide these below.
(Use separate page if you wish).

[illegible]

12.2 Survey database table structure

Table I. Form A data structure

Field Name	Data Type	Description
ANPICC_ID	Number	NPICC nominated LGA ID
BDY_ID	Number	LGA ID for georeferencing
STATE	Text	State name
LGA NAME	Text	LGA name
PASTURE_CODE	Number	Pasture code from form eg. 3.2
CULT_AREA%	Number	Percentage of LGA area under nominated pasture

Table II. Form B Q1-4 data structure

Field Name	Data Type	Description
BNPICC_ID	Number	NPICC nominated LGA ID - key link to Form A
STATE	Text	State name
LGA_NAME	Text	LGA name
BPASTURE_CODE	Number	Pasture code linked to Form A
ROLE	Text	Permanent (P), temporary (T), crop rotation (C)
YEARS_PASTURE	Number	Years in pasture
YEARS_CROP	Number	Years in crop
RESOW_MEAN	Number	Mean resowing interval in years
RESOW_FROM	Number	Maximum resowing interval in years
RESOW_TO	Number	Minimum resowing interval in years

Table III. Form B Q5-6 data structure

Field Name	Data Type	Description
BNPICC_ID	Number	NPICC nominated LGA ID - key link to Form A
STATE	Text	State name
LGA_NAME	Text	LGA name
BPASTURE_CODE	Number	Pasture code linked to Form A
UPDATE CODE	Number	Simplified pasture code
COMMON NAME	Text	Common name of species
BOTANICAL NAME	Text	Botanical name of species
PRESENCE	Text	Sown (S), Volunteer (V) or Weed (W)
ORIGIN	Number	Introduced (1) or Native (2)
LIFE CYCLE	Number	Annual (1) or Perennial (2)
TYPE	Number	Grass (1), legume (2), dicot weed (3), sedge/rush (4), shrub (5)
SPECIES_CODE	Number	Species code
MEAN_COMP%	Number	Mean percent composition
RANGE_FROM%	Number	Minimum percent composition
RANGE_TO%	Number	Maximum percent composition

Table IV. Form B Q7 data structure

Field Name	Data Type	Description
BNPICC_ID	Number	NPICC nominated LGA ID - key link to Form A
PASTURE_CODE	Number	Pasture code linked to Form A
CULTIVAR	Text	Cultivar name

Table V. Form B Q8-9 data structure

Field Name	Data Type	Description
BNPICC_ID	Number	NPICC nominated LGA ID - key link to Form A
STATE	Text	State name
LGA_NAME	Text	LGA name
BPASTURE_CODE	Number	Pasture code linked to Form A
P_STOCK	Number	Percentage area used for livestock
P_CROP	Number	Percentage area used for crop yield/protein
P_SUSTAINABILITY	Number	Percentage area used for Landcare etc.
LC_STRUCT	Number	Percentage Landcare use for improved soil structure
LC_EROSION	Number	Percentage Landcare use for erosion control
LC_SALINITY	Number	Percentage Landcare use for salinity control
LC_ACIDITY	Number	Percentage Landcare use for acidity control

Table VII. Form B Q11-13 data structure

Field Name	Data Type	Description
BNPICC_ID	Number	NPICC nominated LGA ID - key link to Form A
STATE	Text	State name
LGA_NAME	Text	LGA name
BPASTURE_CODE	Number	Pasture code linked to Form A
CC_ACTUAL*	Number	Actual carrying capacity
CC_POTENTIAL*	Number	Potential carrying capacity
DRYLAND	Number	Percentage of pasture grown dryland
IRRIGATED	Number	Percentage of pasture grown under irrigation
AUTUMN_MEAN	Number	Mean autumn ground cover (%)
AUTUMN_FROM	Number	Maximum autumn ground cover (%)
AUTUMN_TO	Number	Minimum autumn ground cover (%)
SPRING_MEAN	Number	Mean spring ground cover (%)
SPRING_FROM	Number	Maximum spring ground cover (%)
SPRING_TO	Number	Minimum spring ground cover (%)

* Data for range of carrying capacities sometimes given on original forms but data not entered.

Table VIII. Form B 14 data structure

Field Name	Data Type	Description
BNPICC_ID	Number	NPICC nominated LGA ID - key link to Form A
STATE	Text	State name
LGA_NAME	Text	LGA name
BPASTURE_CODE	Number	Pasture code linked to Form A
OPTIMUM	Number	Percentage of pasture producing to optimum
STABLE	Number	Percentage of pasture below optimum but stable
DECLINE	Number	Percentage of pasture in decline

* Data for range of carrying capacities sometimes given on original forms but data not entered.

Table IX. Form B Q15 data structure

Field Name	Data Type	Description
BNPICC_ID	Number	NPICC nominated LGA ID - key link to Form A
STATE	Text	State name
LGA_NAME	Text	LGA name
BPASTURE_CODE	Number	Pasture code linked to Form A
UNDERSTOCKING	Number	Rating (0-3) for understocking as a cause of decline
OVERSTOCKING	Number	Rating (0-3) for overstocking as a cause of decline
EXCESSIVE_CROP	Number	Rating (0-3) for cropping as a cause of decline
FERTILITY	Number	Rating (0-3) for low fertility as a cause of decline
ACIDITY	Number	Rating (0-3) for acidity as a cause of decline
SALINITY	Number	Rating (0-3) for salinity as a cause of decline
WEEDS	Number	Rating (0-3) for weed infestation as a cause of decline
INSECTS	Number	Rating (0-3) for insect pests as a cause of decline
DISEASE	Number	Rating (0-3) for plant disease as a cause of decline
DROUGHT	Number	Rating (0-3) for drought as a cause of decline

* Data for range of carrying capacities sometimes given on original forms but data not entered.

Table X. Form B Q16 data structure

Field Name	Data Type	Description
BNPICC_ID	Number	NPICC nominated LGA ID - key link to Form A
STATE	Text	State name
LGA_NAME	Text	LGA name
BPASTURE_CODE	Number	Pasture code linked to Form A
EROSION	Number	Contribution of pasture to erosion (-2) or retention (2)
STRUCTURE	Number	Contribution of pasture to structural change (-2 to 2)
FERTILITY	Number	Contribution of pasture to fertility change (-2 to 2)
GROUNDWATER	Number	Contribution of pasture to ground water use (-2 to 2)
ACIDIFICATION	Number	Contribution of pasture to acidification (-2 to 2)
NUTRIENTS	Number	Contribution of pasture to nutrient cycling (-2 to 2)

Table XI. Form B Q17-18 data structure

Field Name	Data Type	Description
BNPICC_ID	Number	NPICC nominated LGA ID - key link to Form A
STATE	Text	State name
LGA_NAME	Text	LGA name
BPASTURE_CODE	Number	Pasture code linked to Form A
P_AT_SOW	Number	Phosphorus applied at sowing (kg/ha)
P_MAINTENANCE	Number	Phosphorus applied for maintenance (kg/ha/yr)
P_IN_CROP	Text	Phosphorus applied with crop (kg/ha/yr)
S_AT_SOW	Text	Sulphur applied at sowing (kg/ha)
S_MAINTENANCE	Text	Sulphur applied for maintenance (kg/ha/yr)
S_IN_CROP	Text	Sulphur applied with crop (kg/ha/yr)
K_AT_SOW	Text	Potassium applied at sowing (kg/ha)
K_MAINTENANCE	Text	Potassium applied for maintenance (kg/ha/yr)
K_IN_CROP	Text	Potassium applied with crop (kg/ha/yr)
N_AT_SOW	Text	Nitrogen applied at sowing (kg/ha)
N_MAINTENANCE	Text	Nitrogen applied for maintenance (kg/ha/yr)
N_IN_CROP	Text	Nitrogen applied with crop (kg/ha/yr)
LIME_AT_SOW	Text	Lime applied at sowing (kg/ha)
LIME_MAINT	Text	Lime applied for maintenance (kg/ha/yr)
LIME_IN_CROP	Text	Lime applied with crop (kg/ha/yr)
OTHER_TYPE	Text	Other form of nutrient
OTHER_AT_SOW	Text	Other nutrient applied at sowing (kg/ha)
OTHER_MAINT	Text	Other nutrient applied for maintenance (kg/ha/yr)
OTHER_IN_CROP	Text	Other nutrient applied with crop (kg/ha/yr)
FOR_MAINTENANCE	Text	Frequency of nutrient application for maintenance
FOR_CROP	Text	Frequency of nutrient application for crop

* Data for range of carrying capacities sometimes given on original forms but data not entered.

Table XII. Presence in LGAs of modelled adaptation zones for species.

Field Name	Data Type	Description
BNPICC_ID	Number	NPICC nominated LGA ID - key link to Form A
BDYID	Number	LGA id for georeferencing
STATE	Text	State name
RED CLOVER	Number	1 = presence in LGA, 0 = absence from LGA
SUBTERRANEAN CLOVER	Number	“ “
WHITE CLOVER	Number	“ “
BALANSA CLOVER	Number	“ “
TALL FESCUE	Number	“ “
COCKSFOOT	Number	“ “
PERENNIAL RYEGRASS	Number	“ “
PHALARIS	Number	“ “
SERRADELLA	Number	“ “
LUCERNE	Number	“ “
BARREL MEDIC	Number	“ “

Table XIII. Correspondence between Statistical Local Areas and Local Government Areas used for the original survey for Mainland Australia and excluding Tasmania.

This should enable users to reproduce maps presented in this report for Mainland Australia. Due to severe incompatibilities between 1993/94 SLAs, 1993 LGAs and original survey LGAs in Tasmania, production of maps from the survey requires interpolation of survey data to "best bet" fits of LGA or SLA boundaries unless using the original survey LGA boundary data.

Field Name	Data Type	Description
SLAID	Number	SLA georeferencing ID
BDYID	Number	LGA ID for georeferencing
SLA_NAME	Text	SLA name

12.3 Species recorded in the survey database

Table XIV. Species recorded in the survey database. Common names were used by respondents on the original forms. These are listed in their entirety.

PASTURE NAME	BOTANICAL NAME	SPECIES
Tall wheatgrass	<i>Agropyron elongatum</i>	10
Blowngrass	<i>Agrostis avenacea</i>	20
Bent	<i>Agrostis spp.</i>	21
Bent grass	<i>Agrostis spp.</i>	21
Padlock hairgrass	<i>Aira spp.; Deschampsia spp.</i>	30
Onion	<i>Allium cepa var. cepa</i>	800
Meadow foxtail	<i>Alopercurus pratensis</i>	40
Whiskey grass	<i>Andropogon virginicus</i>	50
Sweet vernal	<i>Anthoxanthum odoratum</i>	60
Wild parsley	<i>Apium leptophyllum</i>	810
Capeweed	<i>Arctotheca calendula</i>	820
Capeweed/storksbill	<i>Arctotheca calendula/Erodium spp.</i>	821
Kerosene grass	<i>Aristida contorta; A. browniana; A. hygrometrica</i>	70
Wiregrass	<i>Aristida ramosa</i>	71
Samphire	<i>Arthrocnemum leiostachyum</i>	830
Capeweed	<i>Arctotheca calendula</i>	820
Onion weed	<i>Asphodelus fistulosus; Nothoscordum inodorum</i>	840
Mitchell grass	<i>Astrebla spp.</i>	80
Saltbush	<i>Atriplex spp.</i>	1601
Bladder saltbush	<i>Atriplex vesicaria</i>	1602
Wild oats	<i>Avena fatua; A. ludoviciana; A. barbata</i>	91
Oats	<i>Avena sativa</i>	92
Carpet grass	<i>Axonopus affinis</i>	100
Redleg grass	<i>Bothriochloa macra</i>	110
Redgrass	<i>Bothriochloa spp.</i>	111
Brachiaria	<i>Brachiaria spp.</i>	120
Brassica	<i>Brassica spp.</i>	860
Rape	<i>Brassica spp.</i>	860
Turnip	<i>Brassica spp.</i>	860
Various brassica spp.	<i>Brassica spp.</i>	860
Wild canola	<i>Brassica spp.</i>	860
Wild turnip	<i>Brassica spp.</i>	860
Crucifers	<i>Brassica/Raphanus spp. etc</i>	861
Shivery grass	<i>Briza minor</i>	130
Prairie grass	<i>Bromus catharticus</i>	140
Compact brome	<i>Bromus madritensis</i>	142
Soft brome	<i>Bromus mollis/molliformis</i>	143
Red brome	<i>Bromus rubens</i>	144
Brome grasses	<i>Bromus spp.</i>	145
Bindy eye	<i>Calotis hispidula</i>	870
Shepherd's purse	<i>Capsella bursa-pastoris</i>	880
Slender thistle	<i>Carduus pycnocephalus; C. tenuis</i>	890
Thistles	<i>Carduus spp.</i>	1000
Saffron thistle	<i>Carthamus lanatus</i>	900
Buffel grass	<i>Cenchrus ciliaris</i>	150
Spiny burr grass	<i>Cenchrus incertus; C. longispinus</i>	151
St. Barnaby's thistle	<i>Centaurea solstitialis</i>	910
Chick weed	<i>Cerastium glomeratum/Stellaria media</i>	920
Tagasaste	<i>Chamaecytisus prolifer</i>	600

Table XIV (cont). Species recorded in the survey database. Common names were used by respondents on the original forms. These are listed in their entirety.

PASTURE NAME	BOTANICAL NAME	SPECIES
Rock fern	<i>Cheilanthes tenuifolia</i>	930
Chicory	<i>Chicorium intybus</i>	940
Chicory puna	<i>Chicorium intybus</i>	940
Rhodes grass	<i>Chloris gayana</i>	160
Pioneer rhodes grass	<i>Chloris gayana</i> cv <i>Pioneer</i>	160
Rhodes grass callide	<i>Chloris gayana</i> cv. <i>Callide</i>	160
Chloris	<i>Chloris</i> spp.	163
Chloris spp.	<i>Chloris</i> spp.	163
Windmill grass	<i>Chloris truncata</i>	164
Skeleton weed	<i>Chondrilla juncea</i>	950
Ribbon grass	<i>Chrysopogon latifolius</i> ; <i>C. pallidus</i>	170
Spear thistle	<i>Cirsium</i> spp.	960
Spear thistle	<i>Cirsium vulgare</i>	960
Fleabane	<i>Conyza</i> spp.	970
Crassula	<i>Crassula</i> spp.	980
Barb wire grass	<i>Cymbopogon refractus</i>	180
Couch	<i>Cynodon dactylon</i>	190
Couch blue grass	<i>Cynodon incompletus</i>	191
Dogtail grass	<i>Cynosurus cristatus</i>	200
Dogtail grass	<i>Cynosurus cristatus</i>	200
Crested dogtail	<i>Cynosurus cristatus</i>	200
Dogtail grass	<i>Cynosurus cristatus</i>	200
Nutgrass	<i>Cyperus rotundus</i>	1500
Cyperus spp.	<i>Cyperus</i> spp.	1501
Sedges	<i>Cyperus</i> spp.	1501
Umbrella sedge	<i>Cyperus</i> spp.	1501
Sedges & rushes	<i>Cyperus</i> spp.; <i>Juncus</i> spp.	1502
Cocksfoot	<i>Dactylis glomerata</i>	210
Button grass	<i>Dactyloctenium radulans</i>	220
Wallaby grass	<i>Danthonia</i> spp.	230
Carrot weed	<i>Daucus</i> spp.	990
Blue grass	<i>Dicanthium</i> spp.	240
Qld bluegrass	<i>Dicanthium</i> spp.	240
Thistle	<i>Dicotyledons</i>	1000
Thistles	<i>Dicotyledons</i>	1000
Annual broadleaf	<i>Dicotyledons</i>	1000
Broadleaf	<i>Dicotyledons</i>	1000
Broadleaf & thistle	<i>Dicotyledons</i>	1000
Broadleaf thistles	<i>Dicotyledons</i>	1000
Broadleaf weeds	<i>Dicotyledons</i>	1000
Dicots	<i>Dicotyledons</i>	1000
Forbs	<i>Dicotyledons</i>	1000
Other broadleaf weeds	<i>Dicotyledons</i>	1000
Thistle	<i>Dicotyledons</i>	1000
Thistles	<i>Dicotyledons</i>	1000
Various broadleaves	<i>Dicotyledons</i>	1000
Perennial summer grass	<i>Digitaria ciliaris</i>	250
Blue grass digitaria	<i>Digitaria didactyla</i>	251
Crabgrass	<i>Digitaria sanguinalis</i> / <i>Digitaria ciliaris</i>	252
Summer grass	<i>Digitaria sanguinalis</i> ; <i>D. ciliaris</i>	252
Digitaria spp.	<i>Digitaria</i> spp.	254
Umbrella grass	<i>Digitaria</i> spp.; <i>Chloris</i> spp.	255

Table XIV (cont). Species recorded in the survey database. Common names were used by respondents on the original forms. These are listed in their entirety.

PASTURE NAME	BOTANICAL NAME	SPECIES
Crabs foot	<i>Digitaria/Erodium spp.</i>	256
Curious saltbush	<i>Dissocarpus paradoxus</i>	1010
Australian saltgrass	<i>Distichlis disticophylla</i>	260
Sundew	<i>Drosera spp.</i>	1020
Wild millet	<i>Echinochloa colona</i> ; <i>E. crus-galli</i> ; <i>Panicum decomp</i>	270
Barnyard grass	<i>Echinochloa crus-galli</i>	271
Paterson's curse	<i>Echium plantagineum</i>	1030
Perennial veldt grass	<i>Ehrharta calycina</i>	280
Veldt grass	<i>Ehrharta spp.</i>	281
Lymegrass	<i>Elymus arenarius</i> ; <i>E. virginicus</i>	290
Doublegee	<i>Emex australis</i>	1040
Nineawn	<i>Enneapogon spp.</i>	300
Curly windmill grass	<i>Enteropogon acicularis</i>	310
Woollybutt grass	<i>Eragrostis eriopoda</i>	320
Neverfail	<i>Eragrostis eriopoda</i> ; <i>E. laniflora</i> ; <i>E. setifolia</i>	321
Lovegrass	<i>Eragrostis spp.</i>	322
Storksbill spp.	<i>Erodium spp.</i>	1050
Crowsfoot	<i>Erodium spp./Eleusine indica</i>	1052
Tall fescue	<i>Festuca arundinacea</i>	330
Tall fescue demeter	<i>Festuca arundinacea cv. Demeter</i>	331
Geranium	<i>Geranium spp.</i>	1060
Glycine	<i>Glycine spp.</i>	610
Glycine spp.	<i>Glycine spp.</i>	610
Cudweed	<i>Gnaphalium spp.</i>	1070
Primrose	<i>Goodenia spp.</i> ; <i>Oenothera spp.</i>	1080
Primrose	<i>Goodenia spp.</i> ; <i>Oenothera spp.</i>	1080
Blue heliotrope	<i>Heliotropium amplexicaule</i>	1090
Heliotrope	<i>Heliotropium spp.</i>	1091
Black speargrass	<i>Heteropogon contortus</i>	340
Yorkshire fog	<i>Holcus lanatus</i>	350
Cape Tulip	<i>Homeria spp.</i>	1100
Barley grass	<i>Hordeum leporinum</i>	360
Sea barley grass	<i>Hordeum marinum</i>	361
Barley	<i>Hordeum spp.</i>	362
Coolatai grass	<i>Hyparrhenia hirta</i>	370
St. John's wort	<i>Hypericum perforatum var. angustifolium</i>	1110
Catsear	<i>Hypochoeris radicata</i>	1120
Flatweed	<i>Hypochoeris radicata</i>	1120
Blady grass	<i>Imperata cylindrica</i>	380
Blady grass mat	<i>Imperata cylindrica</i>	380
Morning glory	<i>Ipomoea spp.</i>	1130
Spiny rush	<i>Juncus acutus</i>	1510
Toadrush	<i>Juncus bufonius</i>	1511
Rushes	<i>Juncus spp.</i>	1512
Fat pea	<i>Lathyrus spp. (?)</i>	620
Pea	<i>Lathyrus spp.</i> ; <i>Swainsona spp.</i> ; <i>Crotolaria spp. et</i>	621
Pea Spp.	<i>Lathyrus spp.</i> ; <i>Swainsona spp.</i> ; <i>Crotolaria spp. et</i>	621
Hairy hawkbit	<i>Leontodon taraxacoides</i>	1140
Woolly buttons	<i>Leptorhynchus spp.</i>	
Biennial ryegrass	<i>Lolium hybridum/multiflorum</i>	390
Italian ryegrass	<i>Lolium multiflorum</i>	391
Tetraploid ryegrass	<i>Lolium multiflorum</i>	391

Table XIV (cont). Species recorded in the survey database. Common names were used by respondents on the original forms. These are listed in their entirety.

PASTURE NAME	BOTANICAL NAME	SPECIES
Perennial ryegrass	<i>Lolium perenne</i>	392
Perennial ryegrass KV/Ellett	<i>Lolium perenne</i>	392
Annual ryegrass	<i>Lolium rigidum</i>	393
Wimmera ryegrass	<i>Lolium rigidum</i>	393
Hybrid ryegrass	<i>Lolium spp.</i>	394
Ryegrass	<i>Lolium spp.</i>	394
Short lived ryegrass	<i>Lolium spp.</i>	394
Winter ryegrass	<i>Lolium spp.</i>	394
Matrush	<i>Lomandra spp.</i>	1540
Greater lotus	<i>Lotus pedunculatus/uliginosus</i>	630
Greater lotus maku	<i>Lotus pedunculatus/uliginosus</i> cv. <i>Grasslands Maku</i>	631
Lotus	<i>Lotus spp.</i>	632
Lotus minor	<i>Lotus spp.</i>	632
Lotus minor/major	<i>Lotus spp.</i>	632
Blue lupins	<i>Lupinus cosentini</i>	640
Hyssop's loosestrife	<i>Lythrum hyssopifolia</i>	1150
Eastern cotton bush	<i>Maireana brevifolia</i>	1611
Black Bluebush	<i>Maireana pyramidata</i>	1610
Shrubby bluebush	<i>Maireana pyramidata</i>	1610
Pearl bluebush	<i>Maireana sedifolia</i>	1612
Bluebush	<i>Maireana spp.</i>	1613
Cotton bush	<i>Maireana/Gomphocarpus spp.</i>	1614
Marshmellow	<i>Malva parviflora</i>	1160
Horehound	<i>Marubium vulgare</i>	1170
Spotted medic	<i>Medicago arabica</i>	650
Cutleaf medic	<i>Medicago laciniata</i>	651
Strand medic	<i>Medicago littoralis</i>	652
Woolly burr medic	<i>Medicago minima</i>	653
Burr medic	<i>Medicago polymorpha</i>	654
Gama medic	<i>Medicago rugosa</i>	655
Lucerne	<i>Medicago sativa</i>	656
Lucerne aurora	<i>Medicago sativa</i> cv. <i>Aurora</i>	656
Snail medic	<i>Medicago scutellata</i>	658
Annual medic	<i>Medicago spp.</i>	659
Barrel medic	<i>Medicago spp.</i>	662
Barrrel medic	<i>Medicago spp.</i>	662
Medic	<i>Medicago spp.</i>	656
Medic	<i>Medicago spp.</i>	659
Native medic	<i>Medicago spp.</i>	659
Naturalised medic	<i>Medicago spp.</i>	659
Volunteer medic	<i>Medicago spp.</i>	659
Trefoil	<i>Medicago spp.</i> ; <i>Trifolium spp.</i> ; <i>Lotus spp.</i>	660
Disc medic	<i>Medicago tornata</i>	661
Barrel medic	<i>Medicago truncatula</i>	662
Barrel medic ascot	<i>Medicago truncatula</i> cv. <i>Ascot</i>	662
Medic bennalong	<i>Medicago truncatula</i> cv. <i>Bennelong</i>	662
Barrel medic cyprus	<i>Medicago truncatula</i> cv. <i>Cyprus</i>	662
Barrel medic jemalong	<i>Medicago truncatula</i> cv. <i>Jemalong</i>	662
Barrel medic paraggio	<i>Medicago truncatula</i> cv. <i>Paraggio</i>	662
Barrel medic sephi	<i>Medicago truncatula</i> cv. <i>Sephi</i>	662
Medic & clover	<i>Medicago/Trifolium spp.</i>	671
Penny royal	<i>Mentha pullegium</i>	1180

Table XIV (cont). Species recorded in the survey database. Common names were used by respondents on the original forms. These are listed in their entirety.

PASTURE NAME	BOTANICAL NAME	SPECIES
Weeping grass	<i>Microlaena stipoides</i>	400
Bandicoot grass	<i>Monochather paradoxa</i>	410
Serrated tussock	<i>Nassella trichotoma</i>	420
Evening primrose	<i>Oenothera spp.</i>	1190
Scotch thistle	<i>Onopordum acanthium</i>	1200
Serradella	<i>Ornithopus spp.</i>	680
Soursob	<i>Oxallis pes-caprae</i>	1210
Green panic	<i>Panicum maximum var. trichoglume</i>	430
Panic bambatsi	<i>Panicum spp.</i>	431
Panicum	<i>Panicum spp.</i>	431
Curly ryegrass	<i>Parapholis incurva</i>	440
Brigalow grass	<i>Paspalidium caespitosum</i>	450
Paspalum	<i>Paspalum dilatatum</i>	460
Water couch	<i>Paspalum paspaloides</i>	461
Paspalum spp.	<i>Paspalum spp.</i>	462
Kikuyu	<i>Pennesetum clandestinum</i>	470
Phalaris	<i>Phalaris aquatica</i>	480
Annual phalaris	<i>Phalaris paradoxa</i>	481
Perennial paradoxa	<i>Phalaris paradoxa</i>	481
Phalaris paradoxa	<i>Phalaris paradoxa</i>	481
Ox tongue	<i>Picris echoides</i>	1220
Poverty bush	<i>Pimelea spp.; Sclerolaena spp.</i>	1230
Buck's-horn plantain	<i>Plantago coronopus</i>	1240
Plantain	<i>Plantago lanceolata</i>	1241
Winter grass	<i>Poa annua</i>	490
Poa tussock	<i>Poa labillardieri</i>	491
Kentucky bluegrass	<i>Poa pratensis</i>	1000
Poa	<i>Poa spp.</i>	492
Poa spp.	<i>Poa spp.</i>	492
Tussock	<i>Poa spp.; Nassella sp.</i>	493
Annual grass	<i>Poaceae</i>	2000
Annual grasses	<i>Poaceae</i>	2000
Annual summer grass	<i>Poaceae</i>	2000
Exotic grass	<i>Poaceae</i>	2000
Grass	<i>Poaceae</i>	2000
Grass weed	<i>Poaceae</i>	2000
Improved grass	<i>Poaceae</i>	2000
Native grass	<i>Poaceae</i>	2000
Native perennial grass	<i>Poaceae</i>	2000
Other annual grass	<i>Poaceae</i>	2000
Other grass	<i>Poaceae</i>	2000
Other native grass	<i>Poaceae</i>	2000
Other summer grass	<i>Poaceae</i>	2000
Perennial grass	<i>Poaceae</i>	2000
Perennial native grass	<i>Poaceae</i>	2000
Some grass	<i>Poaceae</i>	2000
Tropical grass	<i>Poaceae</i>	2000
Volunteer grass	<i>Poaceae</i>	2000
Warm season grass	<i>Poaceae</i>	2000
Hog weed	<i>Polygonum aviculare</i>	1250
Wireweed	<i>Polygonum aviculare</i>	1250
Bracken	<i>Pteridium esculentum</i>	1260

Table XIV (cont). Species recorded in the survey database. Common names were used by respondents on the original forms. These are listed in their entirety.

PASTURE NAME	BOTANICAL NAME	SPECIES
Puccinellia	<i>Puccinellia ciliata</i>	500
Buttercup	<i>Ranunculus spp.</i>	1270
Wild radish	<i>Raphanus raphanistrum</i>	1280
Turnip weed	<i>Rapistrum rugosum</i>	1290
Saltbush Rhagodia spp.	<i>Rhagodia spp.</i>	1601
Onion grass	<i>Romulea rosea var. australis</i>	1300
Sorrel	<i>Rumex acetosella</i>	1310
Dock	<i>Rumex spp.</i>	1311
Sage	<i>Salvia officinalis</i>	1320
Mintweed	<i>Salvia reflexa</i>	1321
Bog rush	<i>Schoenus apogon</i>	1520
Pin Rush	<i>Scirpus nodosus</i>	1530
Yellow burr	<i>Sclerolaena anisacanthoides</i>	1332
Galvanized burr	<i>Sclerolaena birchii</i>	1330
Obliquicuspis burr	<i>Sclerolaena spp.</i>	1331
Fireweed	<i>Senecio laetus</i>	1340
Setaria	<i>Setaria spp.</i>	511
Variegated thistle	<i>Silybum marianum</i>	1341
Sorghum	<i>Sorghum bicolor</i>	520
Silk sorghum	<i>Sorghum bicolor cv. Silk</i>	521
Johnson grass	<i>Sorghum harepense</i>	522
Wild sorghum	<i>Sorghum leiocladum</i>	523
Giant paramatta grass	<i>Sporobolus spp.</i>	530
Sporobolus	<i>Sporobolus spp.</i>	530
Sporobolus spp.	<i>Sporobolus spp.</i>	530
Sporobulus spp.	<i>Sporobolus spp.</i>	530
Chick weed	<i>Stellaria media</i>	1350
Chick weed/annual poa	<i>Stellaria media/ Poa annua</i>	1350
Plains grass	<i>Stipa aristiglumis</i>	540
Speargrass	<i>Stipa spp.; Heteropogon sp.; Anisopogon sp.</i>	540
Speargrass	<i>Stipa spp.; Heteropogon sp.; Anisopogon sp.</i>	541
Speargrass	<i>Stipa spp.; Heteropogon sp.; Anisopogon sp.</i>	541
Variable speargrass	<i>Stipa variabilis</i>	542
Corkscrew grass	<i>Stipa/Aristida spp.</i>	543
Mustard weed	<i>Sysimbrium spp.</i>	1360
Mustards	<i>Sysimbrium spp.</i>	1360
Mustards fam.	<i>Sysimbrium spp.</i>	1360
Wild mustard	<i>Sysimbrium spp.</i>	1360
Dandelion	<i>Taraxacum officinale</i>	1370
New Zealand spinach	<i>Tetragonia tetragonoides</i>	1380
Kangaroo grass	<i>Themeda australis</i>	550
Mulga grass	<i>Thyridolepis mitchelliana</i>	560
Yellow vine	<i>Tribulus terrestris</i>	1390
Berseem clover	<i>Trifolium alexandrinum</i>	690
Narrowleaf clover	<i>Trifolium angustifolium</i>	691
Hare's-foot clover	<i>Trifolium arvense</i>	692
Sub clover brachycalycinum	<i>Trifolium brachycalycinum</i>	708
Hop clover	<i>Trifolium campestre</i>	694
Suckling clover	<i>Trifolium dubium</i>	695
Strawberry clover	<i>Trifolium fragiferum</i>	696
Ball clover	<i>Trifolium glomeratum</i>	697
Cluster clover	<i>Trifolium glomeratum</i>	697

Table XIV (cont). Species recorded in the survey database. Common names were used by respondents on the original forms. These are listed in their entirety.

PASTURE NAME	BOTANICAL NAME	SPECIES
Rose clover	<i>Trifolium hirtum</i>	698
Balansa clover	<i>Trifolium michelianum</i>	699
Balansa clover paradana	<i>Trifolium michelianum</i> cv. <i>Paradana</i>	700
Pill clover	<i>Trifolium pilulare</i>	701
Red clover	<i>Trifolium pratense</i>	702
White clover	<i>Trifolium repens</i>	703
White clover haifa	<i>Trifolium repens</i> cv. <i>Haifa</i>	704
Persian clover	<i>Trifolium resupinatum</i>	705
Persian clover kyambro	<i>Trifolium resupinatum</i>	705
Persian clover maral	<i>Trifolium resupinatum</i>	705
Annual clover	<i>Trifolium</i> spp.	706
Clover	<i>Trifolium</i> spp.	706
Forage clover	<i>Trifolium</i> spp.	706
Naturalised clover	<i>Trifolium</i> spp.	706
Other clover	<i>Trifolium</i> spp.	706
Some clovers	<i>Trifolium</i> spp.	706
Variable clover	<i>Trifolium</i> spp.	706
Various clovers	<i>Trifolium</i> spp.	706
Volunteer clovers	<i>Trifolium</i> spp.	706
Clovers/medics	<i>Trifolium</i> spp./ <i>Medicago</i> spp.	707
Sub clover	<i>Trifolium subterraneum</i>	708
Sub clover karridale	<i>Trifolium subterraneum</i> cv. <i>Karridale</i>	708
Sub clover seaton park	<i>Trifolium subterraneum</i> cv. <i>Seaton Park</i>	708
Woolly clover	<i>Trifolium tomentosum</i>	711
Arrowleaf clover	<i>Trifolium vesiculosum</i>	712
Sub clover yanninicum	<i>Trifolium yanninicum</i>	708
Sub clover yanninicum larisa	<i>Trifolium yanninicum</i> cv. <i>Larisa</i>	708
Sub clover yanninicum trikkala	<i>Trifolium yanninicum</i> cv. <i>Trikkala</i>	708
Sub clover yanninicum yarloop	<i>Trifolium yanninicum</i> cv. <i>Yarloop</i>	708
Spinifex	<i>Triodia irritans</i> ; <i>Plectrachne</i> spp. <i>Spinifex hirsutus</i>	570
Annual weeds	Unknown	3000
Assorted weeds	Unknown	3000
Cool season annual	Unknown	3000
False caper	Unknown	3000
Halophytes	Unknown	3000
Hexaploids	Unknown	3000
Misc. weeds	Unknown	3000
Mixed perennial & annual grass	Unknown	3000
Moss	Unknown	3000
Native legumes & forbs	Unknown	3000
Other	Unknown	3000
Other	Unknown	3000
Other annual	Unknown	3000
Other native	Unknown	3000
Other weeds	Unknown	3000
Others	Unknown	3000
Peatweeds	Unknown	3000
Perennial lawatus	Unknown	3000
Perennial weeds	Unknown	3000
Shrubs	Unknown	3000
Spinex	Unknown	3000
Summer perennial	Unknown	3000

Table XIV (cont). Species recorded in the survey database. Common names were used by respondents on the original forms. These are listed in their entirety.

PASTURE NAME	BOTANICAL NAME	SPECIES
Volunteer	<i>Unknown</i>	3000
Volunteer annuals	<i>Unknown</i>	3000
Warm season annual	<i>Unknown</i>	3000
Weeds	<i>Unknown</i>	3000
Words weed	<i>Unknown</i>	3000
Yearlong green perennial	<i>Unknown</i>	3000
Liverseed grass	<i>Urochloa panicoides</i>	580
Vetch	<i>Vicia spp.</i>	720
Silver grass	<i>Vulpia bromoides/myuros</i>	590
Silvergrass	<i>Vulpia bromoides/myuros</i>	590
Twinleaf	<i>Zygophyllum spp.</i>	1420

12.4 Cultivars recorded in the survey database

Table XV. Cultivar names recorded in the survey database

Pasture Species	Cultivar
Annual ryegrass	Conquest, Corvette, Progrow, Richmond, Wimmera
Axillaris	Archer
Balansa clover	Paradana
Barrel medic	Caliph, Cyprus, Hannaford, Jemmalong, Mogul, Parabinga, Parragio, Sephi
Big trefoil (Greater Lotus)	Grasslands Maku
Bland trefoil	Bland
Buffel grass	Biloela, Gayndah
Burr medic	Circle Valley, Santiago, Serena
Chicory	Puna
Cocksfoot	Currie, Grasslands Apanui, Grasslands Wana, Kara, Porto
Common vetch	Blanchefleur, Languedoc
Disc medic	Tornafield
Forage sorghum	Silk, Zulu
Gama medic	Paraponto, Sapo
Yellow serradella	Madeira, Avila, Elgara, Enneabba, Paros, Pitman, Tauro, Uniserra
Green Panic	Petrie
Greenleaf desmodium	Greenleaf
Guinea Grass	Gatton
Hybrid Ryegrass	Grasslands Manawa
Italian ryegrass	Aristocrat, Concord, Eclipse, Grasslands Paroa, Grasslands Tama, Midmar, Grasslands Moata, Surrey, Tetila
Japanese millet	Shirohie
Kikuyu	Breakwell, Common, Noonan, Whittet
Lovegrass	Consol
Lucerne	Aquarius, Auf107, Aurora, Cimmarron, Commercial, CUF101, Eureka, Falkiner, Hunter River, Hunterfield, Maxidor 2, Nova, P.545, P.551, P.577, P.581, P.5929, P.L52, P.L69, Quadrella, Sceptre, Sequel, Sheffield, Siriver, Southern, Special, Springfield, Trifecta, WL318, WL514, WL516, WL518, WL605
Makarikari Panic	Bambatsi
Murex medic	Zodiac
Oats	Cooba
Perennial ryegrass	Brumby, Ellet, Embassy, Grasslands Nui, Grasslands Ruanui, Jackaroo, Javelin, Kangaroo Valley, Roper, Supernui, Vedette, Victorian, Yatsyn
Perennial veldt grass	Unalee
Persian clover	Archibald, Kyambro, Maral
Phalaris	Australian, Holdfast, Sirolan, Siroso, Uneta
Prairie grass	Matua
Puccinellia	Menemen
Purple vetch	Popany
Red clover	Grasslands Hamua, Grasslands Pawera, Redquinn, Renegade

Table XV (cont). Cultivar names recorded in the survey database.

Pasture Species	Cultivar
Rhodes grass	Callide, Katambora, Pioneer, Samford
Rose clover	Hykon
Setaria	Kazungula, Nandi, Narok, Solander
Silverleaf desmodium	Silverleaf
Siratro	Siratro
Slender serradella	Jebala
Snail medic	Kelson, Robinson, Sava
Sorghum	Jumbo
Sphere medic	Orion
Strand medic	Harbinger, HarbingerAR
Strawberry clover	O'Connors, Palestine
Subterranean clover var. brachycalycinum	Clare, Rosedale
Subterranean clover var. subterraneum	Bacchus Marsh, Daliak, Dalkeith, Denmark, Dinninup, Dwalganup, Esperence, Geraldton, Gosse, Goulburn, Green Range, Junea, Karridale, Leura, Mount Barker, Northam, Nungarin, Seaton Park, Woogenellup
Subterranean clover var. yanninicum	Larissa, Meteora, Trikkala, Yarloop
Tall fescue	Au Triumph, Demeter, Cajun
Tall wheatgrass	Tyrrell
Veldt grass	Mission
White clover	Aran, Dutch wild, Grasslands Huia, Grasslands Kopu, Grasslands Pitau, Grasslands Tahora, Haifa, Irrigation, Ladino, New Zealand
Woolly Pod vetch	Namoi
Yellow serradella	Madeira, Avila, Elgara, Enneabba, Paros, Pitman, Tauro, Uniserra
Miscellaneous	American, Bermuda, CommonC, CommonU, CommonV, Como, Cowgrass, CowPow, Felix, KUR, Lotus, NewZealand, Cowgrass, Rivoli, Roiserta, Swosu, USA

12.5 Potential errors sources in survey database

Table XVI. Procedures adopted for checking database integrity and establishing mapping capability

Procedure	Outcome
1. Check responses to questions	Indicated missing entries for each question - particularly whether Form B Q.5-6 were present
2. Check that percentage sum to 100	Indicated duplicate entries, errors in coding etc.
3. Check entries per pasture code	Duplicates indicate a problem
4. Check matching between Form A and Form B	Indicated where pasture types on Form A had no Form B and where Form B pastures types lacked a Form A
5. Assign SLA IDs for 1994 Agricultural Census - last census with pasture data	eg. Major incompatibilities between LGA/SLA boundaries used for survey and SLA boundaries for 1994 for Victoria.
6. Mapped the most ubiquitous species for each State eg. medics, subclover, phalaris, lucerne	Indicated problems in the database or with LGA/SLA georeferencing - we checked the original forms for suspect gaps in mapping.

Table XVII. Types of error encountered in database

<i>Type of Error</i>	<i>Problem</i>	<i>Solution</i>
No Form B	Confused entries	Manually untangle
	Multiple LGAs per Form B - not all entered	Make new entries
	Data very poorly presented on form and not entered	Manually enter
	Data not present	Flag as missing
	Pasture types recorded as having an area of "0%"	Usually no Form B - but negligible areas ignored
Two data sets	Double entries in Form B due to estimates for same LGA from 2 people or submission of early and late forms for same LGA	Remove one
	Data present with 2 LGA numbers Split LGA/SLA ie A and B	Remove one Find corresponding areas in LGA or SLA - adjust naming and/or LGA/SLA IDs
Type of Error Missing species	Problem	Solution
	Non-specific entries but cultivars identified eg. "annual clovers" with cultivars of subclover given.	Manually alter to identify species - split mean percentage eg 40% annual medic to 20% barrel and 20% snail
	.1,.2,.3,.4,.5,.6 and .10,.20,.30,.40,.50,.60 not distinguished in ArcInfo	Recode numbers not already recoded to .99,.88,.89,.98 etc
	Only some of Form A pasture types having completed Form Bs	None - for some LGAs many undescribed pasture types exist.
	Typographical errors	Corrected
	Form Bs never entered but present in original hard copy	Missing data entered
	Species composition not given in Form B	None - Entries with 0% composition in Q. 5 and 6
	Changes in SLA boundaries b/n years	Reassign attribute as best we can
No cultivar data	Form B Q.7 never entered	Employ person to enter Q.7 data (Dec 2-6)

Table XVII (cont). Types of error encountered in database

<i>Type of Error</i>	<i>Problem</i>	<i>Solution</i>
Percentages total > 100%	A range of cultivars of one species listed each with percentages	Assign the mean percentage to the species.
	Minor errors in partitioning of pasture types ie 90 - 110 %	Leave as is.
	Same species listed as both sown and volunteer	Combine - cannot have multiple entries of the same thing
Missing data in maps	Usually missing LGA/SLA codes	Correct codes
	Form B Q8-18 not entered for much of Victoria, WA, and NSW	Employ person to enter all missing Form B data
Apparent incongruities in the mapped areas	Particular pasture type not identified as present in that LGA	Accept - this is a reflection of the survey basis. eg Dundas in Victorian Western District

12.6 Algorithms used for modelling potential adaptation zones

Table XVIII. Algorithms used to define potential adaptation zones for 16 temperate pasture species.

<u>Balansa clover (<i>Trifolium michelianum</i>)</u>	$\text{balansa1} = \text{awinperat} \geq 0.5 \text{ and } (\text{asumperat} < 0.5 \text{ or } \text{asumpe} < -50) \text{ and } (\text{atotrain} \geq 500 \text{ or } \text{asprperat} > 0.25) \text{ and } (\text{atotrain} < 600 \text{ or } \text{asprperat} < 0.36)$
<u>Persian clover (<i>Trifolium resupinatum</i>)</u>	$\text{persian1} = \text{awinperat} \geq 0.5 \text{ and } (\text{asumperat} < 0.5 \text{ or } \text{asumpe} < -50) \text{ and } (\text{atotrain} \geq 500 \text{ or } \text{asprperat} > 0.25) \text{ and } (\text{atotrain} < 650 \text{ or } \text{asprperat} < 0.45)$
<u>Serradella (<i>Ornithopus</i> spp)</u>	$\text{sdella1} = \text{awinperat} \geq 0.5 \text{ and } (\text{asumperat} < 0.5 \text{ or } \text{asumpe} < -50) \text{ and } (\text{atotrain} \geq 450 \text{ or } \text{asprperat} > 0.28) \text{ and } (\text{atotrain} < 720 \text{ or } \text{asprperat} < 0.65)$
<u>Barrel medic (<i>Medicago truncatula</i>)</u>	$\text{barrel1} = \text{awinperat} \geq 0.5 \text{ and } (\text{asumperat} < 0.5 \text{ or } \text{asumpe} < -50) \text{ and } (\text{atotrain} \geq 250 \text{ and } \text{asprperat} > 0.07) \text{ and } (\text{atotrain} < 500 \text{ or } \text{asprperat} < 0.25)$
<u>White clover (<i>Trifolium repens</i>) - Main</u>	$\text{wcmain1} = (\text{asumperat} \geq 0.5 \text{ and } \text{atotrain} \geq 1000) \text{ or } (\text{asumpe} \geq -30 \text{ and } \text{atotrain} \geq 1000) \text{ or } (\text{ajanmax} < 26.5 \text{ and } \text{atotrain} = 1000) \text{ and } (\text{awinperat} \geq 0.5)$
- Marginal	$\text{wc marg1} = (\text{asumperat} \geq 0.44 \text{ and } \text{atotrain} \geq 700 \text{ and } \text{atotrain} < 1000) \text{ or } (\text{asumpe} \geq -42 \text{ and } \text{atotrain} \geq 700 \text{ and } \text{atotrain} < 1000) \text{ or } (\text{ajanmax} < 26.5 \text{ and } \text{atotrain} \geq 700 \text{ and } \text{atotrain} < 1000) \text{ and } (\text{awinperat} \geq 0.5)$
- Combined	$\text{wczone1} = \text{wcmain1} + \text{wc marg1}$
<u>Lucerne (<i>Medicago sativa</i>) - Main</u>	$\text{lucerneM1} = (\text{asumperat} \geq 0.3 \text{ and } \text{atotrain} \geq 400) \text{ or } (\text{asumpe} \geq -60 \text{ and } \text{atotrain} \geq 400) \text{ or } (\text{asumperat} \geq 0 \text{ and } \text{asumperat} < 0.5 \text{ and } \text{asprperat} \geq 0.8 \text{ and } \text{aautperat} \geq 0.8) \text{ and } (\text{awinperat} \geq 0.3) \text{ and } (\text{atotrain} < 1500)$
- Wet winter	$\text{lucerneW1} = (\text{asumperat} \geq 0.3 \text{ and } \text{atotrain} \geq 400) \text{ or } (\text{asumpe} \geq -50 \text{ and } \text{atotrain} \geq 400) \text{ or } (\text{asumperat} \geq 0 \text{ and } \text{asumperat} < 0.5 \text{ and } \text{asprperat} \geq 0.8 \text{ and } \text{aautperat} \geq 0.8) \text{ and } (\text{awinperat} \geq 0.3) \text{ and } (\text{atotrain} < 1500) \text{ and } (\text{ajunperat} > 3.0 \text{ or } \text{ajulperat} > 3.0 \text{ or } \text{aaugetperat} > 3.0)$
- Combined zone	$\text{lucerne4} = \text{lucerneM1} + \text{lucerneW1}$
<u>Caucasian clover (<i>Trifolium ambiguum</i>)</u>	$\text{Caucasian1} = (\text{atotrain} \geq 500 \text{ and } (\text{asumperat} \geq 0.5 \text{ or } \text{asumpe} \geq -60)) \text{ and } \text{atotrain} < 1000 \text{ and } \text{ajanmax} < 26.0 \text{ and } \text{ajulmin} < 5.0$
<u>Big trefoil (<i>Lotus pedunculatus</i>)</u>	$\text{lotusp} = (\text{atotrain} \geq 860 \text{ or } (\text{asumperat} \geq 0.8 \text{ or } \text{asumpe} \geq -20)) \text{ and } \text{awinperat} \geq 0.50 \text{ and } \text{ajanmax} < 28.0 \text{ and } \text{ajulmin} \geq 0$
<u>Birdsfoot trefoil (<i>Lotus corniculatus</i>)</u>	$\text{lotusc1} = (\text{asumperat} \geq 0.6 \text{ and } \text{atotrain} \geq 600) \text{ or } (\text{asumpe} \geq -36 \text{ and } \text{atotrain} \geq 600) \text{ or } (\text{asumperat} \geq 0 \text{ and } \text{asumperat} < 0.6 \text{ and } \text{asprperat} \geq 0.8 \text{ and } \text{aautperat} \geq 0.8) \text{ and } (\text{awinperat} \geq 0.3) \text{ and } (\text{atotrain} < 1500) \text{ and } (\text{ajunperat} > 3.0 \text{ or } \text{ajulperat} > 3.0 \text{ or } \text{aaugetperat} > 3.0) \text{ and } (\text{awinperat} \geq 0.5) \text{ and } (\text{atotrain} < 1500)$
<u>Red clover (<i>Trifolium pratense</i>)</u>	$\text{tpratensel1} = (\text{asumperat} \geq 0.7 \text{ and } \text{atotrain} \geq 600) \text{ or } (\text{asumpe} \geq -20 \text{ and } \text{atotrain} \geq 600) \text{ or } (\text{ajanmax} < 28.0 \text{ and } \text{atotrain} \geq 600) \text{ and } (\text{awinpe} \geq 0.5) \text{ and } (\text{ajulmax} \geq 0.8) \text{ and } (\text{atotrain} < 1900)$
<u>Strawberry clover (<i>Trifolium fragiferum</i>)</u>	$\text{strawberry1} = (\text{asumperat} \geq 0.5 \text{ and } \text{atotrain} \geq 1000) \text{ or } (\text{asumpe} \geq -30 \text{ and } \text{atotrain} \geq 1000) \text{ or } (\text{ajanmax} < 26.5 \text{ and } \text{atotrain} \geq 1000) \text{ and } (\text{awinperat} \geq 0.5)$

Table XVIII (cont). Algorithms used to define potential adaptation zones for 16 temperate pasture species.

<u>Perennial ryegrass (<i>Lolium perenne</i>)</u> -	
- Main	ryemain=(asumperat $\geq$ 0.55 and atotrain $\geq$ 675 and atotrain $<$ 2000) or (asumpe $\geq$ -26 and atotrain $\geq$ 675 and atotrain $<$ 2000) or (asumperat $\geq$ 0.2 and asumperat $<$ 0.5 and asprperat $\geq$ 0.6 and aautperat $\geq$ 0.6) and (ajanmax $<$ 32.0) and (awinperat $\geq$ 0.5)
- Marginal	ryemarg=(asumperat $\geq$ 0.3 and atotrain $\geq$ 550 and atotrain $<$ 675) or (asumpe $\geq$ -50 and atotrain $\geq$ 550 and atotrain $<$ 675) or (asumperat $\geq$ -20 and asumperat $<$ 0.2 and asprperat $\geq$ 0.8 and aautperat $\geq$ 0.8) and (ajanmax $<$ 32.0) and (awinperat $\geq$ 0.5)
- Combined	ryegrass1=ryemain+ryemarg
<u>Phalaris (<i>Phalaris aquatica</i>)</u> - Main	
- Wet winter	phalarisM1=(asumperat $\geq$ 0.3 and atotrain $\geq$ 450 and atotrain $<$ 1000) or (asumpe $\geq$ -60 and atotrain $\geq$ 450 and atotrain $<$ 1000) or (asumperat $\geq$ 0 and asumperat $<$ 0.3 and asprperat $\geq$ 0.5 and aautperat $\geq$ 0.5) and (ajanmax $<$ 34.0) and (awinperat $\geq$ 0.5)
- Combined	phalarisW1=(asumperat $\geq$ 0.3 and atotrain $\geq$ 450 and atotrain $<$ 1000) or (asumpe $\geq$ -60 and atotrain $\geq$ 450 and atotrain $<$ 1000) or (asumperat $\geq$ 0 and asumperat $<$ 0.3 and asprperat $\geq$ 0.5 and aautperat $\geq$ 0.5) and (ajanmax $<$ 34.0) and (awinperat $\geq$ 0.5) and (ajunperat $>$ 3.0 or ajulperat $>$ 3.0 or aaugperat $>$ 3.0)
<u>Tall fescue (<i>Festuca arundinacea</i>)</u>	
- Combined	phalaris1=phalarisM1+phalarisW1
- Northern European	fescue1=(asumperat $\geq$ 0.3 and atotrain $\geq$ 600) or (asumpe $\geq$ -42 and atotrain $\geq$ 600) or (asumperat $\geq$ 0.18 and asumperat $<$ 0.3 and asprperat $\geq$ 0.5 and aautperat $\geq$ 0.5) and (ajanmax $<$ 29.0) and (atotrain $<$ 1500) and (awinperat $\geq$ 0.5)
- Mediterranean	cocksfootM2=(asumperat $\geq$ 0.3 and atotrain $\geq$ 500 and atotrain $<$ 850) or (asumpe $\geq$ -42 and atotrain $\geq$ 500 and atotrain $<$ 850) or (asumperat $\geq$ 0 and asumperat $<$ 0.3 and asprperat $\geq$ 0.7 and aautperat $\geq$ 0.7) and (ajanmax $<$ 34.0) and (awinperat $\geq$ 0.5)
- Winter wet	cocksfootW2=(asumperat $\geq$ 0.3 and atotrain $\geq$ 500 and atotrain $<$ 850) or (asumpe $\geq$ -42 and atotrain $\geq$ 500 and atotrain $<$ 850) or (asumperat $\geq$ 0 and asumperat $<$ 0.3 and asprperat $\geq$ 0.7 and aautperat $\geq$ 0.7) and (ajanmax $<$ 34.0) and (awinperat $\geq$ 0.5) and (ajunperat $>$ 3.0 or ajulperat $>$ 3.0 or aaugperat $>$ 3.0)
- Northern European	cocksfootNE2=(asumperat $\geq$ 0.5 and atotrain $\geq$ 750 and atotrain $<$ 1500) or (asumpe $\geq$ -32 and atotrain $\geq$ 750 and atotrain $<$ 1500) or (asumperat $\geq$ 0.3 and asumperat $<$ 0.5 and asprperat $\geq$ 0.9 and aautperat $\geq$ 0.9) and (ajanmax $<$ 30.0) and (awinperat $\geq$ 0.5)
- Combined zone	cocksfootI2=cocksfootM2+cocksfootW2+cocksfootNE2

Table XIX. Algorithms used to define potential adaptation zones for cultivars of subterranean clover (*Trifolium subterraneum*, *T. brachycalycinum* and *T. yanninicum*). Cultivars in brackets are superseded and not included in maps.

Nungarin	nungl=awinperat $\geq$ 0.5 and (asumperat $<$ 0.5 or asumpe $<$ -50) and (atotrain $\geq$ 300 or asprperat $>$ 0.07) and (atotrain $<$ 400 or asprperat $<$ 0.15)
Northam	northl=awinperat $\geq$ 0.5 and (asumperat $<$ 0.5 or asumpe $<$ -50) and (atotrain $\geq$ 350 or asprperat $>$ 0.10) and (atotrain $<$ 425 or asprperat $<$ 0.18)
Dalkeith	dalkl=awinperat $\geq$ 0.5 and (asumperat $<$ 0.5 or asumpe $<$ -50) and (atotrain $\geq$ 375 or asprperat $>$ 0.13) and (atotrain $<$ 450 or asprperat $<$ 0.21)
(Daliak)	dalil=awinperat $\geq$ 0.5 and (asumperat $<$ 0.5 or asumpe $<$ -50) and (atotrain $\geq$ 400 or asprperat $>$ 0.16) and (atotrain $<$ 475 or asprperat $<$ 0.25)
Seaton Park	sparkl=awinperat $\geq$ 0.5 and (asumperat $<$ 0.5 or asumpe $<$ -50) and (atotrain $\geq$ 450 or asprperat $>$ 0.20) and (atotrain $<$ 550 or asprperat $<$ 0.28)
Trikkala	trikl=awinperat $\geq$ 0.5 and (asumperat $<$ 0.5 or asumpe $<$ -50) and (atotrain $\geq$ 525 or asprperat $>$ 0.28) and (atotrain $<$ 650 or asprperat $<$ 0.36)
Junece	juneel=awinperat $\geq$ 0.5 and (asumperat $<$ 0.5 or asumpe $<$ -50) and (atotrain $\geq$ 550 or asprperat $>$ 0.25) and (atotrain $<$ 600 or asprperat $<$ 0.33)
(Woogenellup)	woogl=awinperat $\geq$ 0.5 and (asumperat $<$ 0.5 or asumpe $<$ -50) and (atotrain $\geq$ 525 or asprperat $>$ 0.33) and (atotrain $<$ 600 or asprperat $<$ 0.40)
(Esperance)	esperl=awinperat $\geq$ 0.5 and (asumperat $<$ 0.5 or asumpe $<$ -50) and (atotrain $\geq$ 550 or asprperat $>$ 0.36) and (atotrain $<$ 625 or asprperat $<$ 0.45)
Enfield	enfieldl=awinperat $\geq$ 0.5 and (asumperat $<$ 0.5 or asumpe $<$ -50) and (atotrain $\geq$ 575 or asprperat $>$ 0.40) and (atotrain $<$ 650 or asprperat $<$ 0.5)
Goulburn	goulbl=awinperat $\geq$ 0.5 and (asumperat $<$ 0.5 or asumpe $<$ -50) and (atotrain $\geq$ 575 or asprperat $>$ 0.45) and (atotrain $<$ 675 or asprperat $<$ 0.60)
Gosse	gossel=awinperat $\geq$ 0.5 and (asumperat $<$ 0.5 or asumpe $<$ -50) and (atotrain $\geq$ 575 or asprperat $>$ 0.45) and (atotrain $<$ 675 or asprperat $<$ 0.60)
Green Range	grnrgl=awinperat $\geq$ 0.5 and (asumperat $<$ 0.5 or asumpe $<$ -50) and (atotrain $\geq$ 600 or asprperat $>$ 0.45) and (atotrain $<$ 750 or asprperat $<$ 0.60)
(Mount Barker)	mtbarkl=awinperat $\geq$ 0.5 and (asumperat $<$ 0.5 or asumpe $<$ -50) and (atotrain $\geq$ 625 or asprperat $>$ 0.50) and (atotrain $<$ 800 or asprperat $<$ 0.65)
Karridale	karrikl=awinperat $\geq$ 0.5 and (asumperat $<$ 0.5 or asumpe $<$ -50) and (atotrain $\geq$ 625 or asprperat $>$ 0.50) and (atotrain $<$ 800 or asprperat $<$ 0.65)
Clare	clarel=awinperat $\geq$ 0.5 and (asumperat $<$ 0.5 or asumpe $<$ -50) and (atotrain $\geq$ 650 or asprperat $>$ 0.60) and (atotrain $<$ 1200 or asprperat $<$ 0.90)
Larissa	larissal=awinperat $\geq$ 0.5 and (asumperat $<$ 0.5 or asumpe $<$ -50) and (atotrain $\geq$ 675 or asprperat $>$ 0.70) and (atotrain $<$ 2000)
Denmark	denmarkl=awinperat $\geq$ 0.5 and (asumperat $<$ 0.5 or asumpe $<$ -50) and (atotrain $\geq$ 675 or asprperat $>$ 0.70) and (atotrain $<$ 2000)
Leura	leural=awinperat $\geq$ 0.5 and (asumperat $<$ 0.5 or asumpe $<$ -50) and (atotrain $\geq$ 700 or asprperat $>$ 0.80) and (atotrain $<$ 3000)
Subterranean clover zone	subcomb1=nungl+northl+dalkl(+dali)+sparkl+trikl+juneel(+woogl)+enfieldl+goulbl+gosse1+grnrgl+karri1 (+mtbarkl)+clarel+larissal+denmarkl+leural