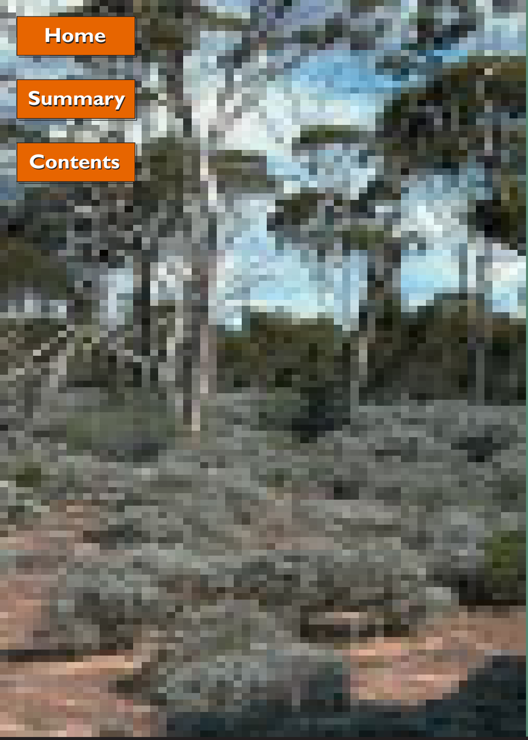

Natural Heritage Trust
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A Commonwealth Government Initiative

LANDSCAPE HEALTH IN AUSTRALIA

A rapid assessment of the relative condition of Australia's bioregions and subregions

Prepared by Gethin Morgan for Environment Australia and the National Land and Water Resources Audit

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OVERVIEW OF AUSTRALIA'S LANDSCAPE HEALTH

Australia's 354 IBRA* subregions are distinctive landscapes with characteristic patterns of landforms, soils and vegetation. They provide a sound framework for assessing the relative impacts of land use at a continental scale (e.g. in the Brigalow Belt bioregion, the forested sandstones of the Carnarvon Ranges can be assessed separately from the adjacent clay plains of the Arcadia Valley; the Simpson-Strzelecki bioregion is divided into dune fields and the periodically flooded terminal wetlands of Cooper Creek).

Clearing, habitat fragmentation and ecosystem loss

Clearing of native vegetation and the accumulating impacts of past clearing continue to be the major cause of landscape change in intensively used bioregions.

- 57 subregions have less than 30% of the original extent of native vegetation remaining.

Recent work has show that loss of species accelerated greatly when less than 30% of native vegetation remains (James & Saunders 2001).

- Connectivity between native vegetation remnants has broken down in 88 subregions.

Even where the total extent of remnant vegetation cover within a subregion may appear relatively high, the level of vegetation fragmentation may still undermine the ecological health of the landscape.

- 40 subregions where between 30% and 50% of native vegetation remains, have lost most of the connectivity between remnant areas of native vegetation. Clearing is continuing in most of these.
- 39 subregions have more than 70% of their component ecosystems threatened.

At the scale of this assessment, clearing is negligible within the extensive use zone but grazing pressures are widespread.

- 50 subregions out of 172 have more than 70% of their area grazed.
- 25 subregions have more than 90% of their area grazed.
- 39 subregions have little or no grazing.

* IBRA refers to the Interim Biogeographic Regionalisation for Australia.

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Conservation reserves

The protection of biodiversity through the reservation of significant areas is an important means of conserving biodiversity. Nationally the level of representation of subregional landscapes within conservation reserves is low.

- 175 subregions have less than 2% of their area in conservation reserves; 33 of these have less than 30% of native vegetation remaining.
- 91 subregions have more than 10% of their area in conservation reserves.

Dryland salinity

- 10 subregions have a high risk or hazard of dryland salinity over more than 10% of their area.
- 9 subregions have more than 10% of their remaining native vegetation coinciding with areas of high risk or hazard of dryland salinity.

Dryland salinity trend assessments undertaken as part of the Audit predict that by the year 2050.

- areas of high risk or hazard of dryland salinity will exceed 10% in 32 subregions.
- The area of high risk or hazard of dryland salinity will coincide and threaten more than 10% of the remaining native vegetation in 22 subregions.

Threatened species

High numbers of nationally listed threatened plants and animals are concentrated in some subregions. More detailed analysis at the species level is required to explain this concentration.

- 38 subregions, mainly in the intensive use zone, are known to contain more than 30 threatened plant species.
- 96 subregions, again mainly in the intensive use zone, have more than 10 threatened vertebrate animal species.

Landscape stress

Continental landscape stress rates subregions over six stress classes.

Representatives of the two highest stress classes have little natural vegetation remaining and that which does remain is under increasing stress from a variety of threatening processes. Landscape scale responses are required in these subregions to prevent further decline and to maximise the protection of remaining subregional biodiversity. Highest priority should be given to protecting and managing the remaining native vegetation coupled with revegetation strategies that concentrate on restoring or enhancing connectivity and increasing the area of more significant remnants.

- 37 subregions (10%) fall into the two highest stress classes; they are all in the intensive use zone.

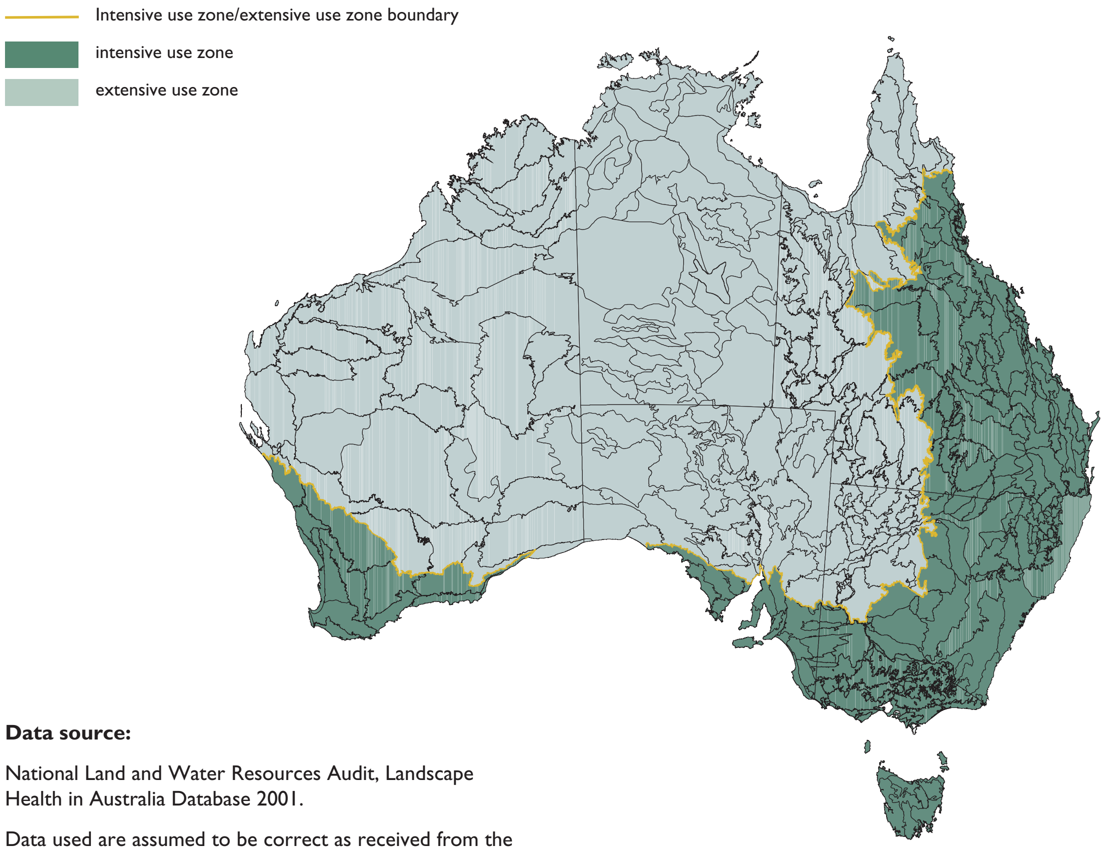
These endangered subregions are mainly concentrated in the south-east of the continent and include south-eastern South Australia, much of Victoria and the South Eastern Highlands, and the Upper Slopes and Lower Slopes subregions of southern New South Wales. Outside this area other endangered subregions include the Avon Wheatbelt and Dandarragan Plateau in south-west Western Australia, the Northern Midlands subregion in Tasmania and a number of subregions in Queensland within the Wet Tropics (lowlands), Mulga lands, South East Queensland and Brigalow Belt (North and South) bioregions. Two Southern Brigalow Belt subregions in northern New South Wales also fall within the endangered category.

Subregions within the two lowest stress classes are considered to be in relatively good health.

- 152 subregions fall into the two lowest stress classes.

These lower stress class subregions are the subregions of marginal value to agriculture or pastoralism. They are distributed equally across the intensive use zone and the extensive use zone. Relative to other subregions, weeds and feral animals are not yet as great a threat to biodiversity and landscape health. These regions provide opportunities for cost-effective and sustainable biodiversity conservation strategies to be implemented. Clearing is continuing in some of these subregions.

Figure 1. IBRA, and extensive/intensive land use zone boundary.



Data source:

National Land and Water Resources Audit, Landscape Health in Australia Database 2001.

Data used are assumed to be correct as received from the data suppliers.

INTRODUCTION

This report is part of the National Land and Water Resources Audit (Audit) assessment of the condition of the natural resources of Australia and examines bioregional landscapes and associated biodiversity. This report provides the foundation for the Audit's Australia-wide biodiversity assessment.

The Landscape Health in Australia Project was jointly funded and supported by the State of the Environment Reporting and the National Reserves System sections of Environment Australia, and the National Land and Water Resources Audit. It is a part of the Audit's Ecosystem Health Theme. This theme focuses on landscape, catchment, river, and estuary, health at a systems level looking at:

- rivers and estuaries, and their catchments and aquatic ecosystems; and
- regional landscapes and their recurrent patterns of geology, landform, soil, and associated biota.

This report addresses the health of regional landscapes from a nature conservation perspective considering the status of their natural ecosystems and associated biodiversity values.

Broad indications of environmental decline across Australia include soil erosion, weed infestations, dryland salinity, and regional extinctions of fauna. The accumulating impact of European patterns of land use profoundly affects many Australian landscapes, ecosystems and their biological diversity. An understanding of relativities in landscape health is needed to help guide the urgent and effective responses required to prevent further long-term damage to landscape health in Australia, and where necessary repair the damage already done.

The primary aim of this project was to use existing information to assess regional differences in the health of landscapes from a natural ecosystems perspective to help guide national initiatives for biodiversity conservation.

The project was a collaborative initiative with the States and Territories, and was supported by a working group of their biodiversity conservation experts. The landscape framework used and the landscape attributes assessed were agreed between the working group, Environment Australia and the Audit, within the framework of established State of the Environment national indicators (Saunders et al. 1998, ANZECC 2000).

Landscape is a scale of study and understanding beyond the paddock or the farm. A landscape includes the:

- underlying geology and hydrogeology;
- landforms and soils; and
- plants and animals.

A landscape may be drained by a number of catchments, and the characteristics of that landscape will apply to those parts of those catchments. While a catchment may contain many different geologies and associated landforms, soils and vegetation, a landscape has a characteristic suite and pattern of these, clearly differentiating it from adjacent landscapes.

Health is a concept requiring a reference point or baseline against which a relative assessment is made. The processes maintaining landscape health need to be understood so that suitable indicators of relative health can be identified. Trends in these indicators can be used to further understand the processes at work. To determine national trends a network of representative points or areas is required, where these indicators can be regularly monitored using standardised methods. In Australia, landscape change has been so rapid that there is no baseline information for most of the continent and there is little systematic long-term monitoring. Much remains unknown ecologically, and an understanding of landscape scale processes is at best rudimentary.

Attributes included:

- vegetation extent and clearing;
- land use;
- fragmentation of native vegetation;
- hydrological change;
- weeds;
- feral animals; and
- threatened ecosystems and species.

Data sources included readily available national and State data, and expert knowledge. Other attributes were initially included but could not be used due to the absence of suitable data or the difficulty of addressing complex attributes in such a short time (e.g. despite its major influence on the health of many Australian ecosystems, the impacts of changes in fire regime could not be reported on). Most attributes relate to the current condition of the subregions. Trend in condition was also assessed for some attributes.

Reporting polygons used in this project are subregions of an IBRA 5 (see Environment Australia 2000a). These subregions delineate the major geomorphic patterns within the IBRA 5 bioregions and provide a robust framework with greater resolution for analysing landscape distribution and environmental impacts of past and present land uses. Three hundred and fifty-four subregions have been delineated, compared with the 85 bioregions of IBRA 5 (Appendix 1). The bioregions in Tasmania are treated as subregions for the purposes of this project. Subregions in the Northern Territory are indicative only. In New South Wales, the coastal analyses were bioregional, not subregional as no agreed subregional classification exists.

The continent was divided into two discrete zones for analysis and reporting of some attributes: the intensive use zone (subregions where extensive clearing has occurred or is occurring) and the extensive use zone (where land use predominantly relies on the use of native vegetation) (Figure 1). The concept is similar to extensive and intensive land use zones used by Graetz et al. 1995, but unlike these—defined by 1:250 000 scale map sheets—they are defined by grouping subregions. Subregions in the intensive use zone have generally been cleared of more than 10% of the original native vegetation.

Data sources are a combination of published and unpublished State and national data sets, and expert knowledge drawn largely from the State and Territory land resource and nature conservation agencies. Attribute values were derived for each subregion and classed, to reduce the scale of variation in the quality and accuracy of the data used, and to simplify analysis and presentation (Appendix 2). Classed condition and trend attribute values are presented in Appendices 3 and 4 and as national maps. Numerical data are available as data through the Atlas.

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Table 1. Data used for each attribute.

Attributes used	Data source (qualitative/quantitative)
Condition attributes	
Current extent of native vegetation	State vegetation coverages—quantitative classification
Degree of connectivity in native vegetation	State vegetation coverages—descriptive – qualitative classification.
Conservation of Native vegetation	State vegetation coverages intersected by protected areas database (Environment Australia 1999)—quantitative
Native vegetation in tenures associated with conservative land use practices	State vegetation coverages intersected by national land use map (Bureau of Resource Sciences 2000)—quantitative, classification of 'association with conservative land use practices'—qualitative
Condition of native vegetation	State vegetation coverages intersected by 'biophysical naturalness' an attribute of the national data set compiled for the National Wilderness Inventory (Lesslie & Maslen 1995)—quantitative, relationship to intensity of grazing semi-quantitative (Landsberg et al. 1999).
Extent of dryland salinity	Audit Australian Dryland Salinity Assessment 2000—quantitative assessment of groundwater depth (Western Australia, South Australia, Victoria, New South Wales)—qualitative hazard assessment (Tasmania, Queensland, Northern Territory).
Degree of changed hydrological conditions	State/subregion-based expert knowledge based on national land use map & native vegetation condition—descriptive classification qualitative.
Distribution and density of non-indigenous plant species (weeds) of national importance	State/subregion-based expert knowledge (absent, occasional, common, abundant)—qualitative.
Distribution and density of non-indigenous vertebrate species (feral animals) of national importance	State/subregion-based expert knowledge (absent, occasional, common, abundant)—qualitative.
Threatened vertebrate animals and plants	Commonwealth listings (Environment Australia 1999)—quantitative site based plus distribution modelling—qualitative expert knowledge
At risk ecological communities and threatened species	Quantitative extent mapping (Queensland, Victoria and Western Australian), quantitative land form surrogates (New South Wales), extent mapping and expert (qualitative) knowledge (South Australia, Tasmania), qualitative condition assessment (Queensland).
Trend attributes	
Current rates of clearing of native vegetation	State and Commonwealth vegetation coverages—quantitative
Trends in the incidences of non-indigenous plant species (weeds) of national importance	State/subregion-based expert knowledge (increasing, decreasing, stable, no records)—qualitative.
Trends in the incidences of non-indigenous vertebrate species (feral animals) of national importance	State/subregion-based expert knowledge (increasing, decreasing, stable, no records)—qualitative.
Trends in dryland salinity	Audit Australian Dryland Salinity Assessment 2000—quantitative assessment of groundwater depth and trends (Western Australia, South Australia, Victoria, New South Wales)—qualitative hazard assessment (Tasmania, Queensland, Northern Territory).
Inappropriate fire regimes	State/subregion-based expert knowledge– qualitative classification.

ASSESSING LANDSCAPE HEALTH

Condition and trend attributes used to assess the subregional landscapes were selected to be independent variables, in order to allow exploration of a wide range of surrogates for landscape and biodiversity status and health. Most of these attributes are related. Increasing fragmentation of native vegetation and intensification of land use are primary drivers of biodiversity decline. They are also associated with changes in rainfall infiltration and run-off, and consequent changes in landscape hydrology, including changed river flows and dryland salinity.

The current health of a particular subregion is best assessed by an analysis of its condition and trend attribute values. However, an assessment of the relative health of the subregions will be more easily made using a synthesis of reported attribute values.

1. CONDITION ATTRIBUTES

Current extent of native vegetation

Extent of native vegetation provides a broad surrogate for the spatial extent of ecological disruption within a subregion and is based on State vegetation coverages. Currency of these coverages varies between 1986 and 2000; scale varies between 1:250 000 and 1:100 000. Extensive broadscale clearing since these coverages were prepared is largely limited to Queensland, New South Wales and Tasmania, and the current extent of native vegetation in these States can be assumed to be overestimates.

Extensive clearing is mainly limited to the intensive use zone, with any clearing in the extensive use zone restricted to clearing for infrastructure or for small areas of irrigated crops (Figures 2, 3). Although some broader scale clearing is occurring in parts of the extensive use zone notably in the Darwin Coastal and Daly Basin subregions of the Northern Territory, and the Victoria Bonaparte (1) subregion in Western Australia, the extent of clearing remains less than 10% in all extensive use zone subregions.

- 97 intensive use zone subregions (53%) have less than 50% of their native vegetation remaining.
- 57 intensive use zone subregions (31%) have less than 30% of their native vegetation remaining.
- 12 intensive use zone subregions (7%) have less than 10% remaining.

The relatively high number of subregions with less than 30% of their native vegetation remaining is of concern. These subregions are distributed around the major cropping and developed pasture regions of Australia, with the most extensively cleared subregions in south-east South Australia, western Victoria and the southern part of the Brigalow Belt South bioregion in Queensland and south-west Western Australia.

- 40 subregions (22%) have 30–50% of their natural vegetation remaining. Clearing is continuing in most of these subregions. A particular concern is that these subregions form the habitat matrix within which the subregions with less than 30% of their native vegetation remaining are distributed.

Figure 2. Current extent of native vegetation in the intensive use zone.

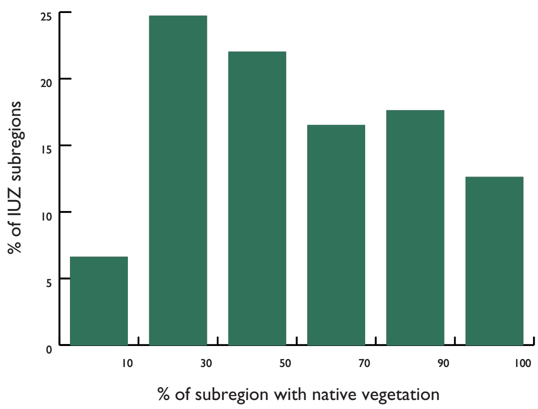
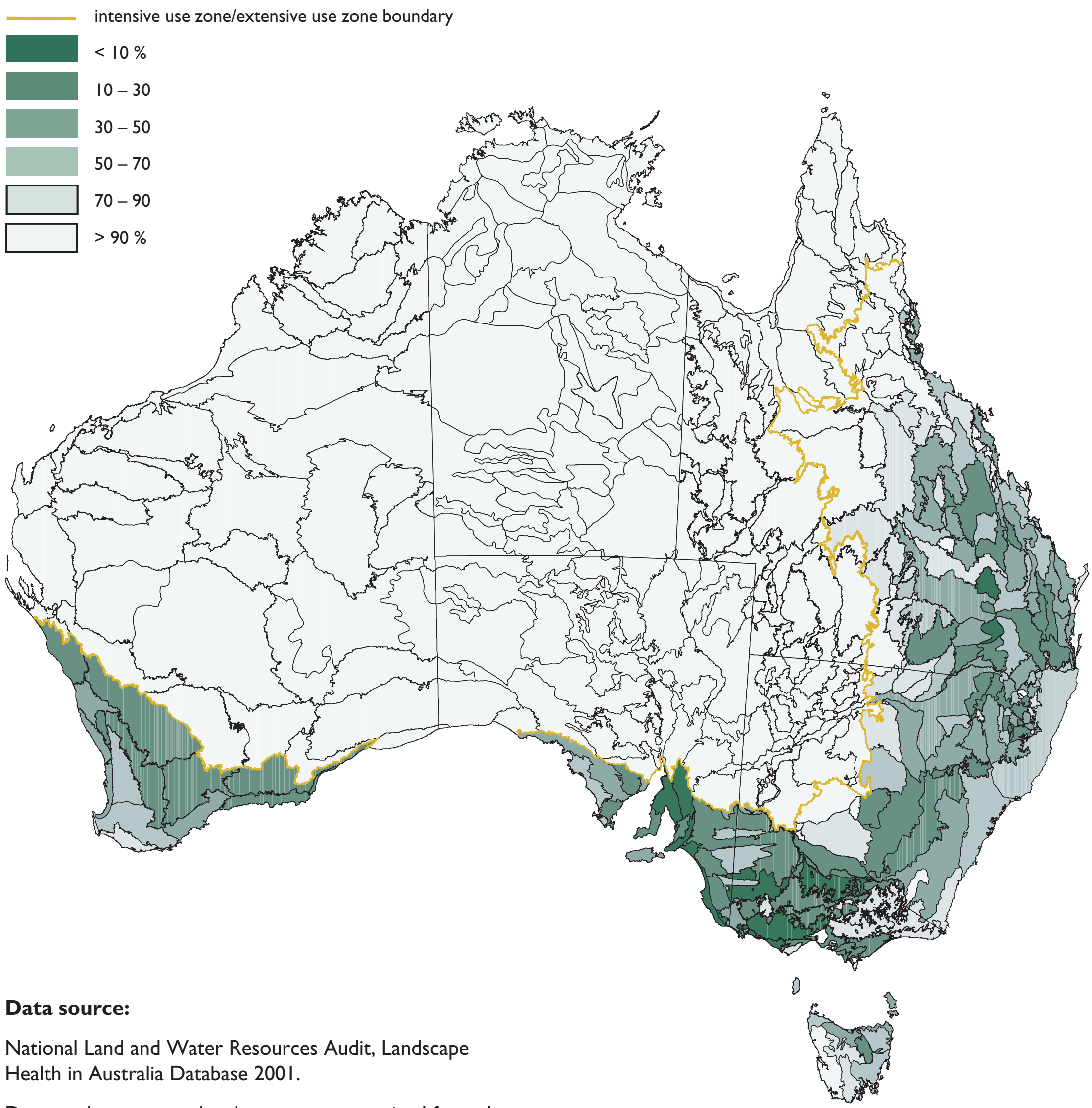


Figure 3. Current extent of native vegetation by subregion.



Data source:

National Land and Water Resources Audit, Landscape Health in Australia Database 2001.

Data used are assumed to be correct as received from the data suppliers.

Degree of connectivity in native vegetation

All the subregions in the extensive use zone have little or no broad acre clearing and connectivity between native vegetation types is high. This attribute therefore only applies to the intensive use zone, where clearing of timbered landscapes and cultivation of grasslands has fragmented the natural patterns of the landscape and led to a reduction in the connectivity of native vegetation. Decreasing connectivity (increasing fragmentation) across a landscape leads to a general decline in biodiversity, particularly of the less mobile vertebrates with more complex habitat or large home area requirements.

Subregions were allocated to one of five connectivity classes, based on a visual analysis of the State vegetation maps. These maps range in currency between 1986 and 2000. Connectivity classes range from those with little connectivity to those that are totally unmodified by major structural change (Figures 4, 5, 6).

- 88 subregions (48%) fall into the first two classes where connectivity between remaining native vegetation has broken down, except for along major natural features (e.g. mountain ranges). This has occurred mainly in the cropping and intensive grazing areas (e.g. south-west Western Australia, and eastern Australia).
- 49 subregions (27%) are in the early stages of fragmentation and contain some isolated remnants. These subregions are often adjacent to the most fragmented subregions and in many cases are subject to continuing clearing.
- 49 subregions have little or no clearing. These subregions either have most of their remaining native vegetation in conservative tenures, are too rugged for further extensive clearing, or, in the case of western and northern Queensland, are the more marginal lands of the intensive use zone.

Figure 4. Diagrammatic representation of connectivity in native vegetation classes in the intensive use zone.

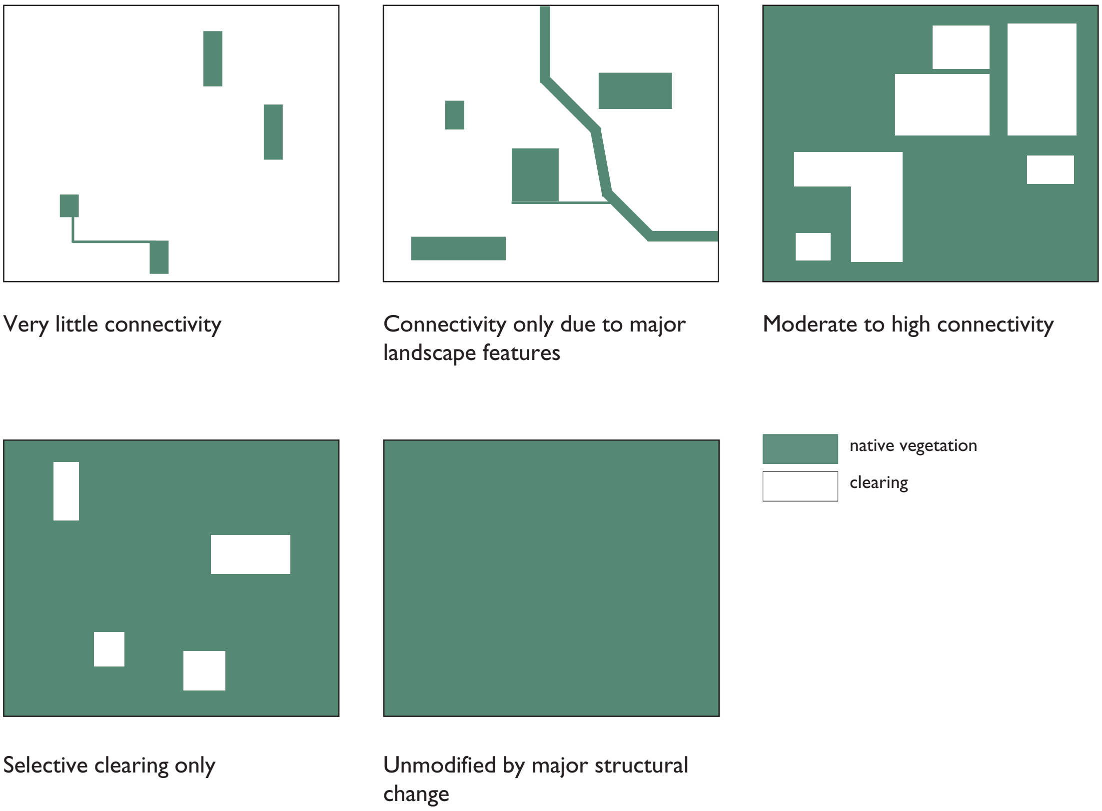


Figure 5. Degree of connectivity in native vegetation in intensive use zone.

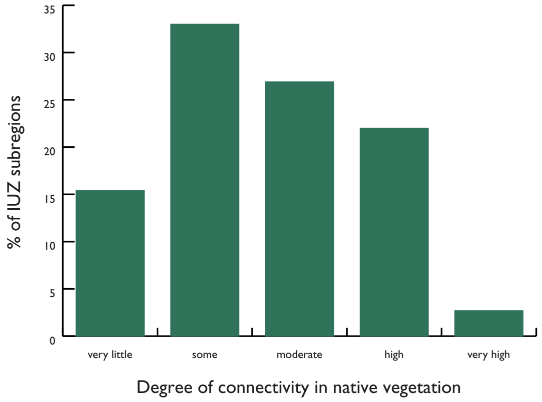
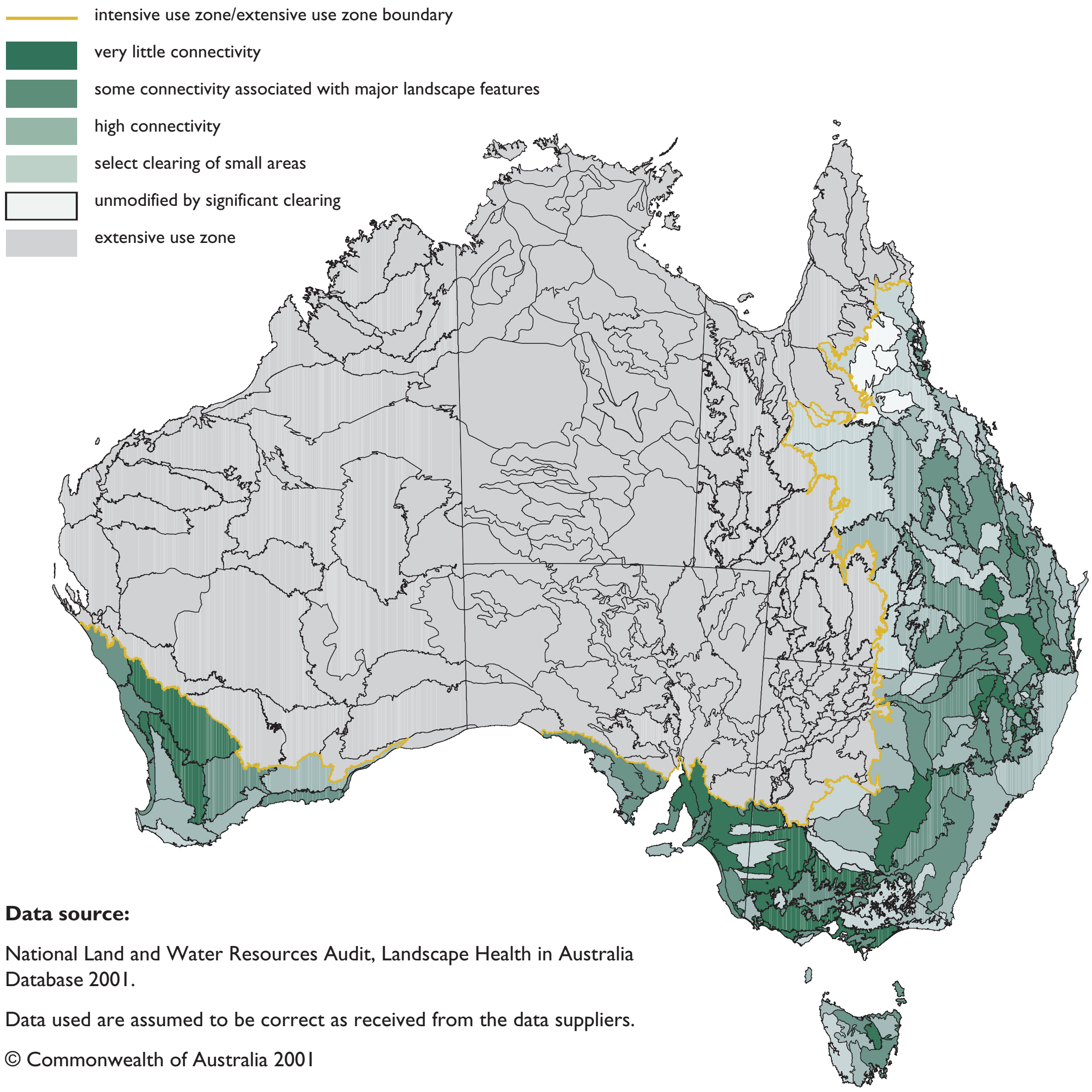


Figure 6. Degree of connectivity in native vegetation in the intensive land use zone.



Data source:

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Protection of native vegetation

Conservation reserves

Protection and conservation of representative areas of the natural environment is a fundamental part of sustainable land use in each subregion. In the absence of detailed ecosystem mapping, the percentage of a subregion in protected areas broadly indicates the extent to which a comprehensive, adequate and representative reserve system has been established (Figures 7, 8).

The 1999 Collaborative Australian and Protected Area Database (Environment Australia 2000b) indicates that protected areas are distributed evenly between but not within the intensive and extensive use zones.

- 71 subregions (20%) of the 354 subregions have no protected areas.
- 173 subregions (49%) have less than 2% of their area protected.

A target of 15% of each vegetation type was accepted as part of the Regional Forest Agreement process as the target for protection in forested areas (JANIS 1996). A comparable figure may be appropriate for other subregions. Only 18% of the subregions meet this target. Half of these are more than 30% reserved for nature conservation, including the Australian Alps, South West Tasmania and Lake Eyre.

Figure 7. Percentage of subregion in conservation reserves across Australia.

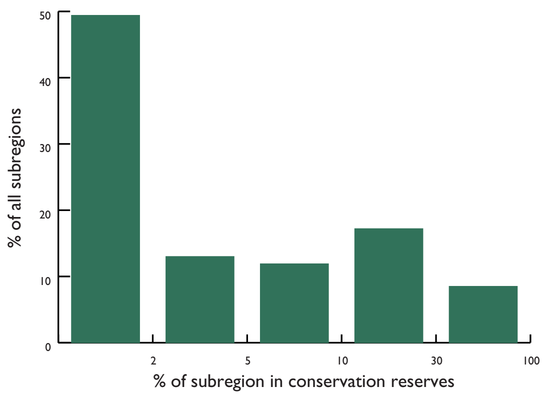
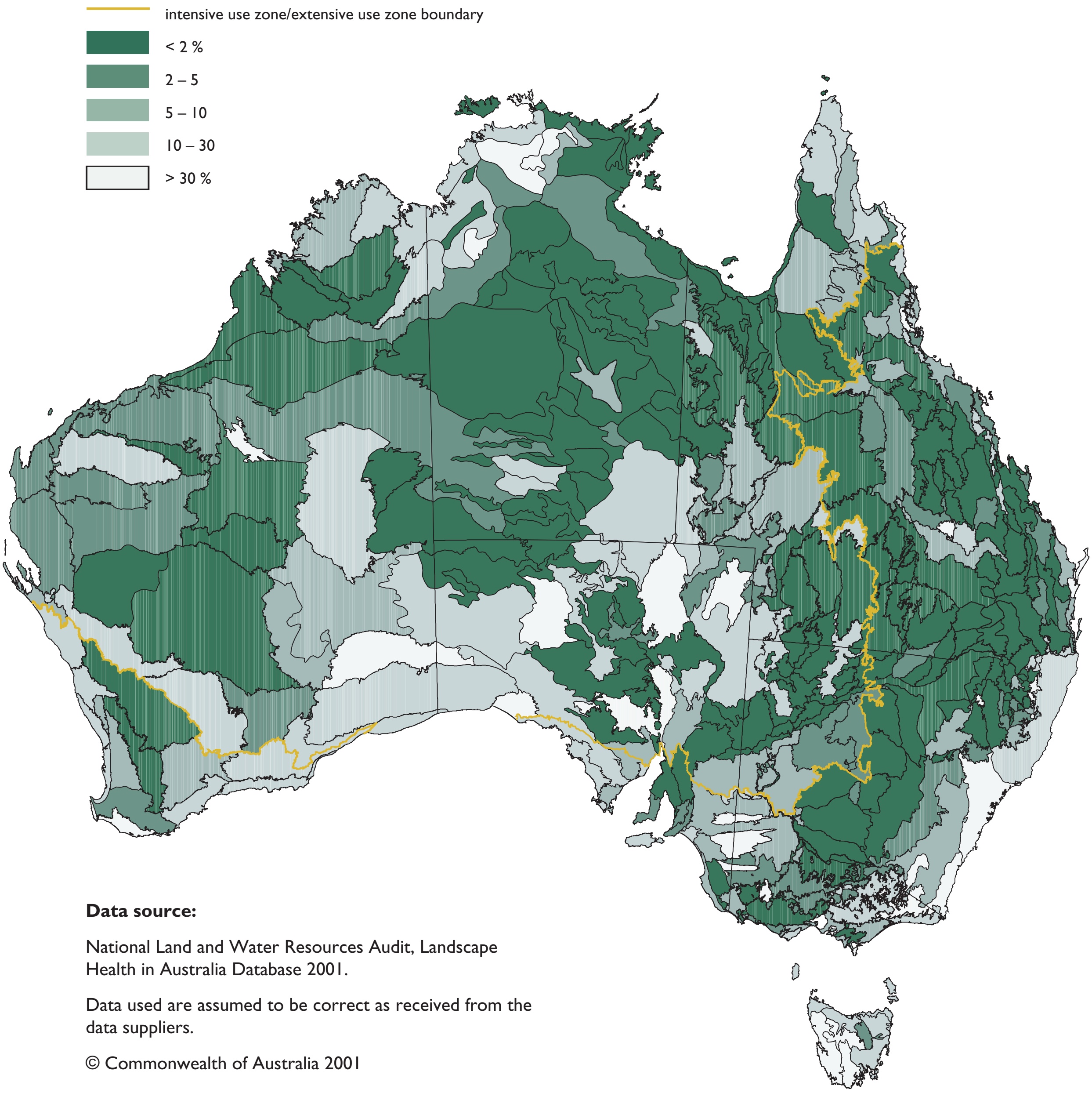


Figure 8. Percentatge of subregion in conservation reserves.



Data source:

National Land and Water Resources Audit, Landscape Health in Australia Database 2001.

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Native vegetation outside conservation reserves

Extensive clearing has often greatly reduced the options for nature conservation in the intensive use zone. The percentage of native vegetation remaining outside protected areas is an indication of opportunities available to increase representation of poorly protected subregions (Figures 9, 10).

- 158 (87%) of the subregions in the intensive use zone have more than 70% of remaining vegetation outside conservation reserves. Eighty-one of these subregions have less than 2% of their total area protected; 131 have less than 10% protected. Significant reserve consolidation options remain in any highly stressed subregion.

Figure 9. Percentage of native vegetation outside conservation reserves in the intensive use zone.

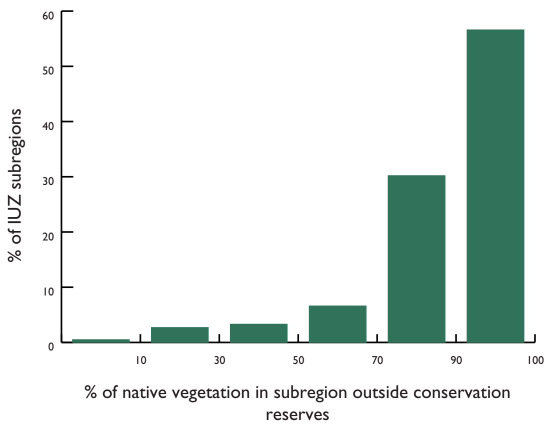
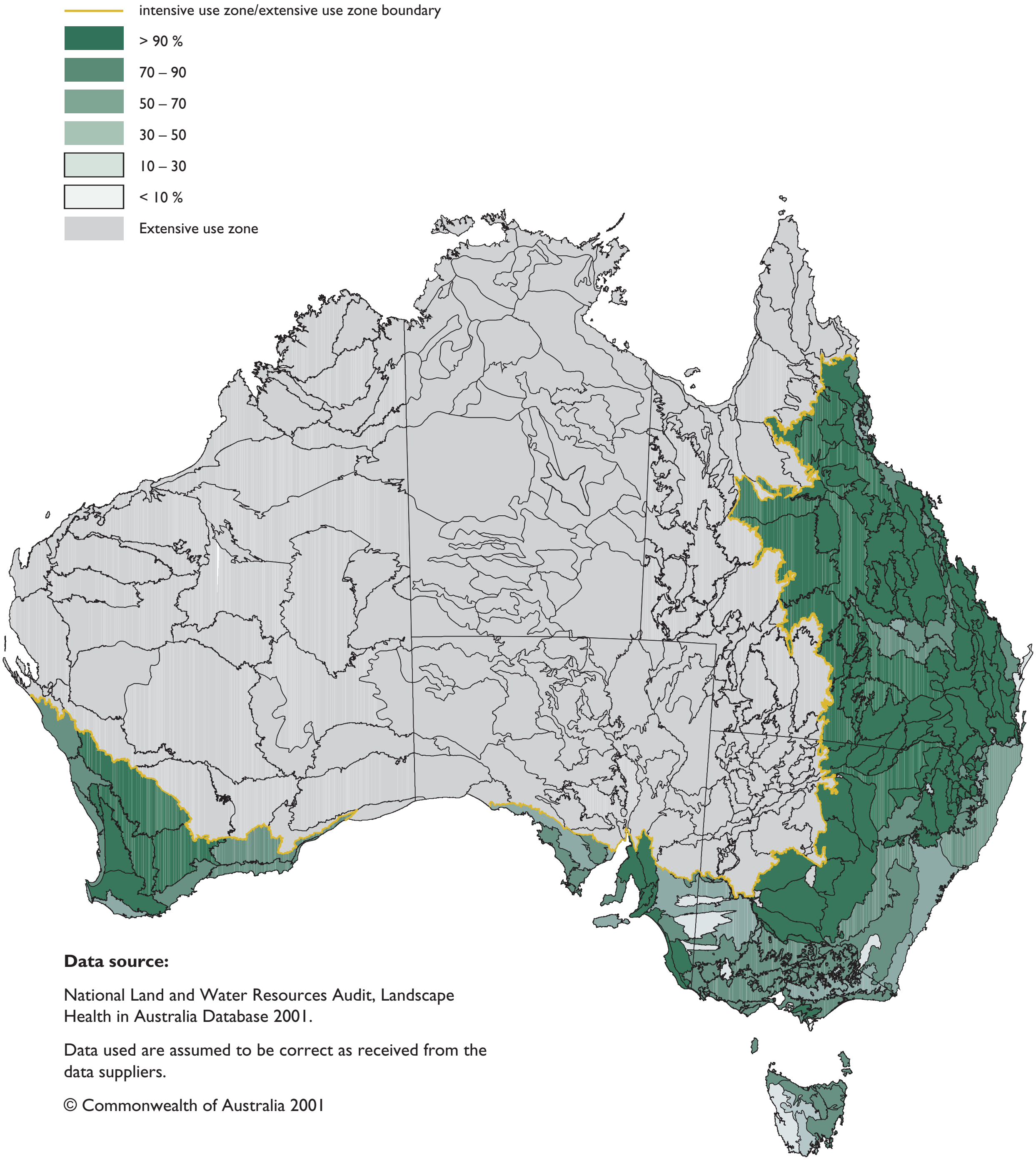


Figure 10. Percentage of native vegetation outside conservation reserves in the intensive use zone.



Data source:

National Land and Water Resources Audit, Landscape Health in Australia Database 2001.

Data used are assumed to be correct as received from the data suppliers.

Condition of native vegetation

Information available on the condition of vegetation across Australia is limited. Other Audit initiatives are specifying condition indicators for Australia's rangelands. No national or State-wide data sets exist. Some States and the Northern Territory measure soil or pasture condition in more arid areas. The data is of varying currency and methodology. Surrogates have been used to infer relative condition from the likely intensity of past and present land uses.

Impact from total grazing pressures—extensive use zone

'Biophysical naturalness'—an attribute of the national data set compiled for the National Wilderness Inventory (Lesslie & Maslen 1995)—incorporates tenure, rangeland type, and distance to (semi-) permanent water to provide a relative measure of the intensity and consequent impacts of total grazing pressure on biodiversity (Landsberg et al. 1999). Lesslie and Maslen's five classes were reduced to three, and the extent of the least disturbed class was determined for each subregion. This class included areas where at most only marginal or irregular grazing occurred (Figures 11, 12).

- 96 subregions (56%) have 50% or more of their area in the 'least impact total grazing pressures' class. These are concentrated around the far north of the continent, the central western deserts and Nullabor. The subregions with the greatest grazing intensity are in the Great Artesian Basin, central west Western Australia and the Barkley Tableland.

Figure 11. Percentage of subregion in the 'least impact from total grazing pressures' class in the extensive use zone.

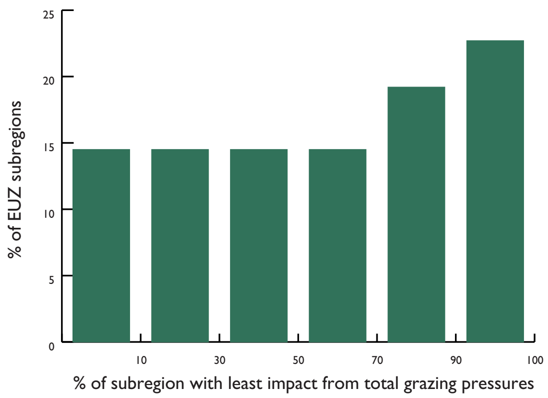
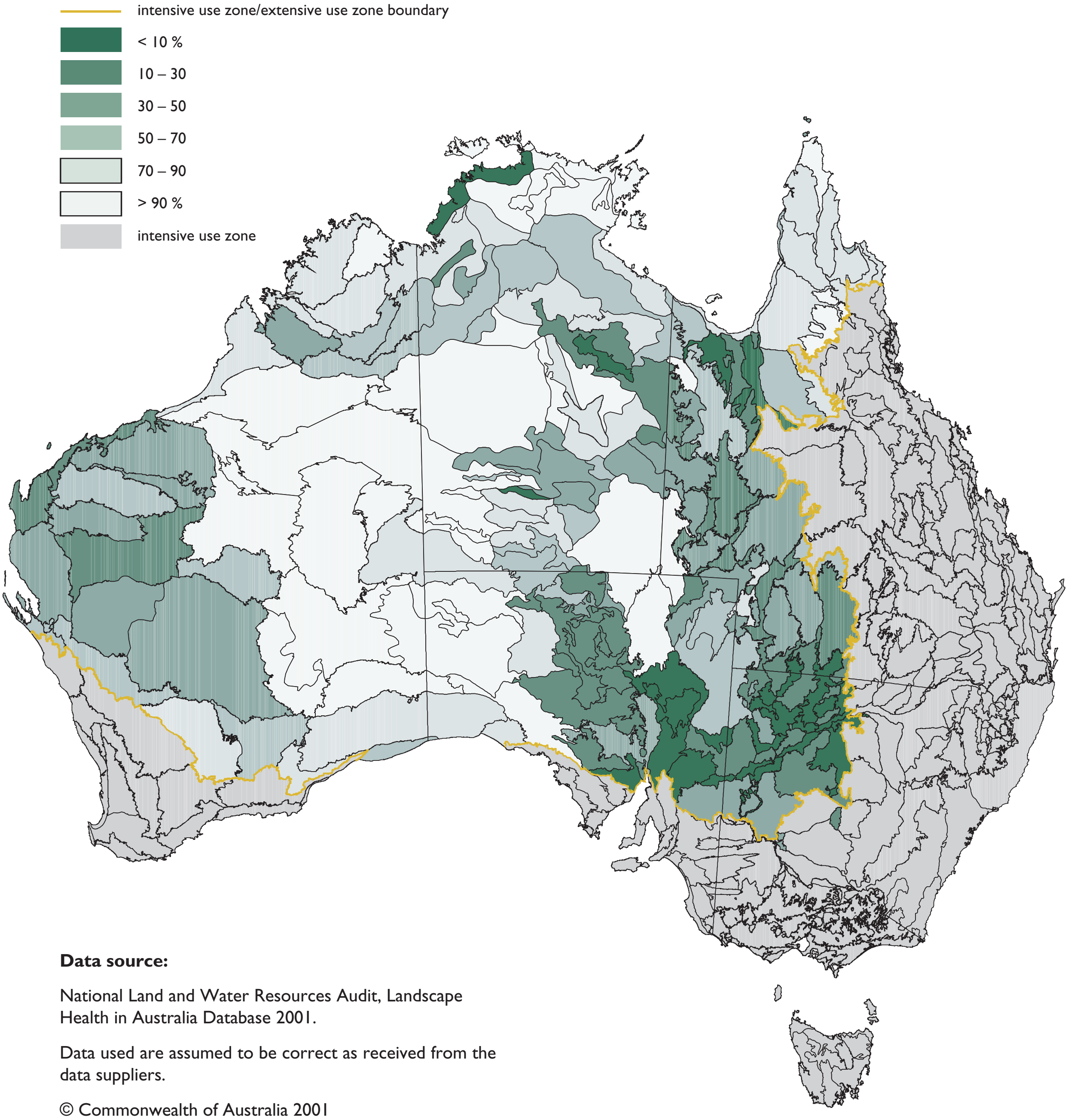


Figure 12. Percentage of subregion in the 'least impact from total grazing pressures' class in the extensive use zone.



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Native vegetation in land tenures associated with less intensive land use practices

Land tenure is another indicator of the likely impact of past and present land uses. Tenures associated with conservative land use practices include conservation reserves, World Heritage areas, vacant crown lands, crown reserves, aboriginal reserves, or armed forces reserves. Lands within such tenures have historically been managed less intensively (or 'conservatively'). Past uses have mainly been restricted to irregular grazing or a single episode of selective logging, and the impacts of these uses are relatively small compared to the more intensively managed grazing lands or native forests.

Land tenure is the most easily collated indicator of intensity of land use in the intensive use zone. Conservative tenures were identified across Australia using the Collaborative Australian Protected Area database (Environment Australia 2000b) and National Land Use mapping (Bureau of Rural Sciences 1999) (Figures 13, 14).

- In the intensive use zone only 19 (10%) of the subregions have greater than 50% of their remnant vegetation in land tenures associated with conservative land uses. They include the New South Wales (and Australian Capital Territory) Alps and Wilsons Promontory, where most of the subregion is reserved as national park. Ninety subregions (49%) have less than 10% of their area in conservative tenures. The subregions in the intensive use zone with the least native vegetation in land tenures associated with conservative land uses are in the Great Artesian Basin, sub-coastal Queensland and the western slopes of New South Wales.
- In the extensive use zone only 17 (10%) of the subregions have greater than 50% of their remnant vegetation in conservative land uses, including Lake Eyre and the Little Sandy Desert. One hundred and ten subregions (64%) have less than 10% of their area in conservative tenures. The subregions in the extensive use zone with the least native vegetation in conservative tenures are in the Great Artesian Basin and across central northern Australia.

Figure 13. Percentage of native vegetation in land tenures associated with conservative land use practices.

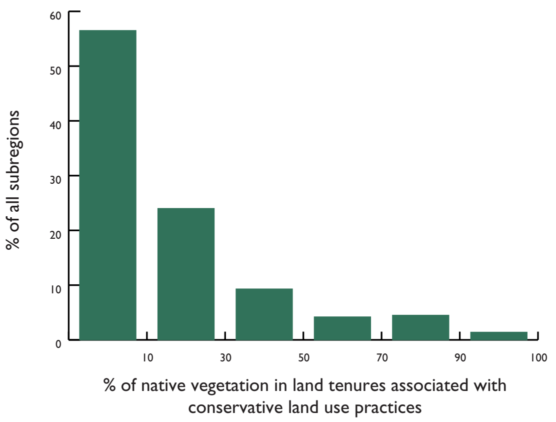
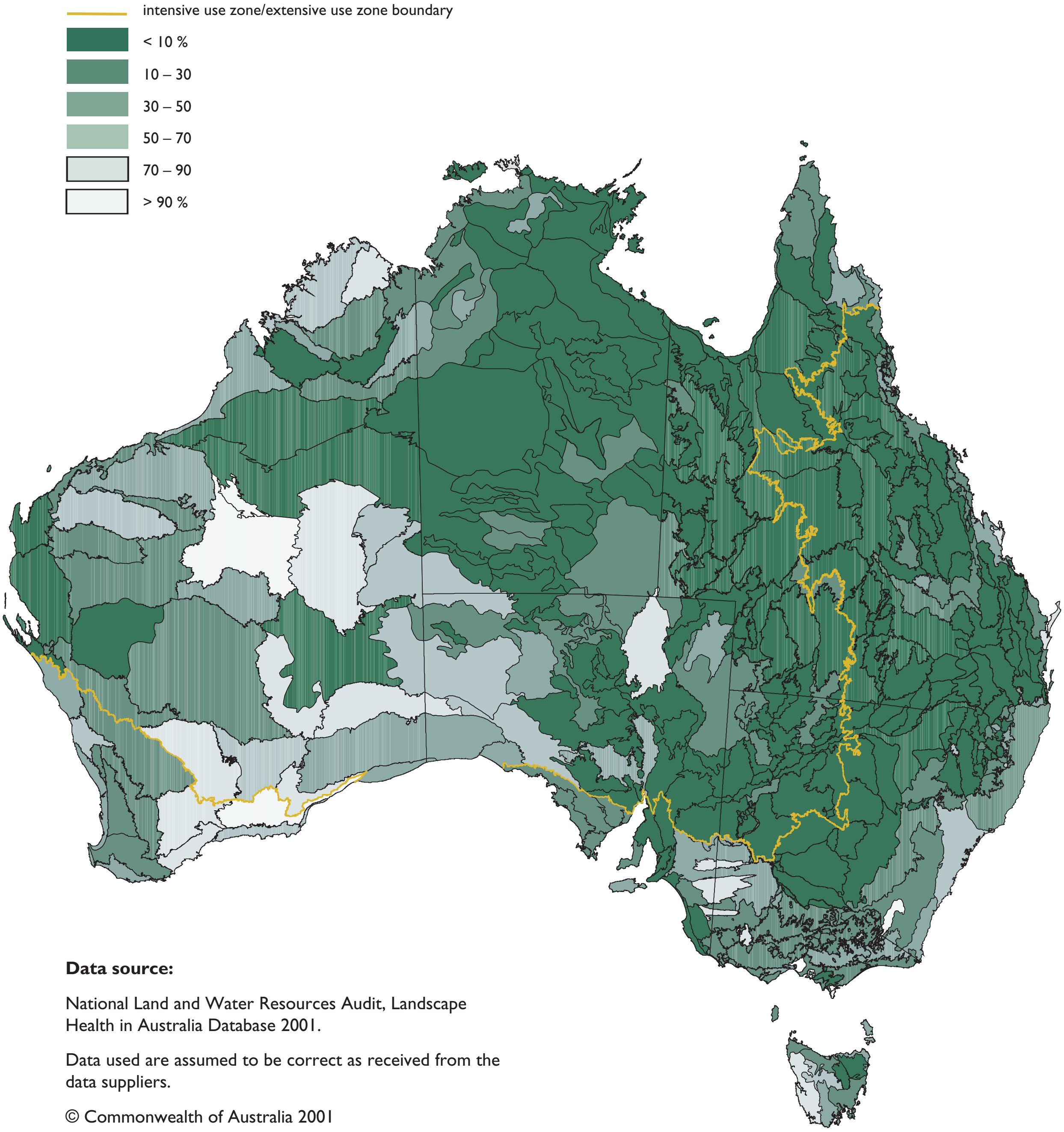


Figure 14. Percentage of native vegetation in land tenures associated with conservative land use practices.



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Extent of changed soil condition

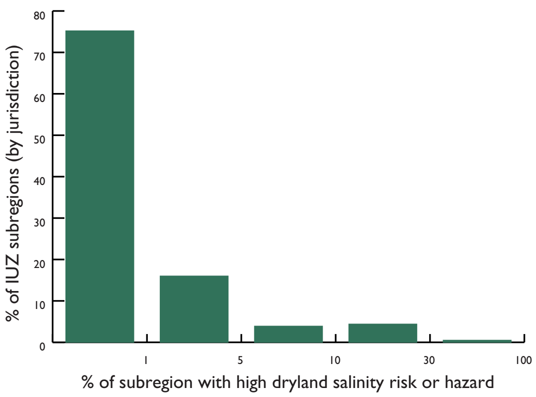
With the exception of dryland salinity, little national data was available on soil condition at the time of this assessment.

Extent of dryland salinity risk or hazard

Assessments undertaken by the States and Territories for the Audit (NLWRA 2000) provide the first national coverage of the extent of dryland salinity. In Western Australia, South Australia, Victoria and New South Wales, this mapping shows the incidence of high water tables and associated high dryland salinity risk, while in Queensland, the Northern Territory and Tasmania, the interpretation of dryland salinity hazard is mainly based on geology, soils and landform. The national coverage was derived by using scaling factors accounting for the different methods used by the States and Territories.

Where subregions cross State or Territory boundaries the data is analysed and presented for each jurisdiction. The number of reporting polygons for this attribute is therefore 206.

Figure 15. Percentage of subregion with high dryland salinity risk or hazard in the intensive use zone.



Percentage of subregion with high dryland salinity risk or hazard in the intensive use zone

The main areas of high salinity risk or hazard are in southern temperate Australia with the worst affected subregions in south west Western Australia, south east South Australia, and central to western Victoria. Subregions with smaller areas of high salinity risk or hazard also occur within the eastern states including the Lower Slopes subregion and Sydney Basin bioregion in New South Wales and coastal and inland cropping subregions of Queensland (Figures 15, 16).

- 10 subregions (4.9%) have a high dryland salinity risk or hazard over more than 10% of their area. These are mainly in south-west Western Australia, where most subregions fall into these two highest categories.
- Dandarragan Plateau north of Perth is the worst affected subregion and has high dryland salinity risk over 41% of its area. It is the only subregion nationally in the >30% affected class.
- Four subregions in south-west Western Australia have a high dryland salinity risk or hazard over more than 20% of their area. These are the northern part of the Avon Wheatbelt, the Western Mallee, Perth, and Fitzgerald.

Other subregions with significant areas of high dryland salinity risk or hazard are the seaward margins of the Murray Basin in South Australia, including all of the subregions of the Naracoorte Coastal Plain bioregion (Tintinara is the worst affected by rising groundwater), and the Central Uplands and Dundas Tablelands subregion of the Victorian Midlands bioregion (the Dundas Tablelands being the worst affected).

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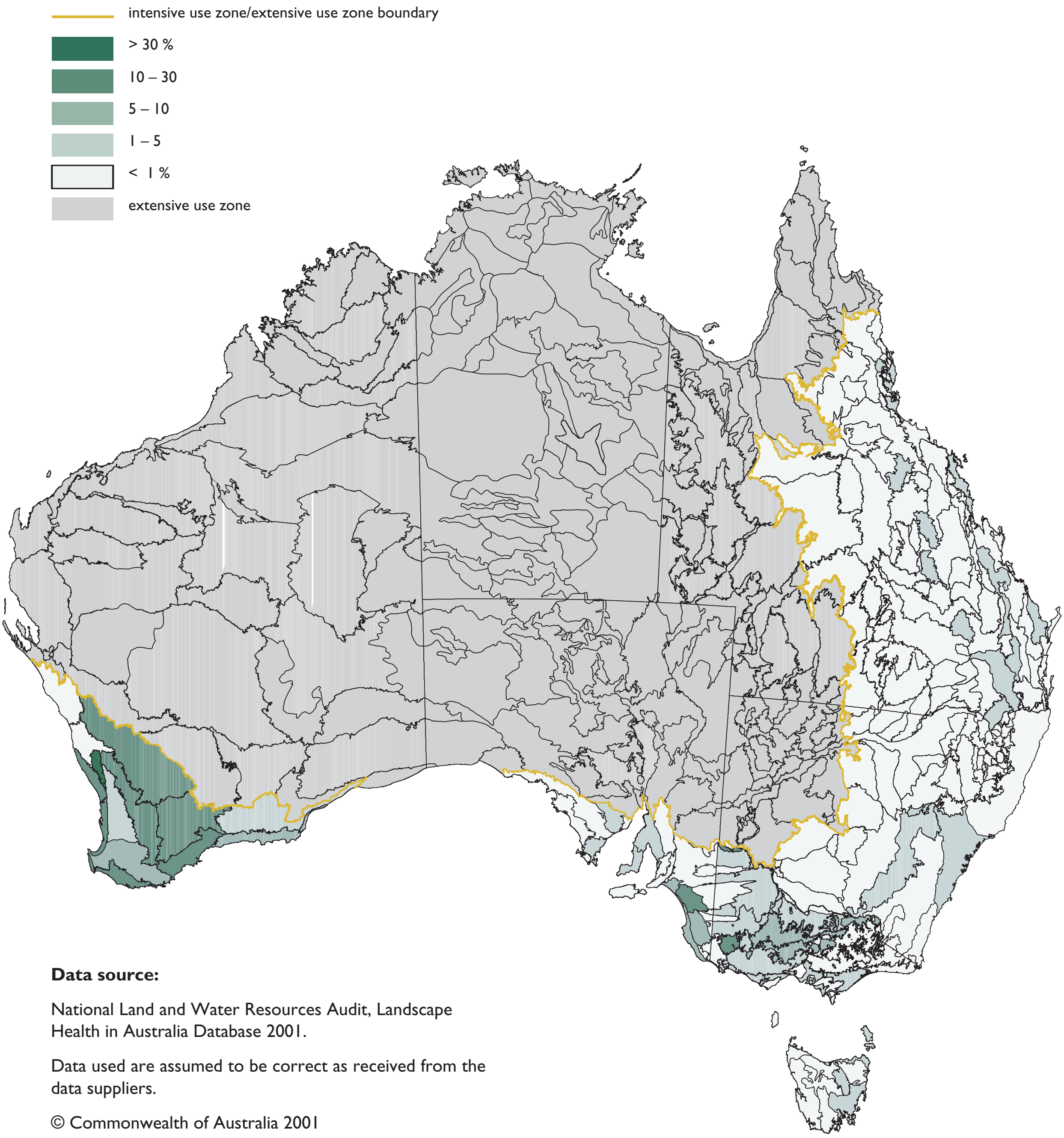
Figure 16. Percentage of subregion with high dryland salinity risk or hazard in the intensive use zone.



Data source:

National Land and Water Resources Audit, Landscape Health in Australia Database 2001.

Data used are assumed to be correct as received from the data suppliers.

Percentage of native vegetation in subregion with high dryland salinity risk or hazard in the intensive use zone

Areas of dryland salinity hazard or risk have also been intersected with native vegetation coverages to determine the amount of native vegetation currently within areas at high risk or hazard from dryland salinity (Figures 17, 18).

Dandarragan Plateau subregion north of Perth has the greatest proportion of native vegetation threatened by dryland salinity, with almost 38% in high risk areas. The Murray River Scroll Belt in Victoria is the next most threatened, with over 20% of native vegetation in high dryland salinity risk areas. Seven other subregions have more than 10% of native vegetation threatened, including five in Western Australia—the two subregions of the Avon Wheatbelt, the Western Mallee, Fitzgerald, Warren, on the far south-west coast, and Bridgewater and Tintinara subregions of the Naracoorte Coastal Plain bioregion near the mouth of the Murray River.

Figure 17. Percentage of native vegetation in subregion with high dryland salinity risk or hazard in the intensive use zone.

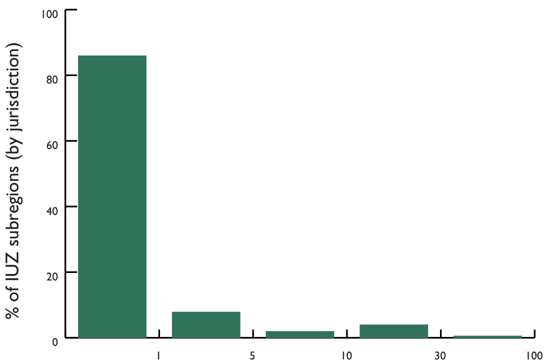
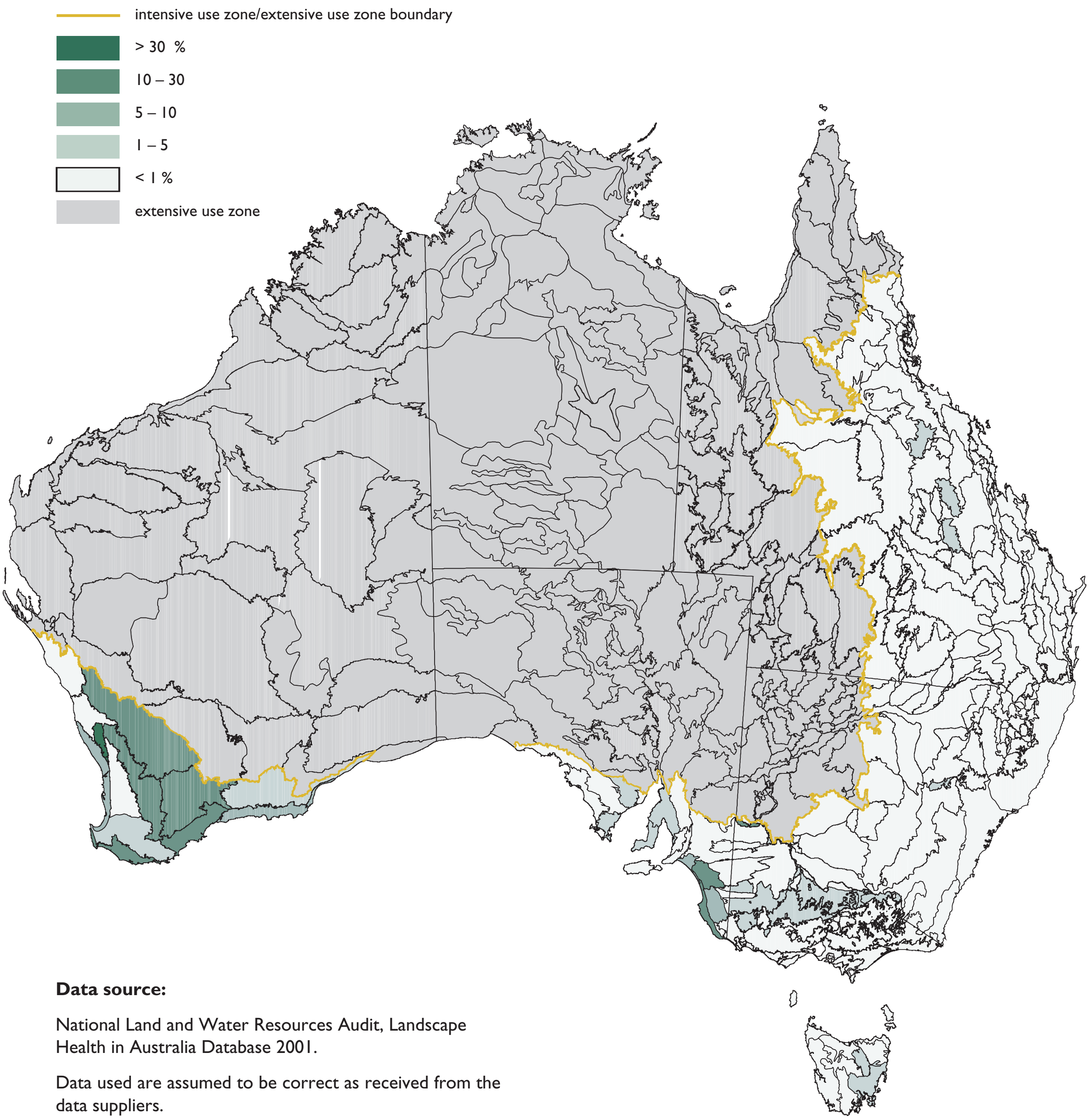


Figure 18. Percentage of native vegetation in subregion with high dryland salinity risk or hazard in the intensive use zone.



Data source:

National Land and Water Resources Audit, Landscape Health in Australia Database 2001.

Data used are assumed to be correct as received from the data suppliers.

Degree of changed hydrological conditions.

This assessment of changed hydrological conditions applies only to the terrestrial component of the subregion and does not include aquatic environments, although the two are clearly connected. The condition of estuaries and riverine environments is the subject of other Audit assessments.

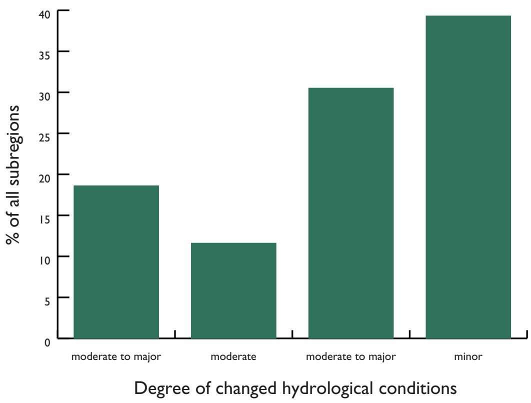
Changed hydrology may result from:

- soil degradation caused by over-grazing or cultivation; or
- land surface change due to vegetation clearing, land levelling, filling of preferential flow paths, drainage development, contour banking, or the construction of dams or levees.

Land use practices may have a major influence on hydrology (e.g. frequency and method of cultivation, degree of pasture development).

This attribute was assessed within four classes, using expert knowledge, the national land use map (BRS 1999), and the information collated on condition of native vegetation (Figures 19, 20).

Figure 19. Degree of changed hydrological conditions.



The subregions where hydrology has been significantly changed are those dominated by pasture development or regular cultivation.

- 66 subregions (19%) in the intensive use zone (36% within this zone) have moderate to major changes in hydrology. In southern Australia these include the subregions now subject to extensive dryland salinity.
- 41 subregions (12%) have a moderate change in hydrology.

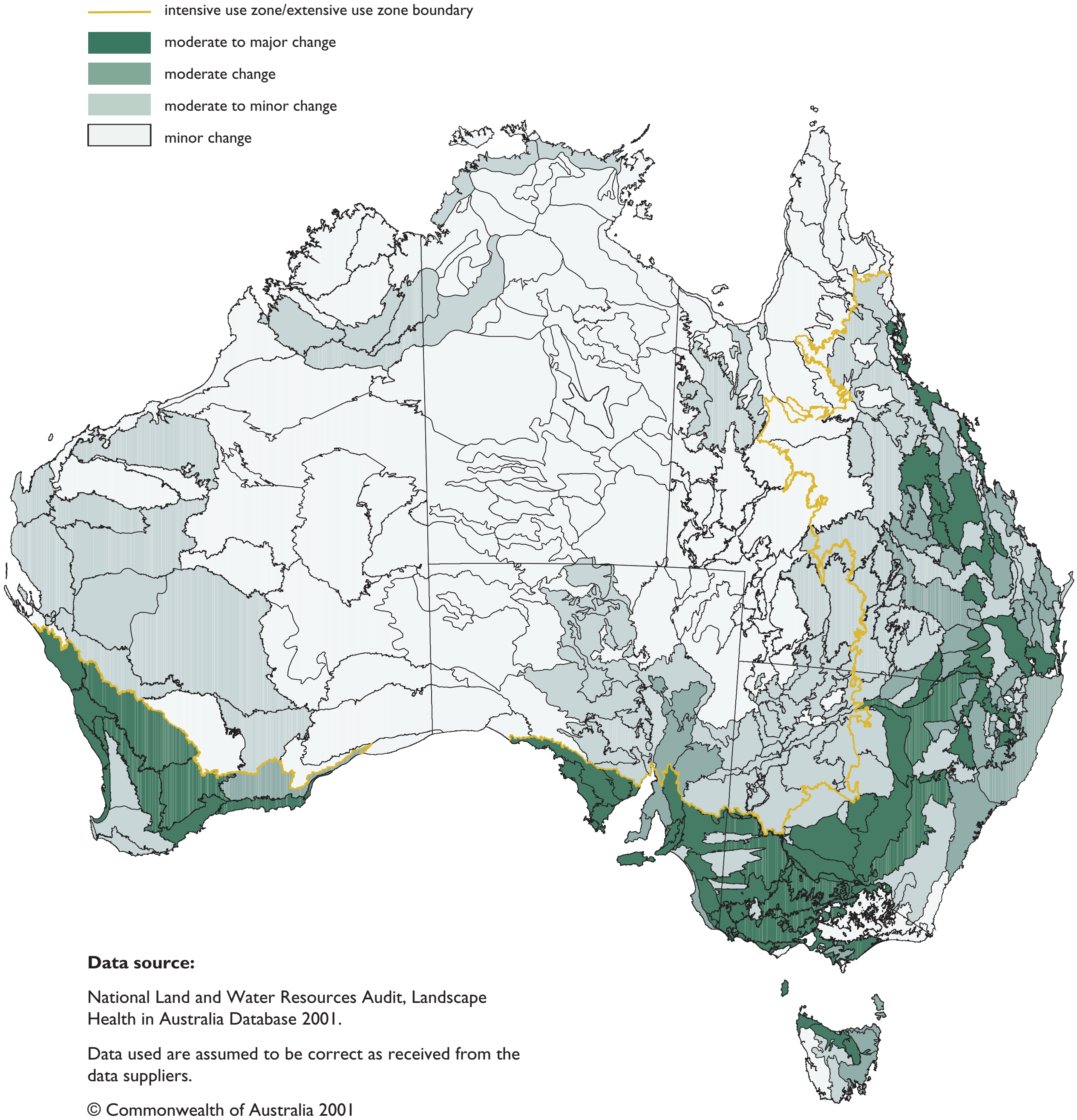
Most of these subregions occur in the intensive use zone where hydrological change is mainly due to:

- clearing of native vegetation;
- extensive disruption of flow paths by land levelling, farm dams or contour banks; or
- extensive changes in infiltration due to soil degradation.

In the extensive use zone, hydrological change is largely due to the cumulative impacts of total grazing pressures on soil surfaces and consequently on infiltration and run-off.

- 117 subregions (68%) have had little to no impact on their hydrology
- 52 subregions (30%) have minor to moderate change—primarily occurring in the more intensively grazed subregions on shallow topsoils or soils that are prone to compaction.

Figure 20. Degree of changed hydrological conditions.



Data source:

National Land and Water Resources Audit, Landscape Health in Australia Database 2001.

Data used are assumed to be correct as received from the data suppliers.

Feral plants and animals

Distribution and density of non-indigenous plant species (weeds) of national importance.

The project mainly assessed the 20 weeds of national significance identified as part of the development of the national weeds strategy (ARMCANZ 1999, Thorpe & Lynch 2000). Other introduced plants that were considered by the States and Territories to pose a particularly significant threat to biodiversity were included.

Assessment of distribution and density was mainly based on expert knowledge for each weed species (density was allocated to one of three classes: occasional, common or abundant). Weed distributions and densities were determined at the subregional scale except in Queensland where most weed data is presented at the bioregional scale. Where trend in density is known, it is also summarised in this section.

Weed species can be grouped according to current and potential distribution in Australia:

Wetland weed species

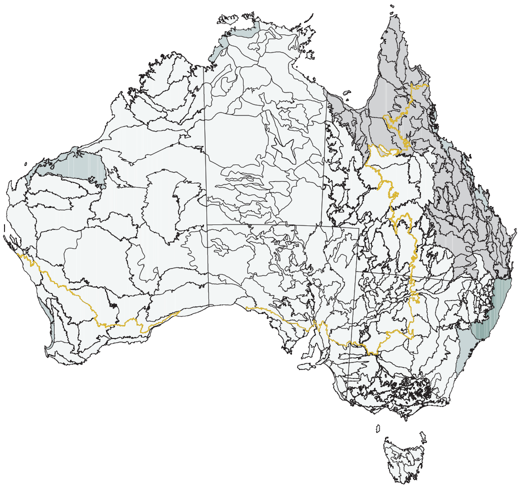
Wetland species are generally able to colonise a wide range of climatic zones. Alligator weed (*Alternanthera philoxeroides*), cabomba, (*Cabomba caroliniana*), and salvinia (*Salvinia molesta*) are able to spread to suitable habitats across most of Australia.

- Alligator weed has been eradicated from Tasmania, and is currently restricted to three subregions in New South Wales, and parts of the southern Brigalow Belt and south-east Queensland. Its trend is not known (Figure 21).
- Cabomba is scattered between north Queensland and Victoria and is increasing in density and extent (Figure 22).
- Salvinia is scattered along the northern Australian coast from the Sydney Basin to south-west Western Australia but is not increasing in density due to control efforts (Figure 23).

Figure 21. Distribution and density of alligator weed.

Figure 22. Distribution and density of cabomba.

Figure 23. Distribution and density of salvinia.



Density of weeds

- intensive use zone/extensive use zone boundary
- abundant and widespread
- common and widespread
- occasional or localised
- absent
- no data

Data source:

National Land and Water Resources Audit, Landscape Health in Australia Database 2001.

Data used are assumed to be correct as received from the data suppliers.

Other wetland species of concern are largely restricted to northern Australia. Hymenachne (*Hymenachne amplexicaulis*) and para grass (*Brachiaria mutica*) are both semi aquatic grasses introduced for grazing purposes and have invaded natural wetlands in Western Australia, Queensland and the Northern Territory (Figures 24, 25). Both appear to be increasing in extent. Pond apple (*Annona glabra*) is a tree that is taking over timbered wetlands on the central and northern coast of Queensland and also appears to be increasing (Figure 26).

Figure 24. Distribution and density of hymenachne.

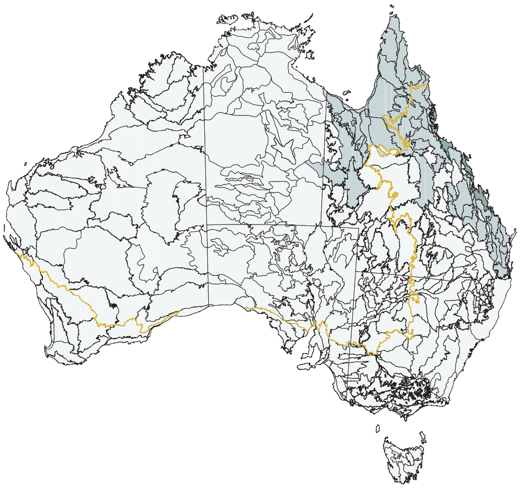


Figure 25. Distribution and density of para grass.

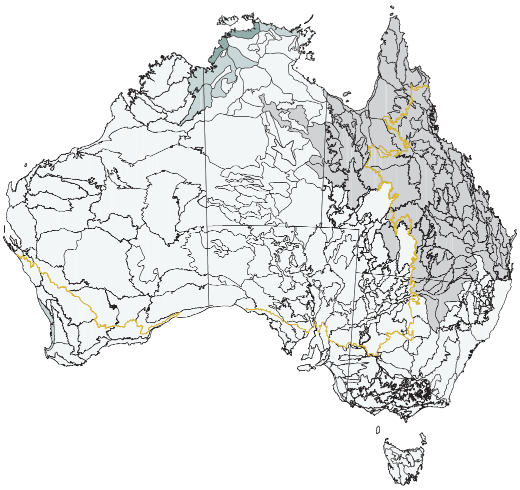
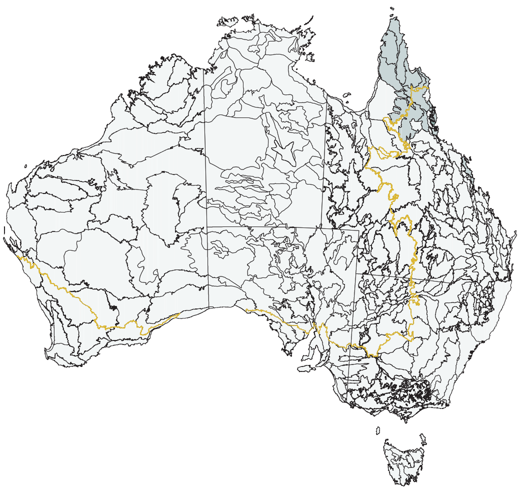


Figure 26. Distribution and density of pond apple.



Dryland species

Dryland species can be divided into three groups:

- species restricted to the north of Australia (usually including the wet/dry tropical areas and in some cases the northern parts of the semi arid or arid interior);
- species that are largely restricted to southern Australia; and
- species with the potential to colonise suitable habitat across the entire continent.

Predominantly northern species include the aggressive introduced pasture species buffel grass (mainly *Cenchrus ciliaris*), gamba grass (*Andropogon gayanus*) and mission grass (*Pennisetum polystachion*) (Figures 27, 28, 29). All are increasing rapidly in extent and density, although gamba grass and mission grass are currently restricted to the north of the Northern Territory. Buffel grass is becoming increasingly extensive and increasing in density across the drier and sandier parts of northern and central Australia.

Figure 27. Distribution and density of buffel grass.

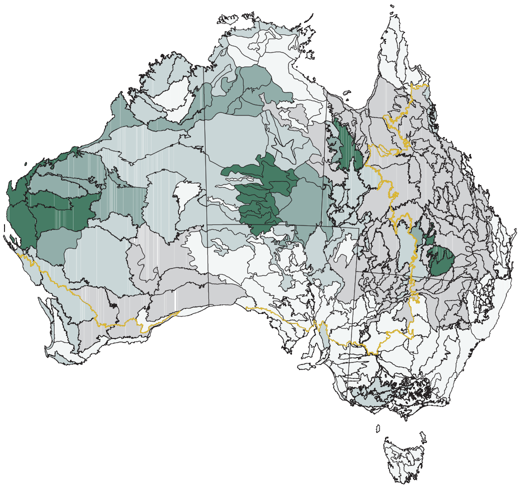


Figure 28. Distribution and density of gamba grass.

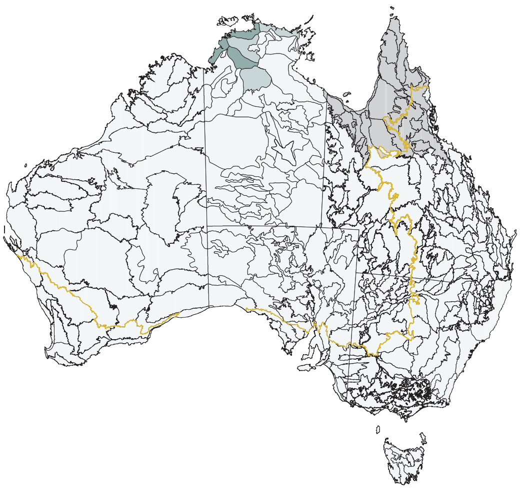
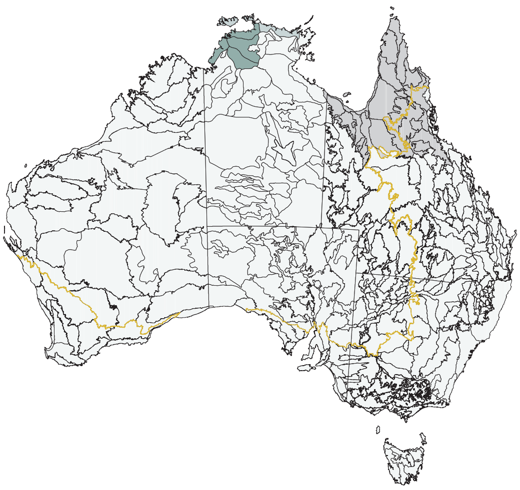


Figure 29. Distribution and density of mission grass.



Density of weeds

- intensive use zone/extensive use zone boundary
- abundant and widespread
- common and widespread
- occasional or localised
- absent
- no data

Data source:

National Land and Water Resources Audit, Landscape Health in Australia Database 2001.

Data used are assumed to be correct as received from the data suppliers.

Woody northern species include athel pine (*Tamarix aphylla*), mesquite (*Prosopis* spp.), mimosa (*Mimosa pigra*), parkinsonia (*Parkinsonia aculeata*), prickly acacia (*Acacia nilotica ssp. indica*), and rubber vine (*Cryptostegia grandiflora*) (Figures 30, 31, 32, 33, 34). Athel pine is restricted to small areas of the Northern Territory, central western New South Wales and South Australia, where it is increasing, and Western Australia, where it is stable. Mimosa is restricted to the northern part of the Northern Territory where it is increasing in density following a reduction in control activities. The remaining species are scattered across northern Australia and are generally increasing in extent and density.

Figure 30. Distribution and density of athel pine.

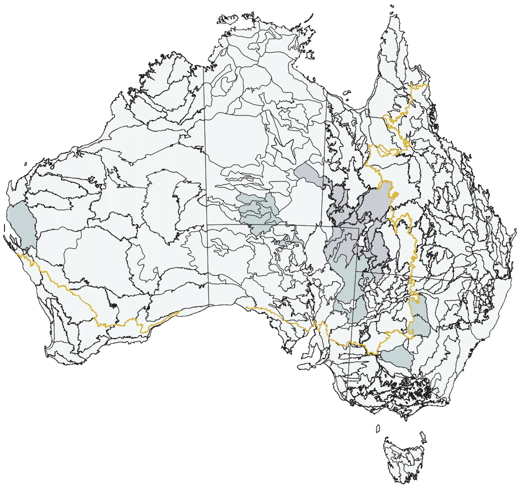


Figure 31. Distribution and density of mesquite.

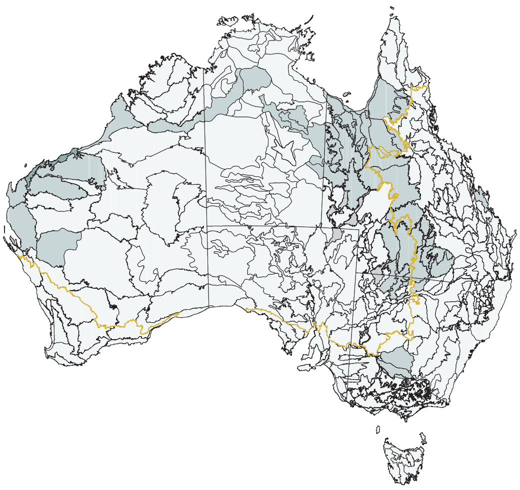


Figure 32. Distribution and density of parkinsonia.

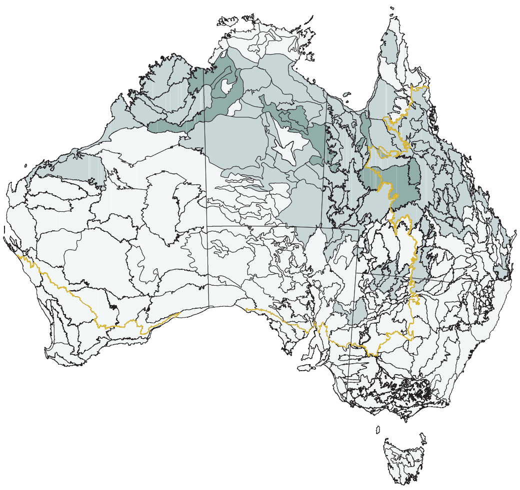


Figure 33. Distribution and density of prickly acacia.

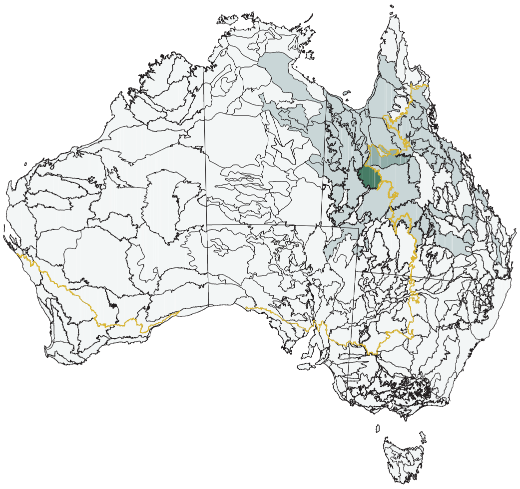
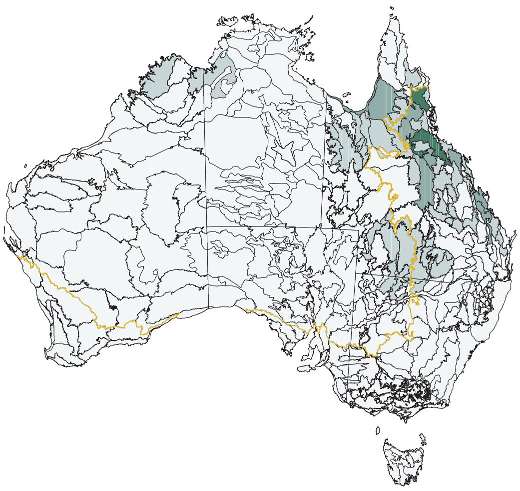


Figure 34. Distribution and density of rubber vine.



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Southern weed species of concern are mainly woody, although they also include a number of herbaceous plants. Herbaceous species include bridal creeper (*Asparagus asparagoides*), Chilean needle grass (*Nassella neesiana*), serrated tussock (*Nassella trichotoma*), and wards weed (*Carrichtena annua*).

- Bridal creeper is the most widespread and aggressive, invading remnant bushland throughout south-west Western Australia, and the more developed parts of South Australia, Victoria, New South Wales and Tasmania (Figure 35).
- Serrated tussock and Chilean needle grass are restricted to South Australia, Victoria, New South Wales and Tasmania, and are increasing in extent and density (Figures 36, 37).
- Wards weed is restricted to the drier parts of southern Western Australia, southern South Australia, and the western parts of New South Wales and Victoria, where it dominates many areas and is spreading rapidly (Figure 38).

Density of weeds

- intensive use zone/extensive use zone boundary
- abundant and widespread
- common and widespread
- occasional or localised
- absent
- no data

Figure 35. Distribution and density of bridal creeper.

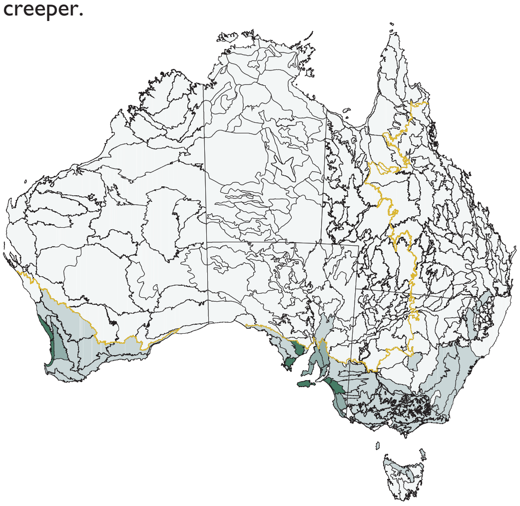


Figure 36. Distribution and density of Chilean needle grass.

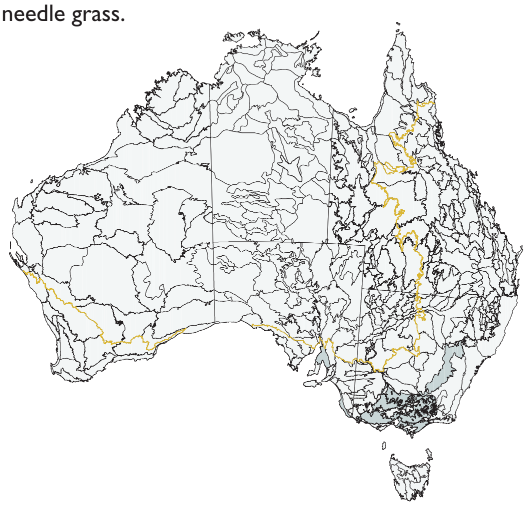


Figure 37. Distribution and density of serrated tussock.

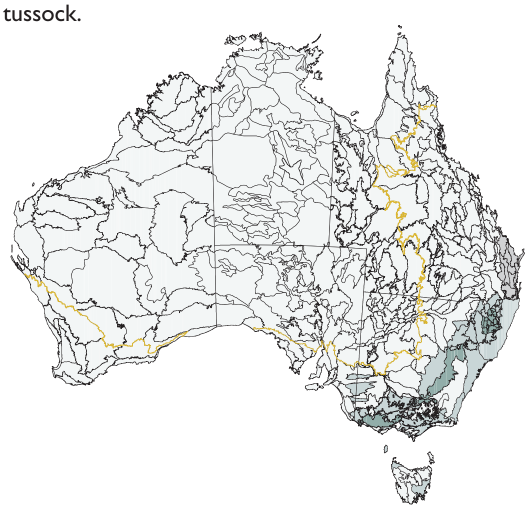
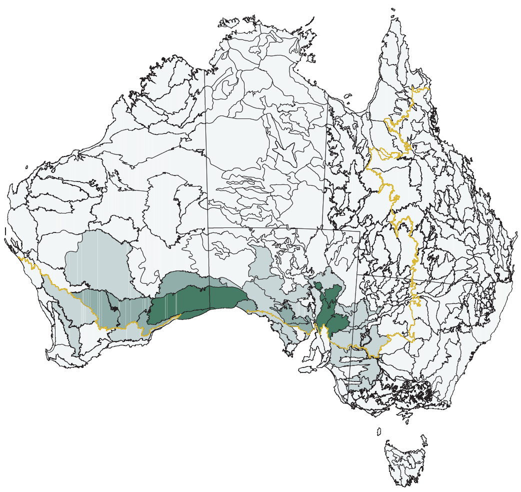


Figure 38. Distribution and density of Wards weed.



Woody southern species of concern include bitou bush/boneseed (*Chrysanthemoides monilifera*), blackberry (*Rubus fruticosus* agg.), gorse (*Ulex europaeus*), willows (*Salix* spp. except *S. babylonica, S. X calodendron* and *S. X reichardtiji*), boxthorn (*Lycium ferocissimum*), broom (*Cytisus* spp. and *Genista monspessulana*), olives (*Olea europaea*), and radiata pine (*Pinus radiata*).

- Bitou bush/boneseed, blackberry, gorse, boxthorn and the willows are all widespread and increasing in extent and density (Figures 39, 40, 41, 42, 43).

Figure 39. Distribution and density of bitou bush.

Figure 40. Distribution and density of blackberry.

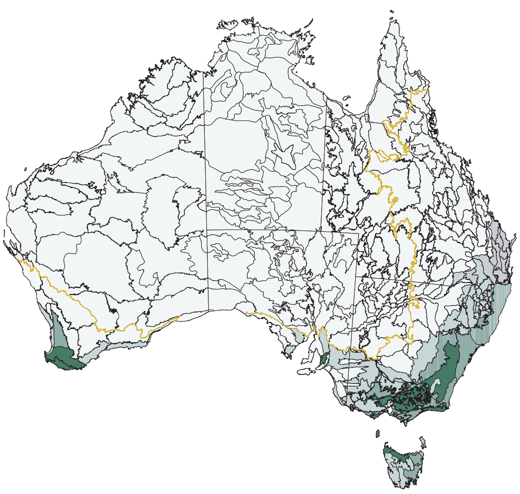
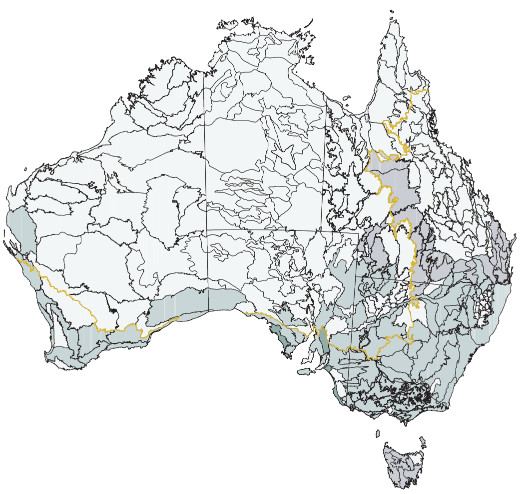


Figure 41. Distribution and density of gorse.

Figure 42. Distribution and density of willows.

Figure 43. Distribution and density of boxthorn.

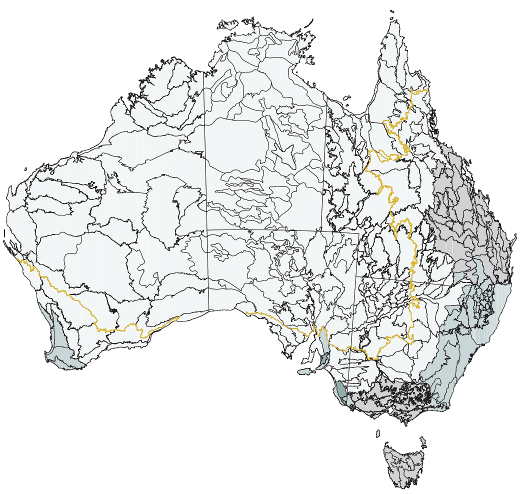


- Broom, olive and radiata pine are most abundant in South Australia, and increasing in extent and density (Figures 44, 45, 46).

Figure 44. Distribution and density of broom.

Figure 45. Distribution and density of olives.

Figure 46. Distribution and density of radiata pine.



Density of weeds

- intensive use zone/extensive use zone boundary
- abundant and widespread
- common and widespread
- occasional or localised
- absent
- no data

Data source:

National Land and Water Resources Audit, Landscape Health in Australia Database 2001.

Data used are assumed to be correct as received from the data suppliers.

Two weeds with the capacity to colonise suitable habitat across much of Australia are lantana (*Lantana camara*) and parthenium weed (*Parthenium hysterophorus*).

- Lantana occurs in high densities along coastal areas in Queensland and New South Wales, and in lower densities on parts of the Western Australia and Northern Territory coasts (Figure 47). While the trend in Western Australia is unknown, lantana is increasing in extent and density in most other areas.
- Parthenium is mainly restricted to central Queensland but is continuing to spread outwards (Figure 48).

Figure 47. Distribution and density of lantana.

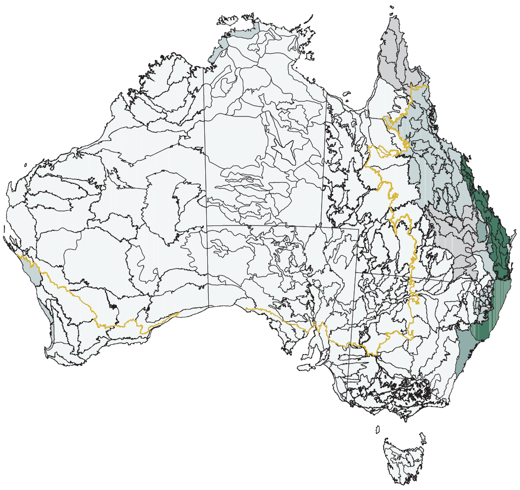
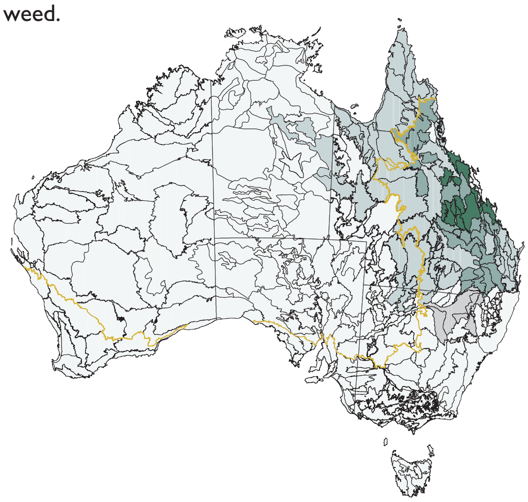


Figure 48. Distribution and density of parthenium weed.



Density of weeds

- intensive use zone/extensive use zone boundary
- abundant and widespread
- common and widespread
- occasional or localised
- absent
- no data

Data source:

National Land and Water Resources Audit, Landscape Health in Australia Database 2001.

Data used are assumed to be correct as received from the data suppliers.

Distribution and density of non-indigenous vertebrate species (feral animals) of national importance.

Feral animals assessed included those for which national threat abatement plans have been produced—goats (*Capra hircus*), foxes (*Vulpes vulpes*), cats (*Felus catus*) and rabbits (*Oryctolagus cuniculus*) (Environment Australia 1999a, 1999b, 1999c, 1999d). States and Territories also considered pigs (*Sus scrofa*), swamp buffalo (*Bubalus bubalis*) and cane toads (*Bufo marinus*) to pose particularly significant threats to biodiversity and these were also assessed. Information on distribution and density was largely based on expert knowledge, with density being allocated to one of three classes—occasional, common or abundant. Distribution and density were determined at the subregional scale except in Queensland and New South Wales where most data is presented at the bioregional scale. Where trend in density was known, it is also summarised in this section.

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- Foxes and rabbits have similar extents, occurring across most of southern and central Australia (except Tasmania in the case of foxes) (Figure 49, 50). They occur in higher densities in the south. Populations of both species have declined due to the impacts of calicivirus, and are now thought to be stable or increasing slightly.
- Cats occur throughout Australia, with southern populations having decreased due to the reduction in rabbits as a food source following the introduction of the calicivirus. Northern populations are stable (Figure 51).
- Goats are widespread in south-eastern Australia, and central-west Western Australia, but absent from northern, central and central-southern Australia (Figure 52). The populations are stable to decreasing except in semi-arid Western Australia where they are increasing.

Figure 50. Distribution and density of rabbits.

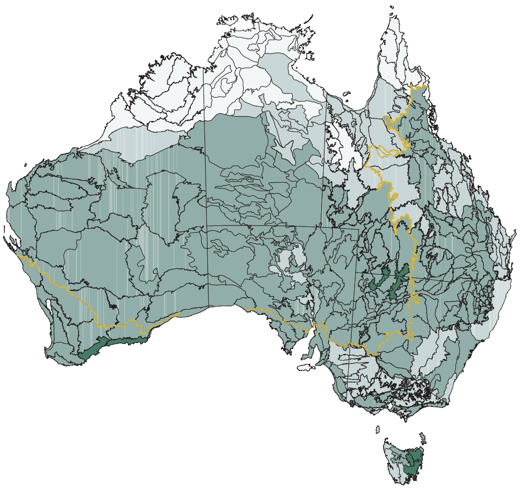


Figure 51. Distribution and density of cats.

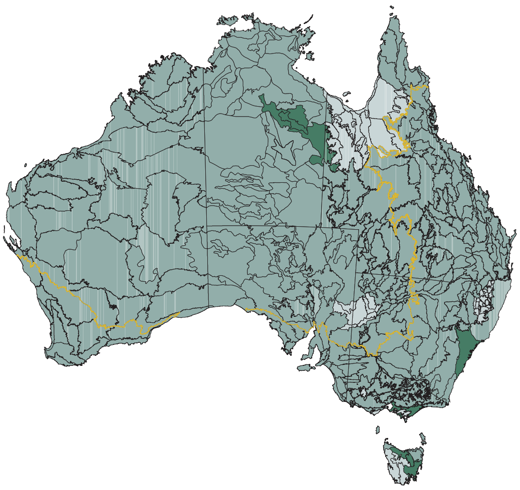


Figure 49. Distribution and density of foxes.

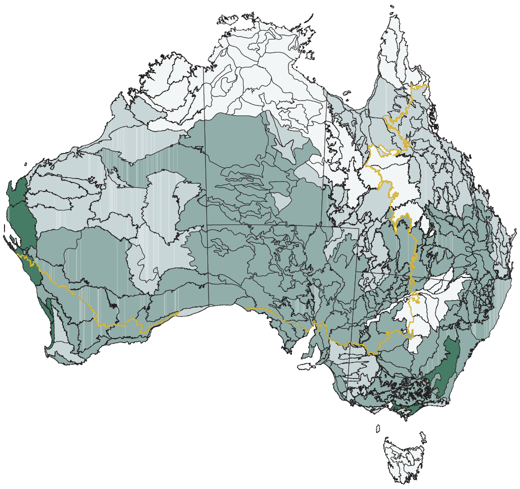


Figure 52. Distribution and density of goats.

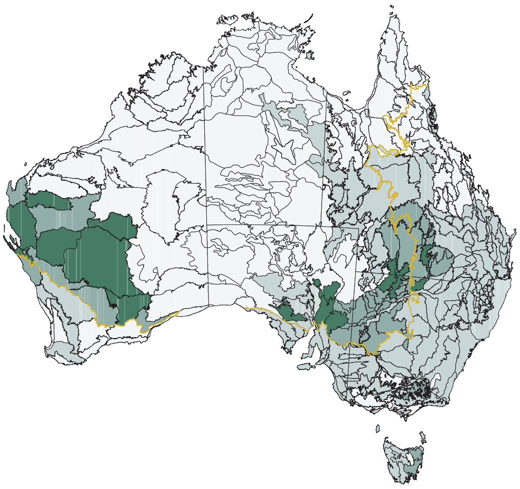


Figure 53. Distribution and density of pigs.

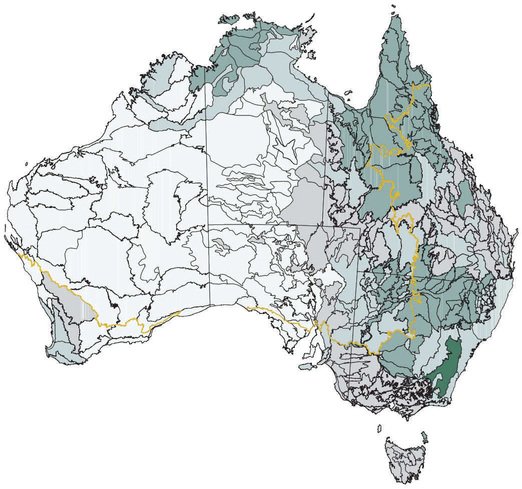


Figure 54. Distribution and density of swamp buffalo.

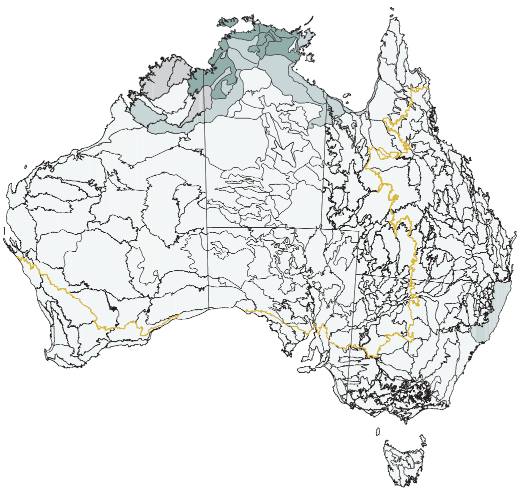
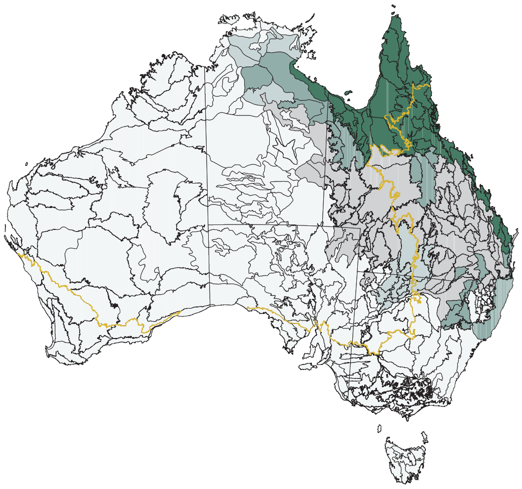


Figure 55. Distribution and density of cane toads.



Information on pigs, buffalo and cane toads is at present patchy, with uncertainty on the limits of spread.

- Pigs are widespread in northern and eastern Australia, and in south-west Western Australia (Figure 53). Densities are stable to increasing in the south west and north, but the trend is unknown in other parts of the mainland. Pigs are present in Tasmania only on Flinders Island where trapping is holding the population at an equilibrium.
- Buffalo are common and increasing in the far north of the Northern Territory, and have spread to the coast of the Gulf of Carpentaria in north-western Queensland (Figure 54).
- Cane toads now extend across north-eastern Australia from northern New South Wales almost to Darwin, and are continuing to expand their range (Figure 55). Their south-western distribution is unclear. They are increasing in density around the fringes of their distribution, but populations appear to have stabilised in most other areas.

Density of feral animals

- intensive use zone/extensive use zone boundary
- abundant and widespread
- common and widespread
- occasional or localised
- absent
- no data

Data source:

National Land and Water Resources Audit, Landscape Health in Australia Database 2001.

Data used are assumed to be correct as received from the data suppliers.

At-risk ecological communities and threatened species

Ecosystems at risk in the intensive use zone

This attribute was only assessed in the intensive use zone, as the loss of natural landscapes following tree clearing or cultivation is more readily defined than that due to land degradation in the extensive use zone where landscape change is less obvious and usually incremental. 'At risk' ecosystems were defined as those with:

- greater than 70% of their original extent cleared or cultivated; and
- those that had an original area of less than 10 000 ha and are subject to continuing clearing.

This definition corresponds broadly to the 'endangered and of concern' categories used to define the biodiversity conservation status of regional ecosystems in Queensland. In Queensland 'at-risk' ecosystems also include ecosystems that have been moderately degraded across most of their range (Sattler & Williams 1999).

The proportion of ecosystems at risk in a subregion is an indicator of the heterogeneity of remaining native vegetation. It provides an early warning of landscape decline associated with the selective removal of particular landscape elements (e.g. tree dieback due to sustained defoliation by insects may follow the loss of ecosystems having critical seasonal food resources or other habitat needs of key predators; clearing of ecosystems associated with recharge areas may lead to the loss of associated wetlands to salinity).

Ecosystems have been generally defined at a scale of 1:100 000.

- Assessment in Western Australia, Victoria, and Queensland, is based on mapping which enabled an accurate assessment of the remaining extent. In Queensland non mapped information on the condition of the remaining vegetation was also used to determine their status (Sattler & Williams 1999).
- Assessment in South Australia and Tasmania was based on a combination of ecosystem mapping and expert knowledge.
- In New South Wales geomorphological units (Pressey et al. 2000) were used within the subregional framework to provide a surrogate for ecosystems, and their remaining extent was derived from the State remnant vegetation cover.

The percentage of subregional ecosystems at risk in the intensive use zone is illustrated in Figures 56, 57.

- 12 subregions (7%) have more than 90% of ecosystems at risk. These include the Mount Lofty Ranges in South Australia, the Victorian Midlands and parts of the Southern Brigalow Belt.
- 27 subregions (15%) have between 70% and 90% of their ecosystems at risk. This includes most of the cropping subregions of southern Australia, parts of the Mulga Lands in Queensland and the Tasmanian Northern Midlands.
- 56 subregions 32%) have between 50% and 70% of their ecosystems at risk, and clearing is continuing in most of these.
- 5 subregions (3%) can be considered to have almost all of their ecosystems still covering more than 30% of their original extent, including Wilsons Promontory and the West Coast of Tasmania.

Figure 56. Percentage of subregional ecosystems at risk in the intensive use zone.

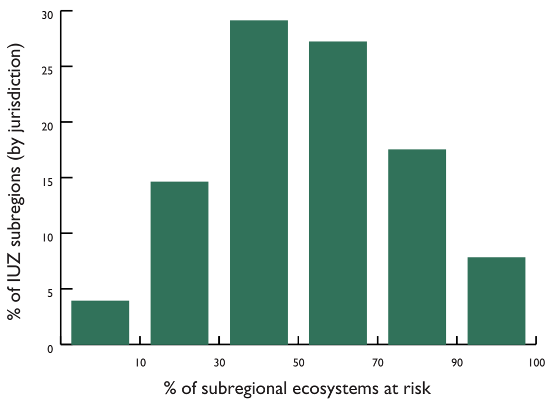
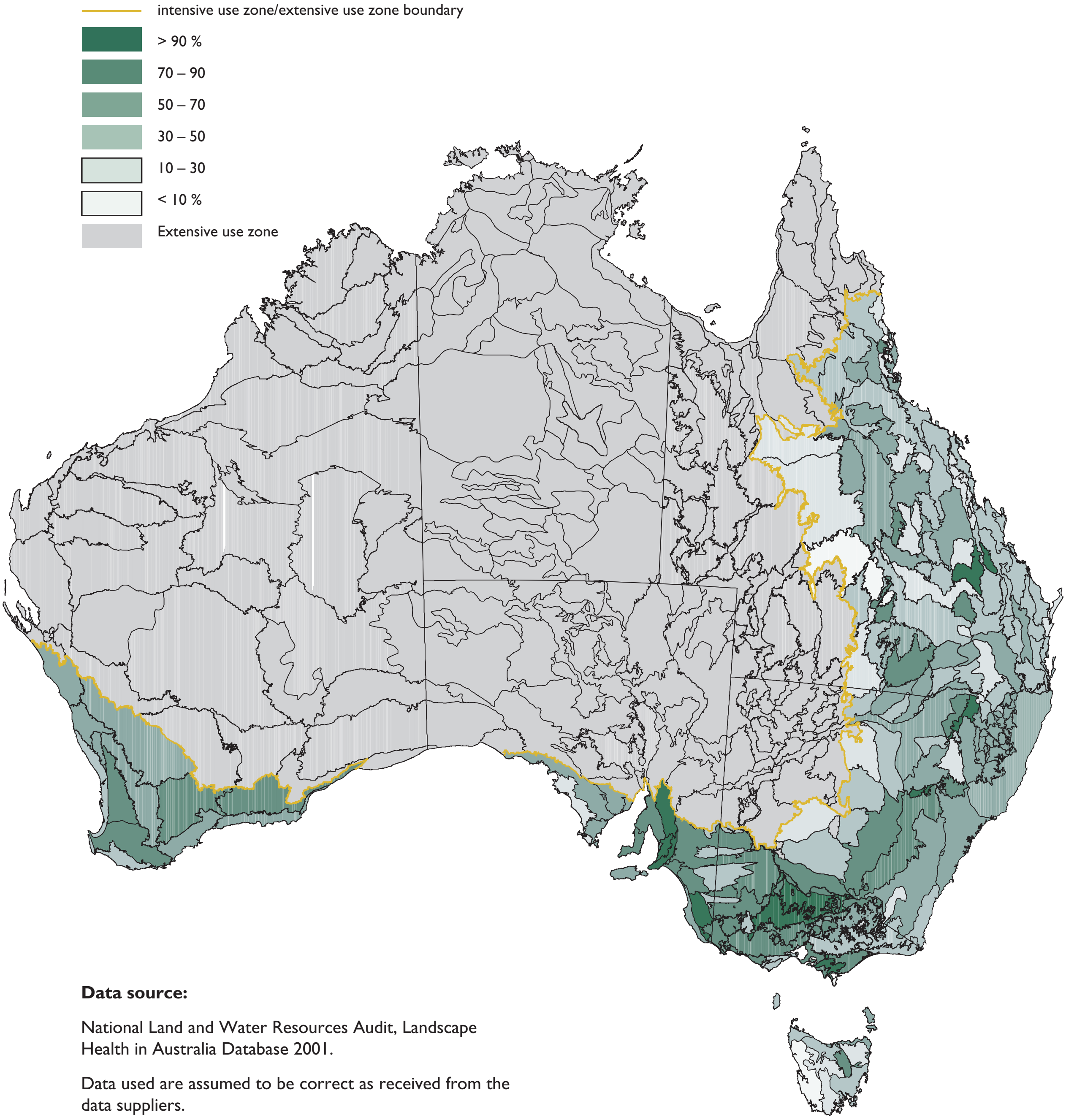


Figure 57. Percentage of subregional ecosystems at risk in the intensive use zone.



Data source:

National Land and Water Resources Audit, Landscape Health in Australia Database 2001.

Data used are assumed to be correct as received from the data suppliers.

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Threatened species

Threatened species considered in this report are those listed nationally in the *Environment Protection and Biodiversity Conservation Act 1999* (Cth). These lists are based on recent sightings provided by the States, and then refined nationally by distribution modelling and expert review. Information is current to 1999. While these lists differ to some extent to those currently under State legislation, the geographic information sets underlying some State lists do not lend themselves readily to analysis using the subregions. State lists also do not necessarily recognise the status of species beyond their jurisdiction.

The absence of a threatened species from a subregion gives no indication of whether it was once present but is now extinct in the subregion—a common situation particularly in more arid areas of the continent. The presence of a threatened species in a bioregion gives no indication of the degree of threat it faces, nor does it necessarily imply that the subregion is critical in the national conservation of that species.

Conservation of threatened species requires a detailed understanding of distribution, ecology and threats to survival. Despite these constraints, an assessment of the relative number of threatened species across the landscapes of Australia may provide a focus for more detailed subregional analysis.

Threatened plants

There are strong national differences in the recorded occurrence of threatened plants between the intensive use zone and the extensive use zone (Figures 58, 59, 60):

- 122 subregions in the intensive use zone (67%) have more than 10 threatened plants species recorded from within them.
- 10 subregions in the extensive use zone (6%) have more than 10 threatened plants species recorded from within them.
- three subregions in the intensive use zone (2%) have no threatened species records.
- 49 subregions in the extensive use zone (28%) have no threatened species records.

These differences reflect biogeography, habitat and threatening processes. They may also reflect search effort, with much of the more remote areas of Australia known only superficially botanically.

- 38 subregions (11%) have more than 30 threatened plants recorded within them including most of south-west Western Australia, Victoria, the coast of New South Wales, south-eastern Queensland and the northern part of the Wet Tropics and southern Cape York Peninsula.
- Subregions with no records of threatened plant species include the deserts of north and north-western Australia, and associated subtropical pastoral lands. The only subregions in the intensive use zone with no records are Culgoa–Bokhara and Narran–Lightning Ridge in the Darling Riverine Plains, and Warrego River Plains in the Mulga Lands.

Figure 58. Number of threatened plants in the intensive use zone.

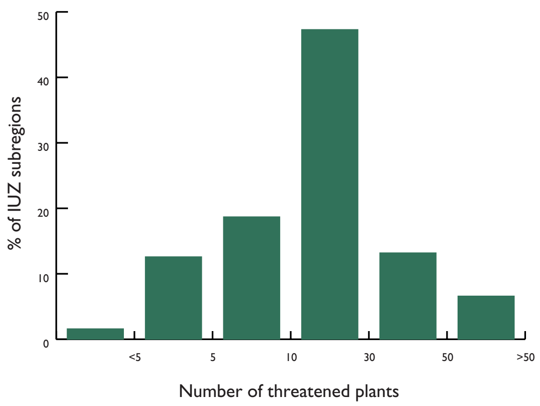


Figure 59. Number of threatened plants in the extensive use zone.

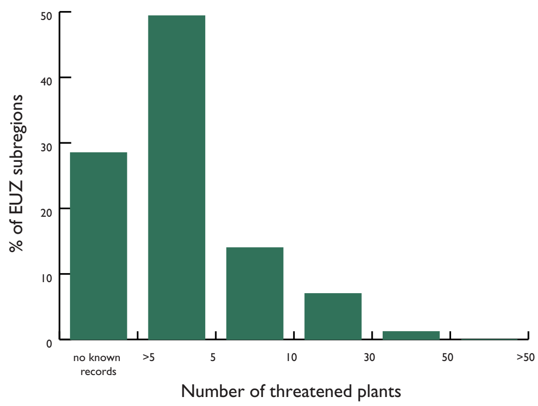
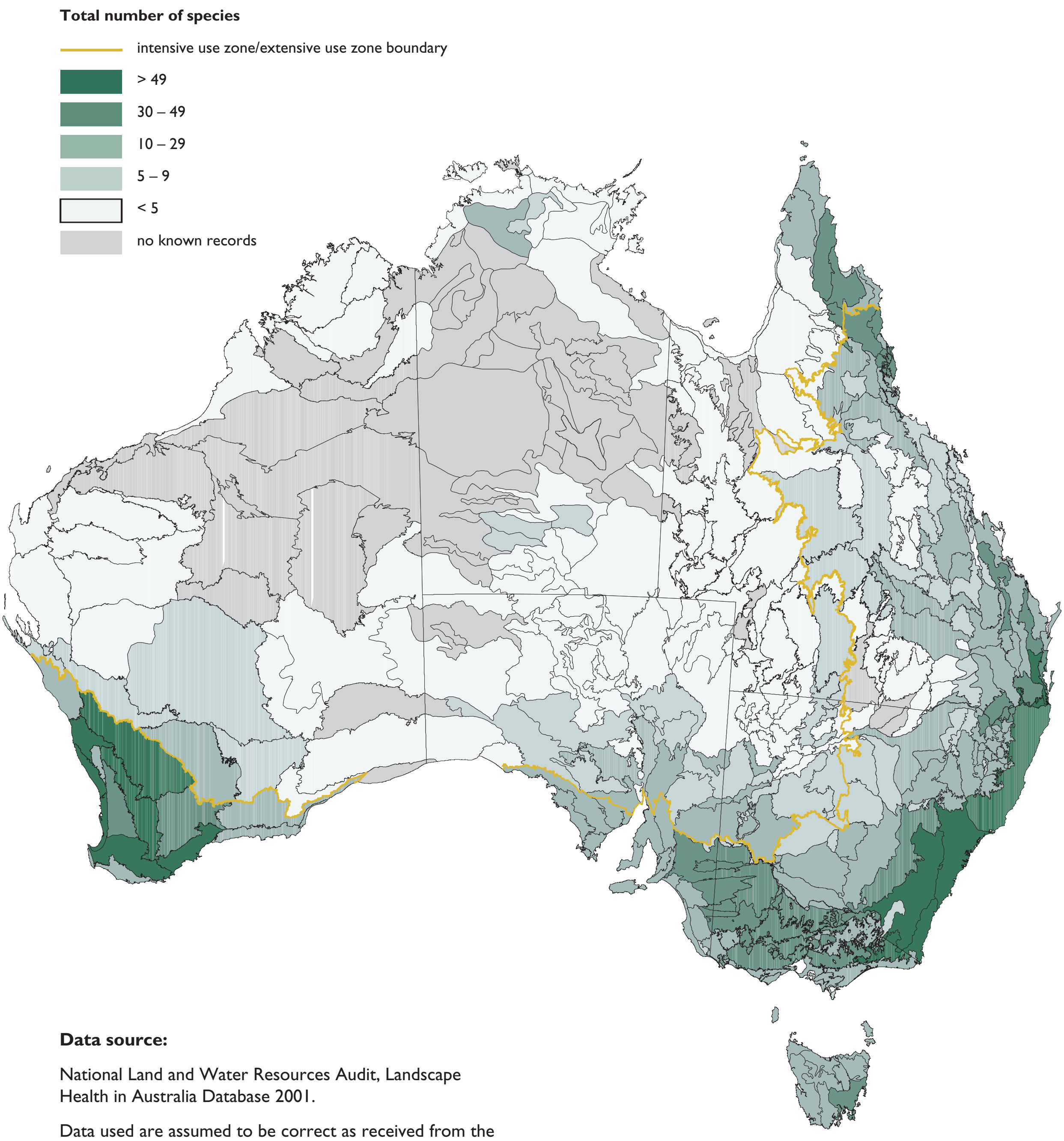


Figure 60. Known and predicted occurrences of threatened plants.



Data source:

National Land and Water Resources Audit, Landscape Health in Australia Database 2001.

Data used are assumed to be correct as received from the data suppliers.

Threatened vertebrate animals

This analysis of threatened vertebrates includes freshwater fish, birds, reptiles and mammals (Figures 61, 62, 63). It does not include marine or pelagic animals that spend part of their life cycle on the continent or on nearby islands (discussed under 'threatened marine and pelagic vertebrate animals').

Clear national differences exist in the recorded occurrence of threatened vertebrate species between the intensive use zone and the extensive use zone:

- 84 subregions in the intensive use zone (46%) have more than 10 threatened animal species recorded from within them.
- 12 subregions in the extensive use zone (7%) have more than 10 threatened animal species recorded from within them.
- No subregions in the intensive use zone have no threatened species records.
- Nine subregions in the extensive use zone (5%) have no threatened vertebrate records.

These contrasts are less marked than for threatened plants, probably reflecting a greater scientific knowledge of a relatively limited suite of vertebrate animal species.

The greatest number of threatened vertebrates are in the south-east of the continent, with the New South Wales North Coast having the highest number (26 species) and a further seven subregions having 20 or more threatened vertebrate animal species.

In the intensive use zone most of the coastal and sub-coastal subregions of north east Queensland have between 10 and 20 threatened vertebrate animals, as does south-west Western Australia.

- no subregions with greater than 20 threatened vertebrate animal species occur in the extensive use zone. The highest numbers (10–20 threatened species) are found in south-east Cape York, the Simpson Desert, Tanami Desert, the Great Sandy Desert and the tropical rangelands in the north-west of the continent.

Figure 61. Number of threatened vertebrate animals in the intensive use zone.

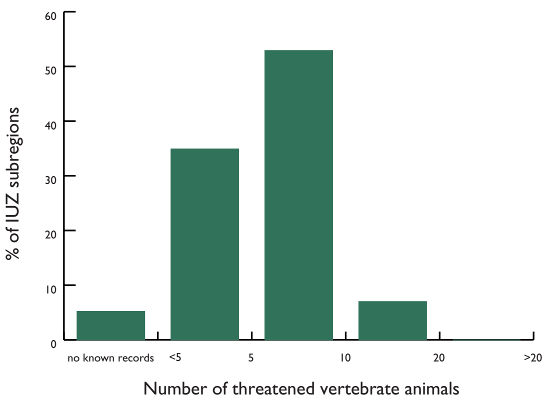


Figure 62. Number of threatened vertebrate animals in the extensive use zone.

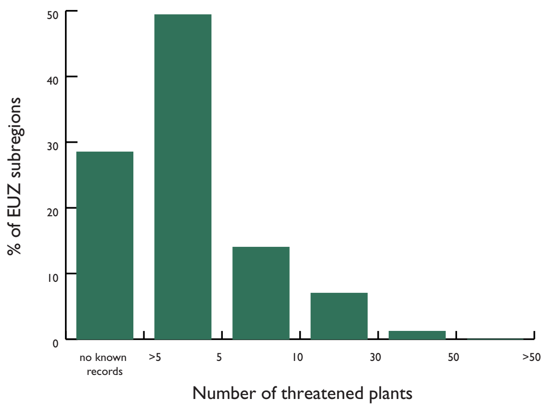
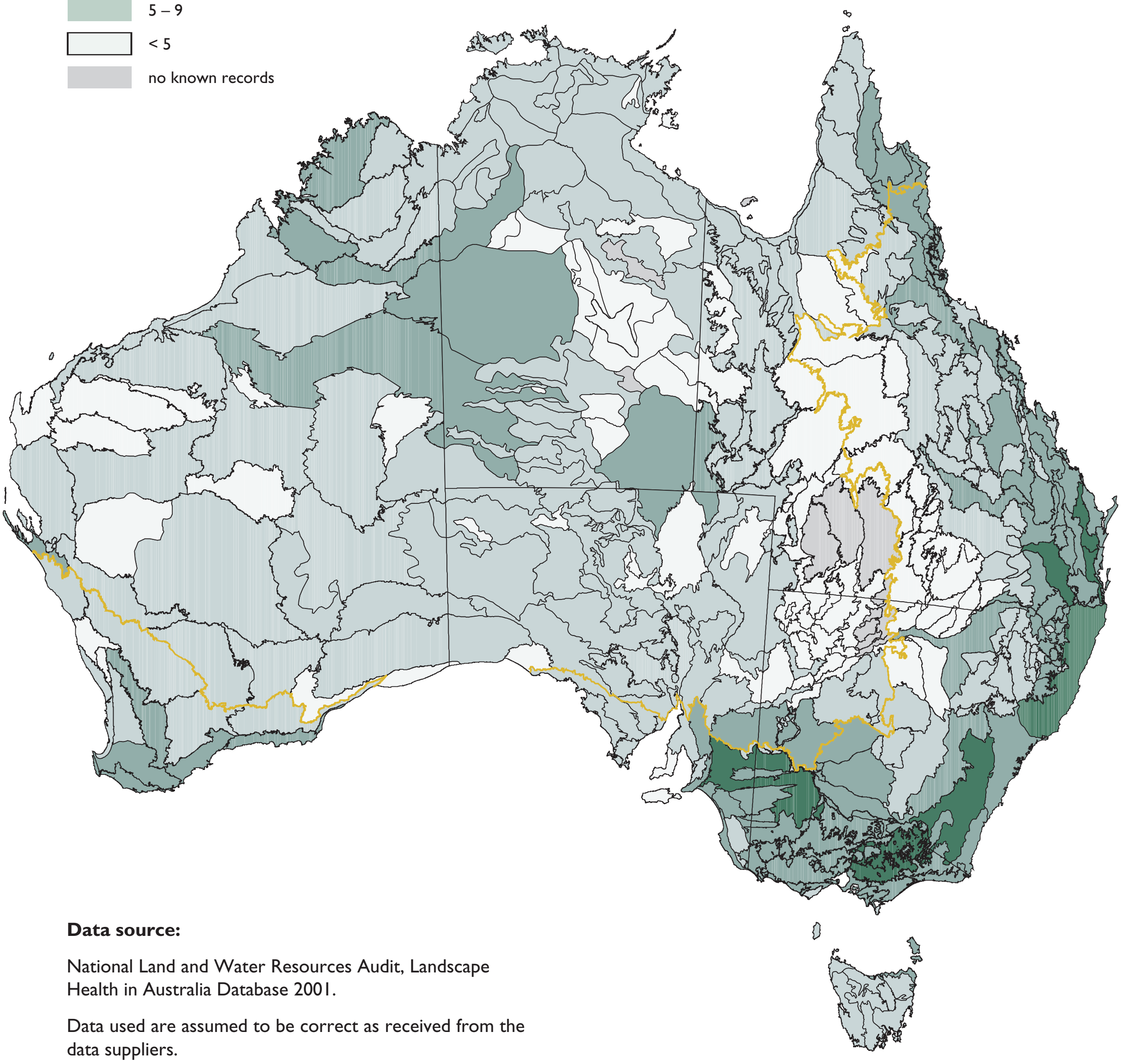


Figure 63. Known and predicted occurrence of threatened vertebrate fauna.

Total number of species

- intensive use zone/extensive use zone boundary
- > 19
- 10 – 19
- 5 – 9
- < 5
- no known records



Data source:

National Land and Water Resources Audit, Landscape Health in Australia Database 2001.

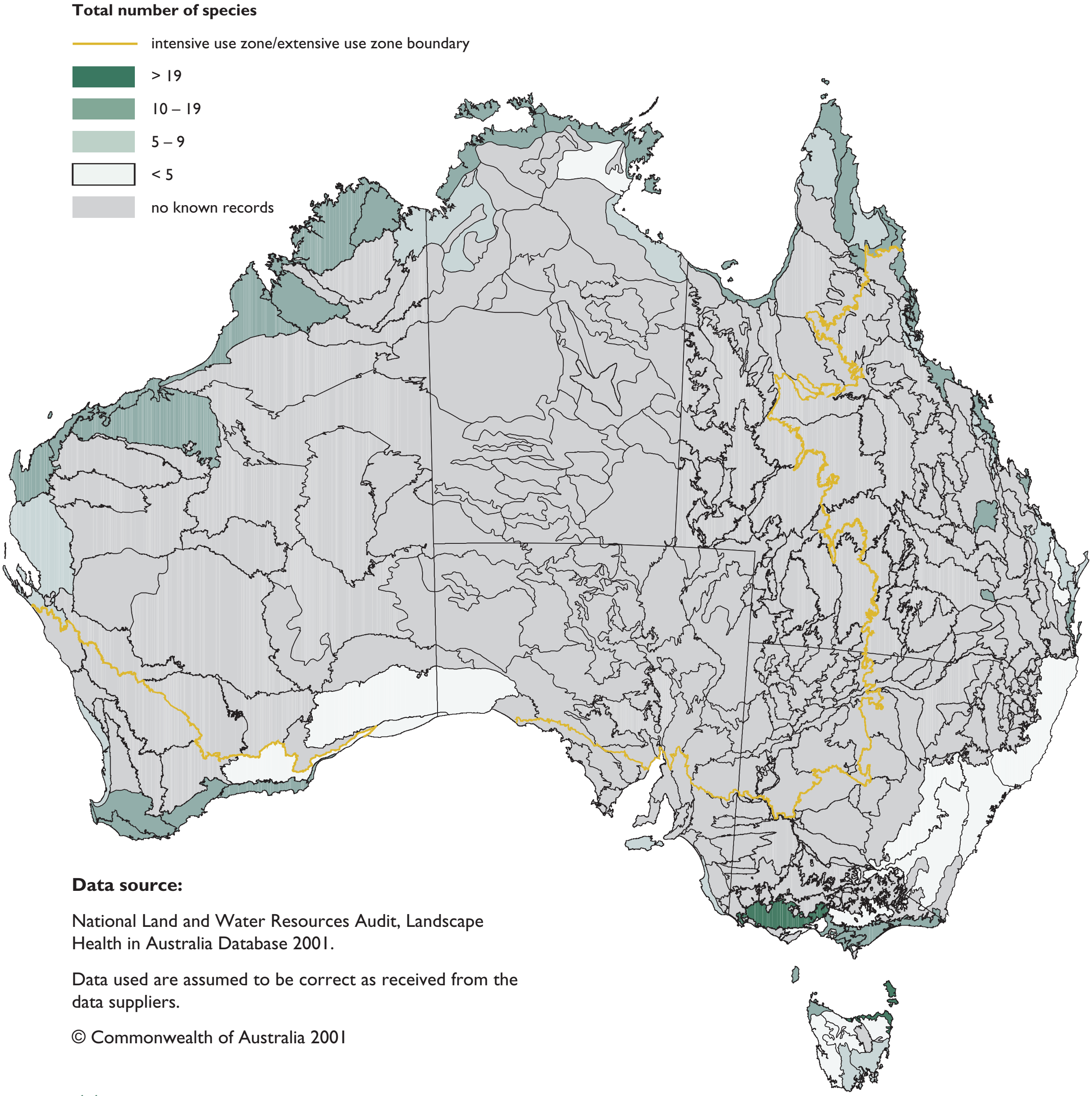
Data used are assumed to be correct as received from the data suppliers.

Threatened marine and pelagic vertebrate animals

Threatened marine and pelagic vertebrate animals include those that spend some time of their life cycle on the continent or on nearby islands.

More threatened species are found around the northern coast of Australia between Shark Bay and Fraser Island, in south-west Western Australia, and south-east Victoria. The highest numbers are found along the coastal parts of the Victorian Volcanic Plains and King Island (Figure 64).

Figure 64. Known and predicted occurrence of marine and pelagic threatened vertebrate fauna.



Data source:

National Land and Water Resources Audit, Landscape Health in Australia Database 2001.

Data used are assumed to be correct as received from the data suppliers.

2. TREND ATTRIBUTES

Current rates of clearing of native vegetation

At the time of this assessment national maps of native vegetation clearing were only available for the period 1980–1995. They are the 1980 to 1990 Land Cover Change data (Graetz et al. 1995) and the 1990–1995 Agricultural Land Cover Change data set (Kitchin & Barson 1998). Clearing rates are readily available for all States and Territories up until 1995. Additional data is available for Tasmania until 1997 and for Queensland until the present.

This attribute is assessed only for the intensive use zone. Clearing rates were determined for each State where subregions extended across more than one jurisdiction.

- Victoria and South Australia have had only limited clearing since 1987.
- Broadscale clearing for agriculture in Western Australia decreased markedly during the 1990s and has now essentially ceased.
- Extensive clearing is now limited mainly to Queensland, New South Wales and Tasmania and parts of the Northern Territory.

Table 2. Area of woody native vegetation cleared each year (1990 to 1995) in the intensive use zone by jurisdiction.

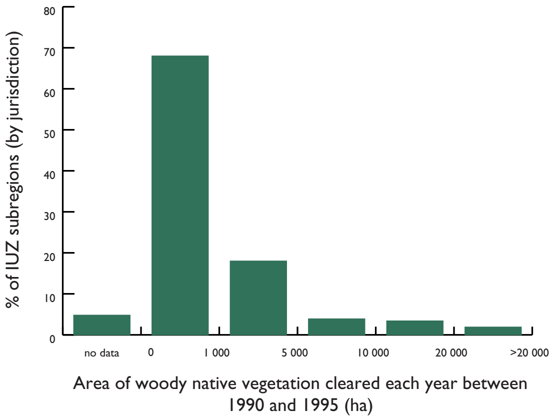
State	No. subregions >1000 ha/yr	No. subregions >10 000 ha/yr	Total cleared ha/yr in intensive use zone	% total ha/yr cleared in intensive use zone
New South Wales	3	0	19 483	5.5
Queensland	40	10	280 209	79.5
South Australia	0	0	285	0.1
Tasmania	1	0	4 345	1.2
Victoria	4	0	8 101	2.3
Western Australia	8	1	40 373	11.4
Total cleared ha/pa	**325 997**	**192 072**	**352 798**	

Area of woody native vegetation cleared each year between 1990 and 1995

The Agricultural Land Cover Change (Kitchin & Barson 1998) study did not identify clearing in native vegetation with a projective foliage cover less than 20%, such as open woodlands and shrublands and hence underestimated clearing in most States (Figures 65, 66; Table 2).

- In New South Wales widespread clearing occurred in more open vegetation along the western parts of the wheat belt (e.g. between 1994 and 1996 there was an average of 11 130 ha cleared each year on the Moree 1:250 000 map sheet alone [NSW NPWS 2000]).
- In Queensland the Agricultural Land Cover Change study recognised only 60% of the annual clearing identified by the subsequent Statewide Landcover and Trees Study (DNR 1999a), a difference of almost 111 000 ha/yr over the State.
- Approximately 2770 ha was permitted for clearing each year in South Australia over the 1990–95 period (DEH 2000), compared with 5238 ha assessed by the Agricultural Land Cover Change study.
- Between 1990 and 1995 broadscale clearing was occurring at a rate greater than 1000 ha/yr in 56 (27%) of the subregions (by jurisdiction) within the intensive use zone. The most extensive clearing identified occurred in Queensland and Western Australia, with annual clearing exceeding 10 000 ha in 10 subregions in Queensland and one in Western Australia. In Queensland clearing was focused on subregions within the eastern part of the Great Artesian Basin (including subregions of the Brigalow Belt South and the Mulga Lands bioregions) and the Brigalow Belt North bioregion. These 56 subregions contributed 92% of the total annual clearing (352 798 ha/yr) in the intensive use zone between 1990 and 1995. The 11 subregions with annual clearing exceeding 10 000 ha contributed 54% of the total clearing.

Figure 65. Area of woody native vegetation cleared each year between 1990 and 1995 in the intensive use zone.*

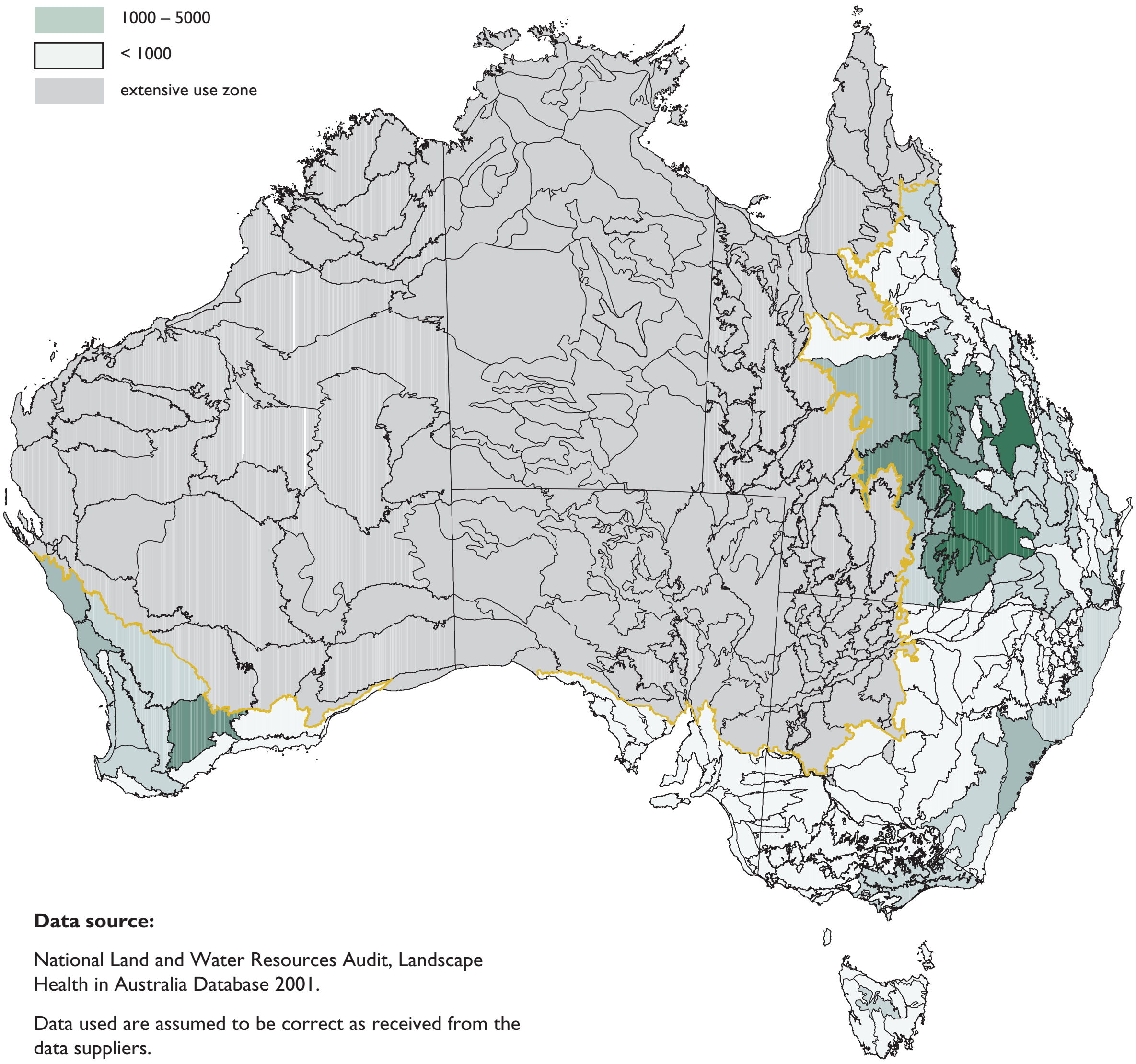


* Queensland data is from the Statewide Landcover and Trees Study (DNR 1999a). This revised Queensland data covers the period 1991 to 1995.

Figure 66. Area of woody native vegetation cleared each year between 1990 and 1995 in the intensive use zone.

Area (ha)

intensive use zone/extensive use zone boundary
> 20 000
10 000 – 20 000
5000 – 10 000
1000 – 5000
< 1000
extensive use zone



Data source:

National Land and Water Resources Audit, Landscape Health in Australia Database 2001.

Data used are assumed to be correct as received from the data suppliers.

Area of woody native vegetation cleared each year between 1995 and 1997

Mapped information on broadscale clearing between 1995 and 1997 is only readily available for Queensland (DNR 1999b) and Tasmania (Kirkpatrick pers. comm.) (Figures 67, 68). Queensland Wet Tropics data on clearing is for the bioregion as a whole, and is not readily available by subregion.

New South Wales has data on clearing of vegetation with a projective foliage cover (density of tree crowns or what satellites can see/distinguish readily) greater than 20% for this period but the data was not available for this project. An estimate is possible for South Australia based on the area given under permit, but similar data was not readily available for Western Australia and Victoria. In South Australia an average of 1310 ha clearing each year was permitted across the intensive use zone for this period (DEH 2000). Clearing in Western Australia, Victoria and the Northern Territory appears to have been of a similar magnitude. In New South Wales between 1996 and 1998 an average of 6280 ha was cleared each year on the Moree 1:250 000 map sheet alone (NSW NPWS 2000).

- In Queensland, an average of 339 662 ha was cleared each year between 1995 and 1997.
- In Tasmania, clearing averaged 78 316 ha each year (Figure 72).
- Broadacre clearing continued in almost all of the 83 subregions for which data is available within the intensive use zone of Queensland and Tasmania.
- Annual clearing rates exceeded 1000 ha/yr in 56 subregions, and exceeded 10 000 ha in 14 subregions, four of which are in Tasmania.
- Between the 1990–95 and 1995–97 periods, average annual clearing rates increased in 50 of the 84 subregions for which data is available.

As with the 1990 to 1995 period, clearing in Queensland was mostly in subregions of the Great Artesian Basin (including subregions of the Brigalow Belt South, Mulga Lands and Desert Uplands bioregions), and the Brigalow Belt North. In Tasmania clearing was most extensive in the South East, and in the Northern Midlands bioregions.

Figure 67. Area of woody native vegetation cleared each year between 1995 and 1997 in the intensive use zone in Queensland and Tasmania.

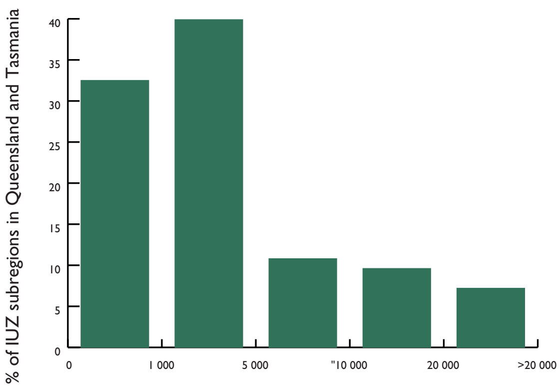
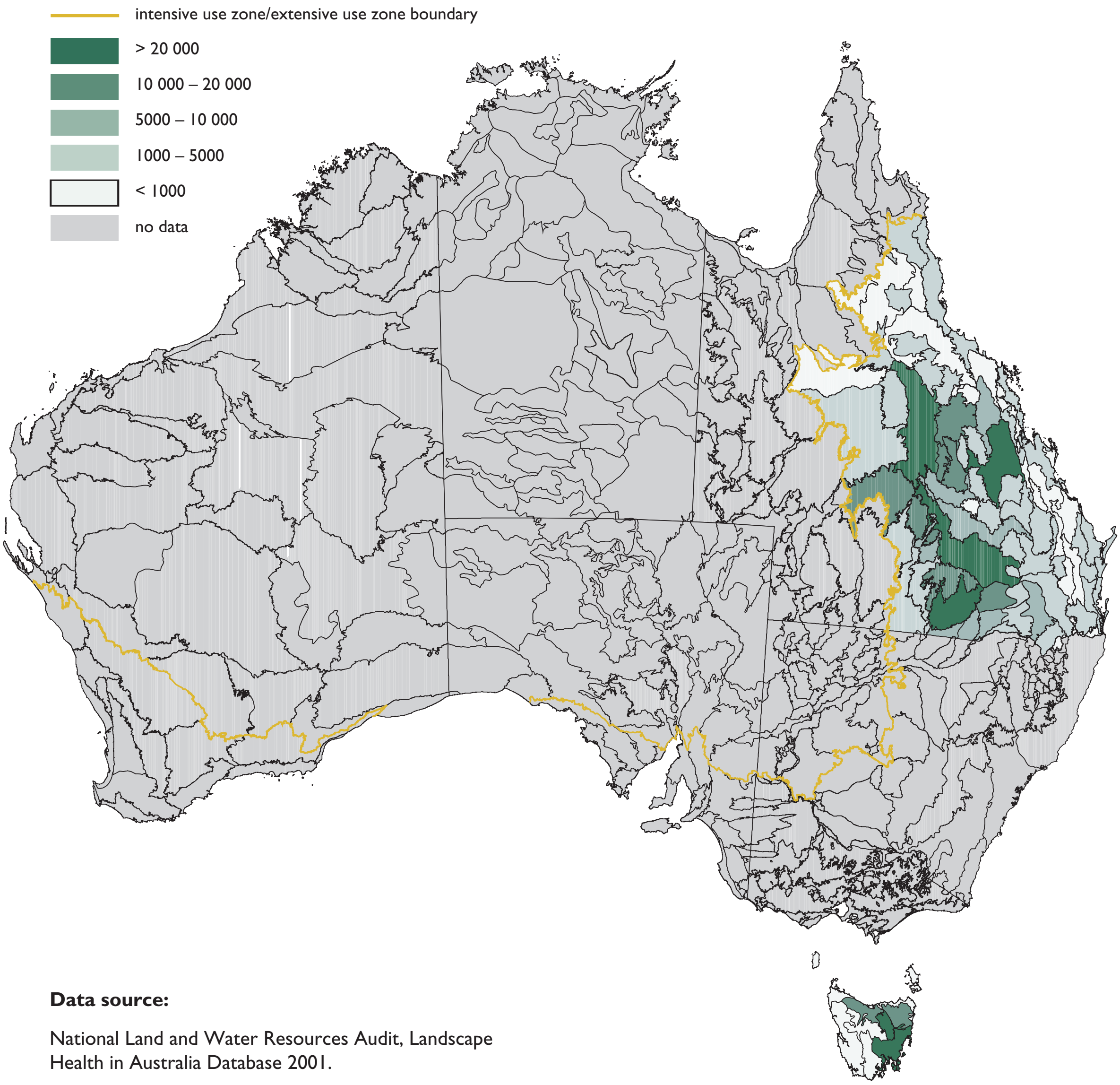


Figure 68. Area of woody native vegetation cleared each year between 1995 and 1997 in the intensive use zone in Queensland and Tasmania.

Area (ha)



Data source:

National Land and Water Resources Audit, Landscape Health in Australia Database 2001.

Data used are assumed to be correct as received from the data suppliers.

Area of woody native vegetation cleared each year (1997–1999)

Broadacre clearing had largely ceased in most jurisdictions, except for Queensland, New South Wales, Tasmania and small areas in the Northern Territory between 1997 and 1999. In South Australia an average of 613 ha/yr was permitted to be cleared across the intensive use zone for this period (DEH 2000) and a similar order of magnitude would apply to Victoria and Western Australia. Mapped information on clearing for this period is largely limited to Queensland (DNR 2000) (Figures 69, 70).

- Broadacre clearing continued in 73 of 74 Queensland subregions for which data is available.
- Annual clearing rates exceeded 1000 ha each year in 54 subregions, and exceeded 10 000 ha in 14 subregions.
- 445 683 ha was cleared on average annually in Queensland between 1997 and 1999, an increase of 106 021 ha (31%) annually on the 1995 to 1997 period.
- Clearing rates increased in 45 of the 74 Queensland subregions.

As with the 1990–95 and 1995–97 periods, this clearing was mostly in subregions of the Great Artesian Basin and the Brigalow Belt North.

Figure 69. Area of woody native vegetation cleared each year between 1997 and 1999 in the intensive use zone in Queensland .

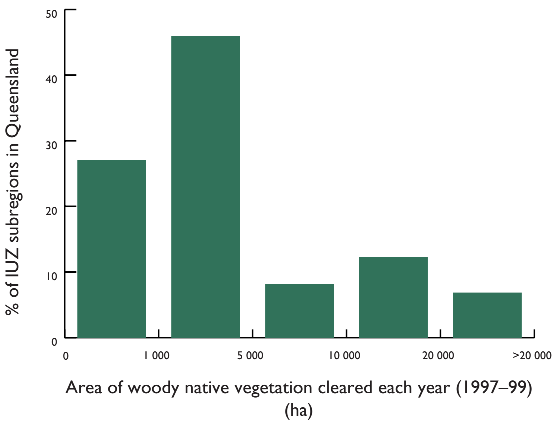
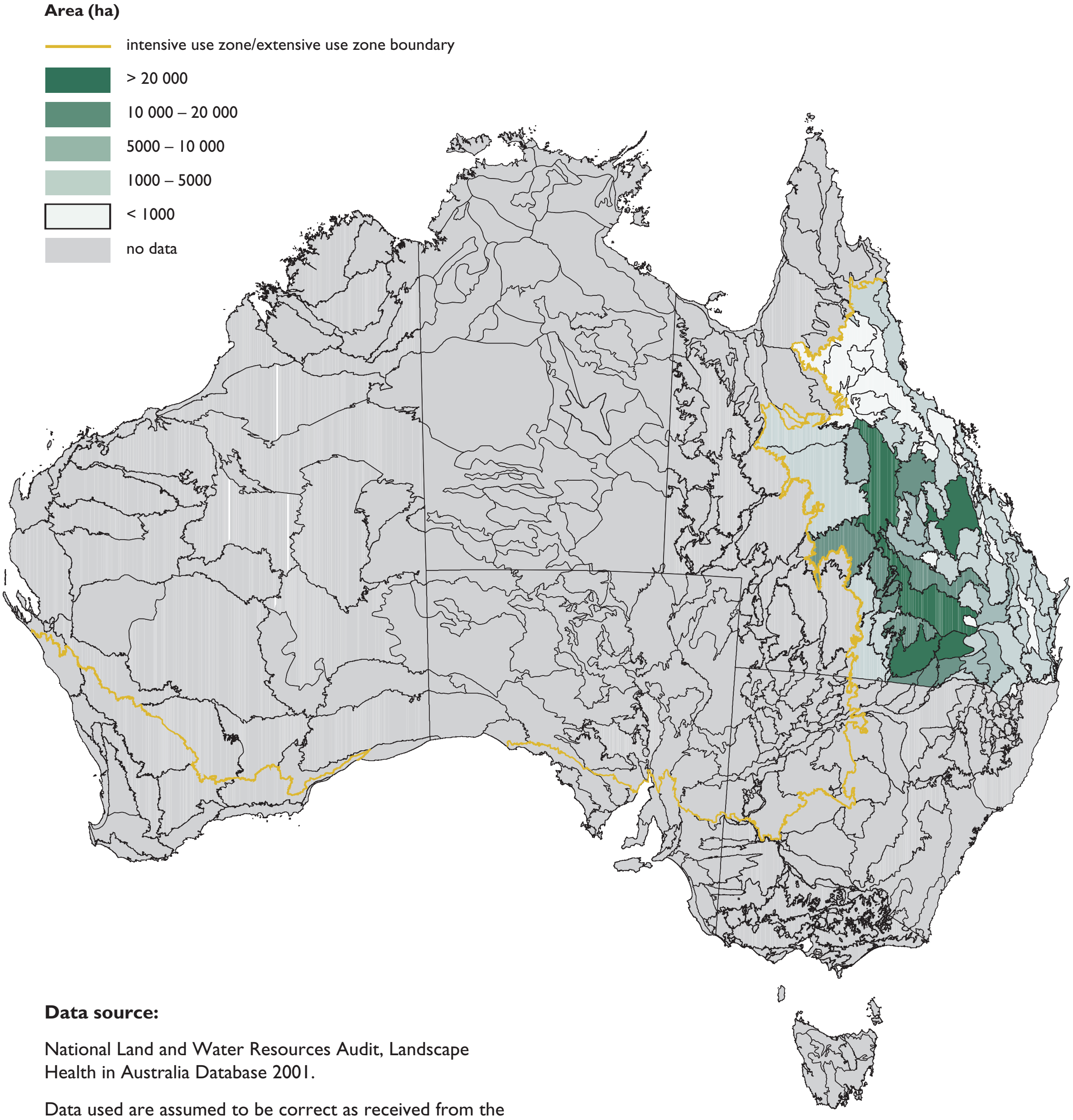


Figure 70. Area of woody native vegetation cleared each year between 1997 and 1999 in the intensive use zone in Queensland.



Data source:

National Land and Water Resources Audit, Landscape Health in Australia Database 2001.

Data used are assumed to be correct as received from the data suppliers.

Change in annual rate of clearing between 1995–97 and 1997–99

The change in annual rate of clearing during this period can only be determined for Queensland, where regular and consistent mapping of the extent of native vegetation is available from the Statewide Landcover and Trees Study (DNR 1999a, 1999b, 2000). This attribute was derived by comparing the average annual clearing rates of the two periods 1995–97 and 1997–99 (Figures 71, 72).

Clearing occurred in 70 of 73 subregions for which data is available. The rate of clearing was increasing in 40 of these, including almost all of the subregions in the Queensland part of the Murray–Darling basin, the southern subregions of the Brigalow Belt North bioregion, the Desert Uplands bioregion, and the acacia woodlands along the eastern margin of the Mitchell Grass Downs bioregion. Clearing was also increasing in the Cape River Hills and Townsville Coastal Plains subregions in the far north of the Brigalow Belt North bioregion.

Figure 71. Change in annual rate of clearing 1995–97 and 1997–99 in the intensive use zone in Queensland.

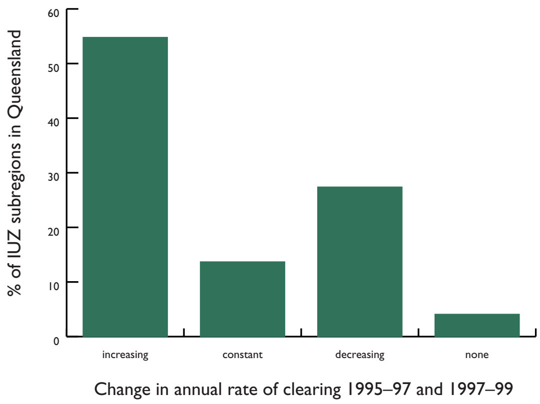
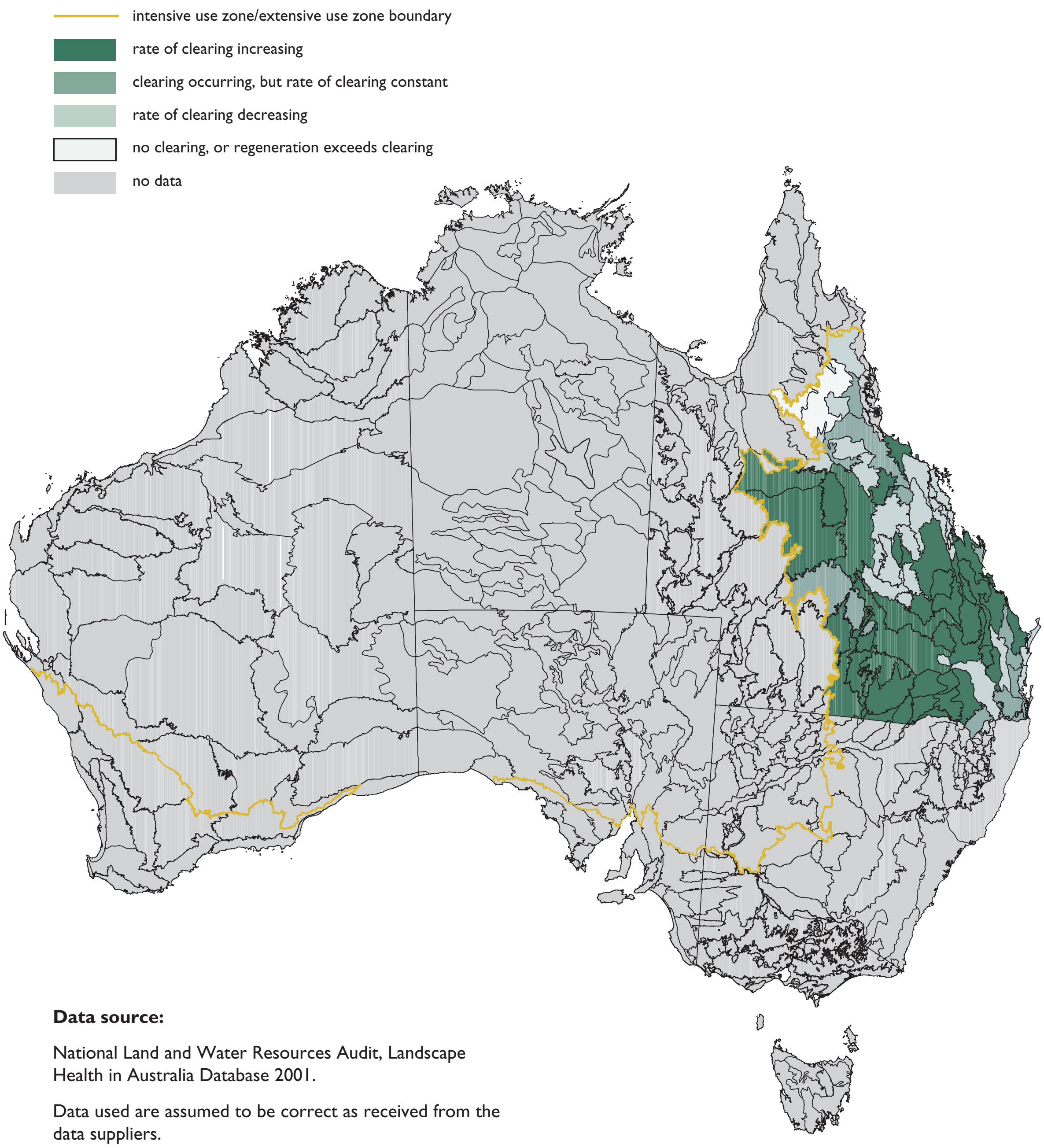


Figure 72. Change in annual rate of clearing 1995–97 and 1997–99 in the intensive use zone in Queensland.



Data source:

National Land and Water Resources Audit, Landscape Health in Australia Database 2001.

Data used are assumed to be correct as received from the data suppliers.

Trends in dryland salinity

Predicted area of subregion affected by dryland salinity in 2050

The national assessment of dryland salinity extent compiled by the Audit (see extent of dryland salinity risk or hazard p. 21) produced predictions of the extent of high dryland salinity risk or hazard for 2050. This coverage was intersected by subregions to examine the implications of 2050 predictions for specific subregional landscapes. (Figures 73, 74, 75, 76, 77, 78, 79, 80).

- 32 subregions (18%) are expected to have a high risk or hazard of dryland salinity over more than 10% of their area by 2050. Ten subregions (5%) are currently in that condition.
- 13 subregions (7%) are expected to have a high risk or hazard of dryland salinity over more than 30% of their area by 2050. One subregion (0.5%) is currently in that condition.

The major part of this predicted increase in extent will be in south-west Western Australia. where

- eight of the 13 Western Australian subregions in the intensive use zone are predicted to have greater than 30% of their area affected by a high risk of dryland salinity, and another three will have greater than 10% affected.
- Recherche will be the worst affected subregion, which is predicted to have a high risk of dryland salinity over 67% of its area by 2050.
- Four subregions in south-west Western Australia will have a high risk of dryland salinity over more than 40% of their area. These are the Dandarragan Plateau, the northern and southern subregions of the Jarrah Forest bioregion, and the Perth subregion.

Figure 73. Percentage of subregion predicted to have high dryland salinity risk or hazard in 2050 in the intensive use zone.

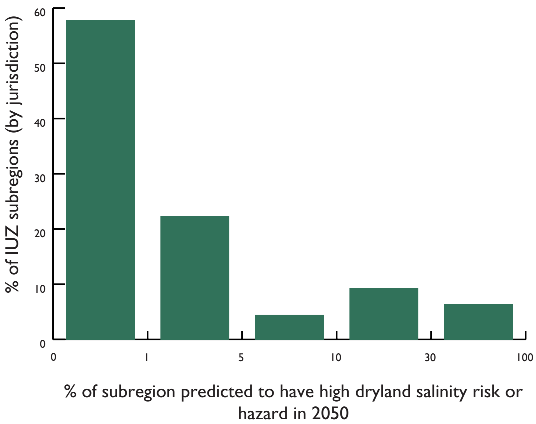
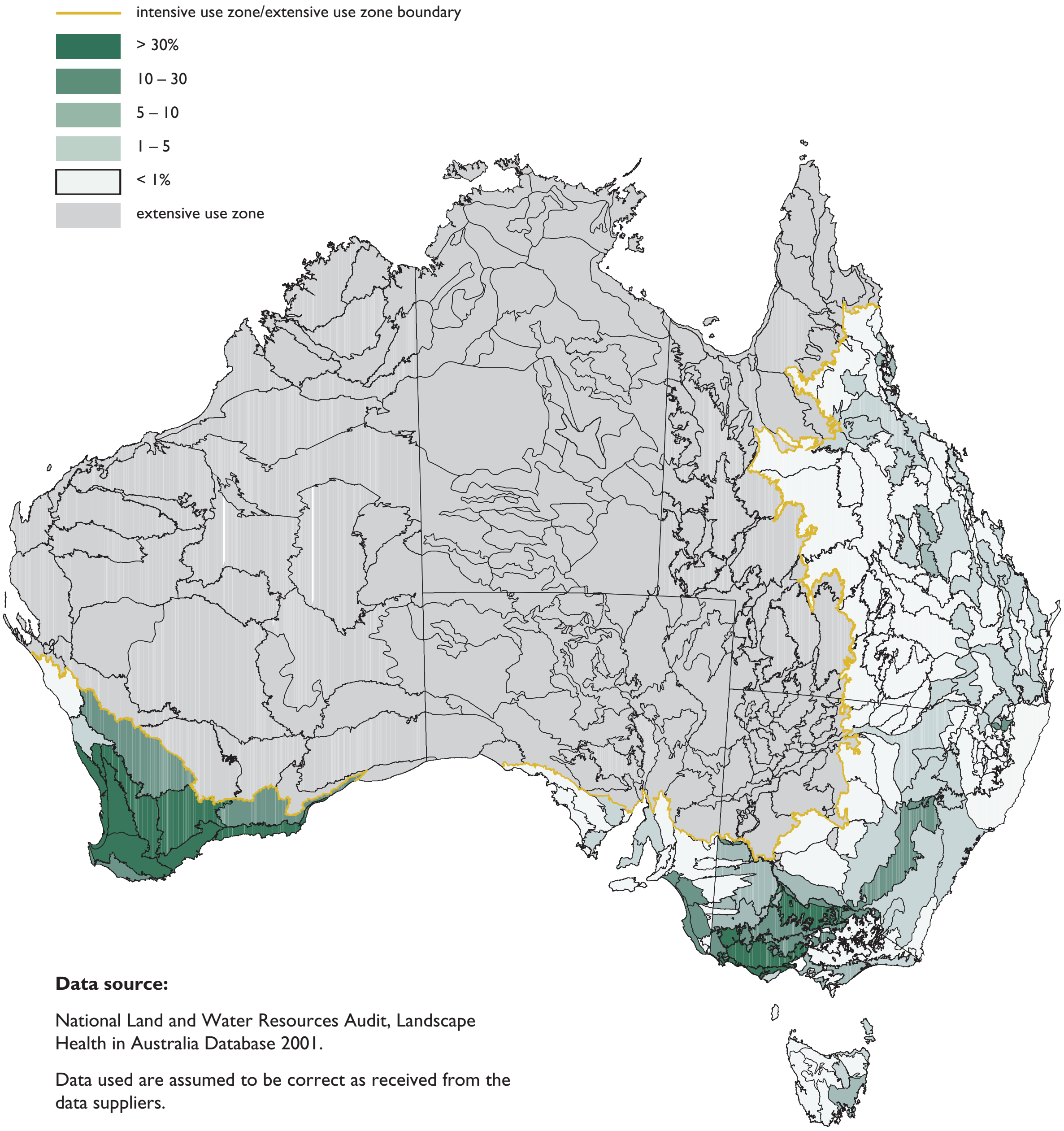


Figure 74. Percentage of subregion predicted to have high dryland salinity risk or hazard in 2050 in the intensive use zone.



Data source:

National Land and Water Resources Audit, Landscape Health in Australia Database 2001.

Data used are assumed to be correct as received from the data suppliers.

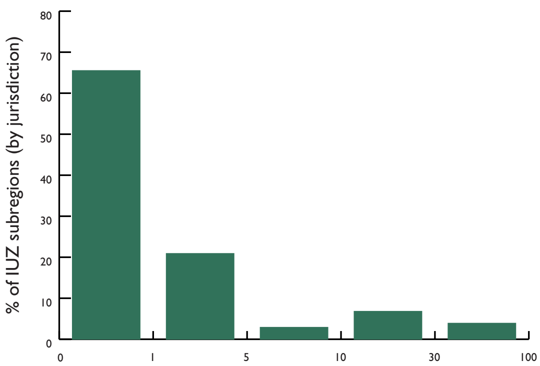
By 2050 almost 30% of the total area of the intensive use zone in Western Australia is predicted to be at high risk of dryland salinity.

Victoria is predicted to be the State next worst affected, with five of its subregions expected to have a high risk of dryland salinity over more than 30% of their area.

- The Dundas Tablelands and the Otway Plain will be the most extensively affected, with 66% and 40% respectively of their areas predicted to be at high risk of dryland salinity by 2050.
- By 2050 almost 14% of the total area of Victoria will be affected by a high risk of dryland salinity.

Other subregions predicted to have a high risk of dryland salinity will be all those of the Naracoorte Coastal Plain bioregion near the mouth of the Murray River, and the Upper Slopes subregion of the New South Wales South Western Slopes bioregion.

Figure 75. Percentage of native vegetation in subregion predicted to have high dryland salinity risk or hazard in 2050 in the intensive use zone.



Predicted area of remnant vegetation affected by dryland salinity in 2050

The predicted extent of dryland salinity risk or hazard can also be used with the current extent of native vegetation to predict the extent of native vegetation likely to be affected by increasing dryland soil salinity. Analysis for this attribute assumes there will be no significant changes in land use or in the extent of native vegetation between now and 2050.

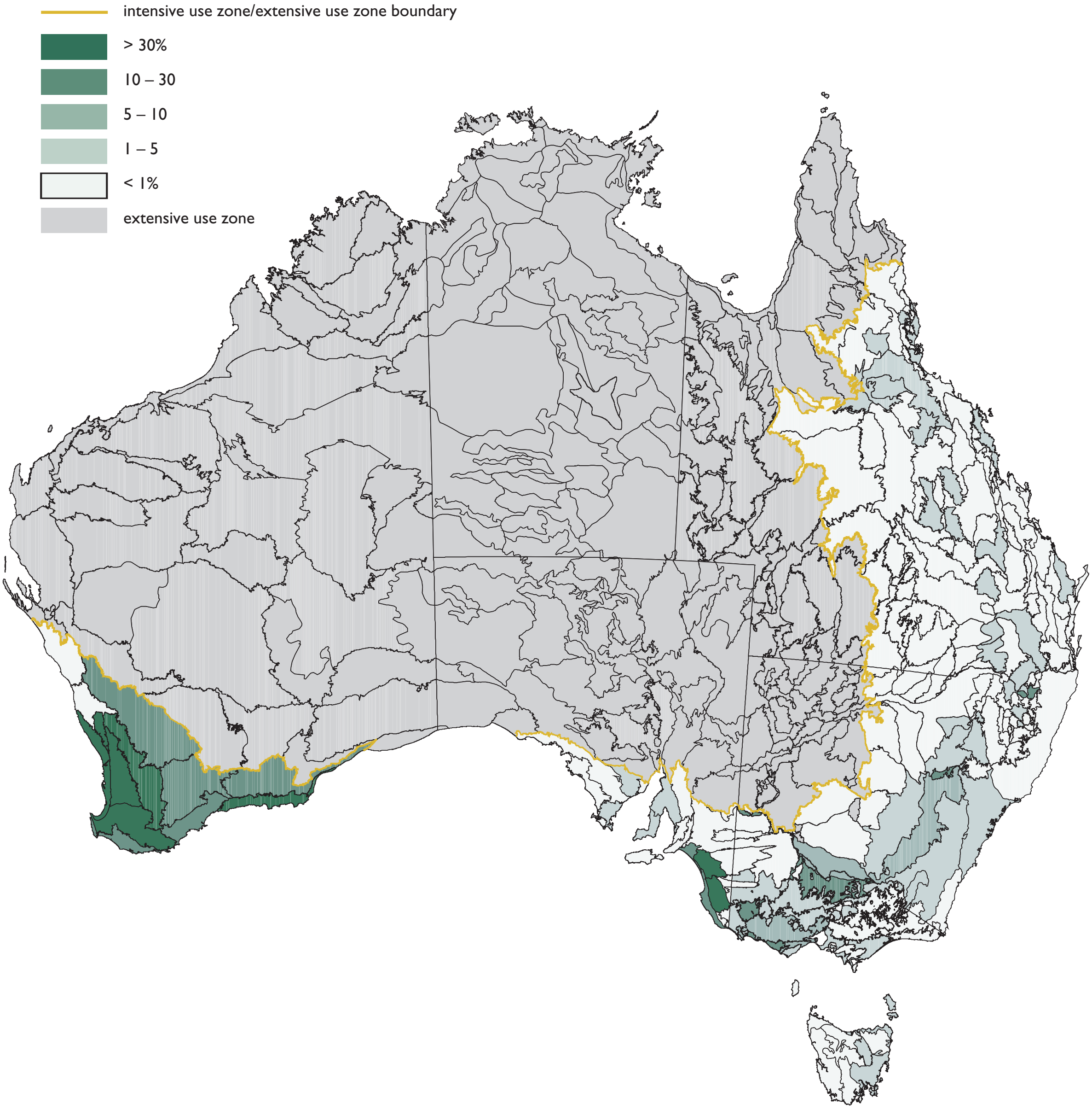
It is predicted that by 2050:

- twenty-two subregions will have more than 10% of their native vegetation threatened by high dryland salinity risk, compared with nine at present;
- half of the 22 are in south-west Western Australia, while South Australia and Victoria both have four, and three are in New South Wales;
- eight subregions will have greater than 30% of their remaining native vegetation affected by a high risk of dryland salinity, six of which are in Western Australia. The other two are the Lucindale and Tintinara subregions of the Naracoorte Coastal Plain bioregion near the mouth of the Murray River.

The greatest areas of native vegetation at risk from high dryland salinity by 2050 are in south-west Western Australia.

- Over 22% of the total remaining native vegetation in the intensive use zone in Western Australia is likely to be affected by a high risk of dryland salinity by 2050.
- The Perth subregion is predicted to have the greatest proportion of native vegetation affected by a high risk of dryland salinity by 2050, with 47% of its remaining native vegetation affected.
- The southern subregion of the Avon Wheatbelt is the next most threatened, with almost 42% of its native vegetation threatened by high dryland salinity risk by 2050.

Figure 76. Percentage of native vegetation in subregion predicted to have high dryland salinity risk or hazard in 2050 in the intensive use zone.



Salinity trends in subregions and remnant vegetation

The trend in high dryland salinity risk or hazard between 2000 and 2050 for subregions as a whole, and for the remaining native vegetation, is similar.

- High dryland salinity risk or hazard is expected to increase in extent in 160 (88%) subregions in the intensive use zone, and the extent of native vegetation affected is also expected to increase in 159 subregions (87%).
- Dryland salinity will remain constant in remaining 22 subregions (12%), with no subregions expected to show decreasing dryland salinity.

Figure 77. Trend in high dryland salinity risk or hazard in subregion between 2000 and 2050 in the intensive use zone.

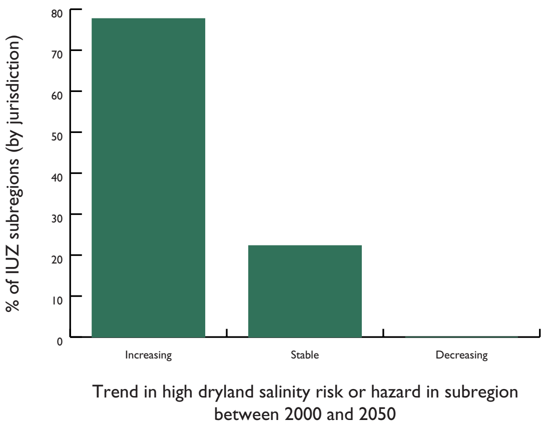


Figure 78. Trend in high dryland salinity risk or hazard in native vegetation between 2000 and 2050 in the intensive use zone.

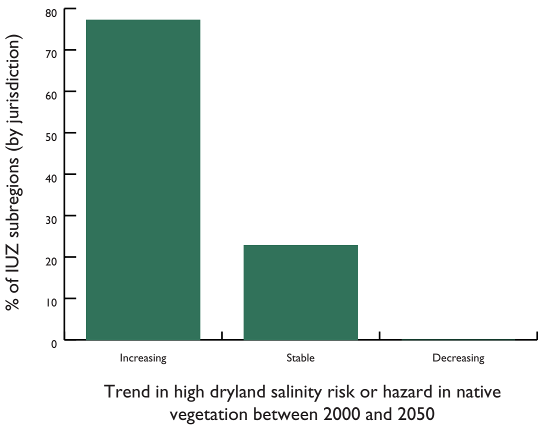
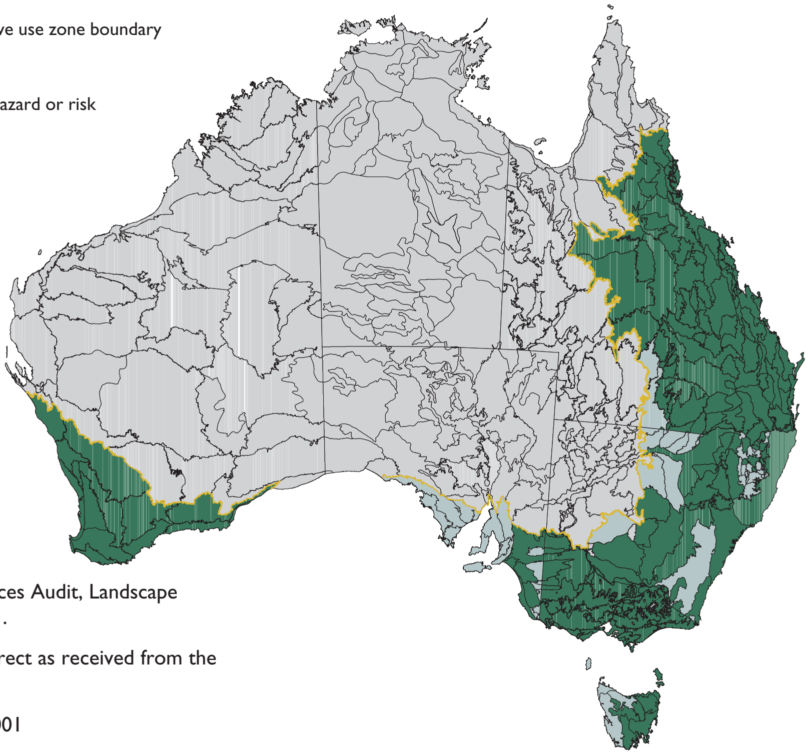


Figure 79. Trend in high dryland salinity risk or hazard in subregion between 2000 and 2050 in the intensive use zone.

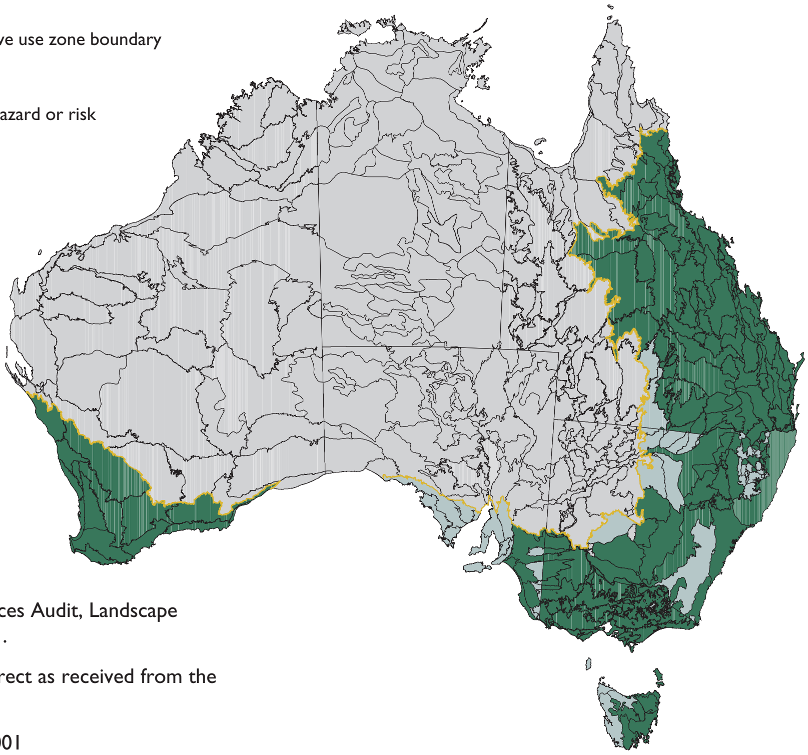


Data source:

National Land and Water Resources Audit, Landscape Health in Australia Database 2001.

Data used are assumed to be correct as received from the data suppliers.

Figure 80. Trend in high dryland salinity risk or hazard in native vegetation between 2000 and 2050 in the intensive use zone.



Data source:

National Land and Water Resources Audit, Landscape Health in Australia Database 2001.

Data used are assumed to be correct as received from the data suppliers.

Inappropriate fire regimes

Fire is clearly an issue of national significance for biodiversity. Analysis is required at the scale of individual tenures, ecosystems and species. Recent studies in northern Australia indicate the urgent need for this analysis (Russel-Smith 2001).

Perceptions of change in landscape health due to altered fire regimes differ greatly between experts. Species-level information is required as an indicator, but is lacking for much of Australia. Expert assessment alone was considered to be too variable for spatial representation. Some general observations about the potential effects of fire are provided to give insight into the major issues.

Northern Australia

In the dry and wet/dry tropics, issues largely relate to:

- intensity and frequency of fires; and
- the area that single fires can cover.

Many fires occur in the late dry season and are consequently very hot, killing young perennials. In better watered areas, grass density increases at the expense of woody and fire sensitive species—compounded by fires occurring annually or biennially. In drier or sandier areas, a net loss of organic matter results in an associated decline in ecosystem productivity. Where ecosystems are steadily invaded by introduced pasture species (e.g. buffel grass) a spiralling loss of biodiversity due to increasing fire intensities and species competition can occur.

In the more heavily grazed parts of the tropics (e.g. the northern part of the intensive use zone in Queensland and in the arid pastoral zone of Western Australia) climatic variation, the absence of sufficient ground cover to carry a fire and a move away from using fire in land management is enabling extensive regeneration of woody species. The denser shrub and lower tree stories further reduce the amount of grasses, compounding the degradation. In parts of the intensive use zone in Queensland the increasing density of woody species is a significant factor stimulating tree clearing.

Southern Australia

In the main cropping and grazing areas, fire is rarely used intentionally as a landscape management tool. Fire dependent species, and ecosystem health in general, are being adversely affected. Where the native vegetation remains as small and isolated remnants, fire cannot readily be used as a management tool due to weed invasion and potential effects on small and often stressed populations of plants and animals. Where fire is intentionally used for management (most commonly in conservation reserves and forestry reserves) there is often disagreement over appropriate regimes. In many cases a risk reduction objective for fire management requires repetitive and frequent cool burns, although some ecosystems (e.g. heaths) reach maximum biodiversity after at least a decade without fire. In some ecosystems periodic crown fire is desirable (e.g. to control mistletoe and facilitate the creation of tree hollows through branch dieback). Responses of individual species vary greatly too (e.g. some plant species depend on seedling production to maintain populations; where fires occur at rates more frequent than the period they require to reach maturity, these plants face a high probability of being loss from the community).

3. SYNTHESIS: LANDSCAPE STRESS

Deriving stress classes

The grouping of the 354 subregions into intensive and extensive use zones reflects continental scale difference in climate and land use potential. Any synthesis of the information collated for this project must assess the two zones separately. Subregions in the intensive use zone have a history of land use intensification, including clearing, pasture development, cropping and plantation establishment. Assessment of general landscape health in this zone must separate the cleared and developed areas from the undeveloped areas. The biodiversity component of landscape health in the intensive use zone relates largely to the extent, distribution and condition of the remaining native vegetation, and these reflect also in the health of the subregion as a whole. In the extensive use zone native vegetation is essentially continuous at the scale of this study. Biodiversity and landscape health are inextricably entwined across each subregion.

The particular condition and trend attributes used to provide a synthesis of landscape health were nominated by the project working group and the resulting measure called 'landscape stress'. The attributes used to derive these landscape stress ratings for the intensive use zone and the extensive use zone are shown in Table 3.

Where subregions crossed jurisdictional boundaries and value of the attribute differed between jurisdictions, a single class was derived for the subregion that reflected the relative extent of the subregion in each jurisdiction.

Intensive use zone

The decision table used to determine landscape stress is shown in Figure 81. The initial stress rating was based on the relative classes of vegetation extent, fragmentation, condition and percentage of subregional ecosystems threatened. These attributes were considered by the working group to be (within the attributes available) the primary determinants of remaining biodiversity. Other attributes were considered by the working group to reflect the major threatening processes on remaining biodiversity and were simplified to a high or low rating, which increased the stress rating by one in the case of the former, or had no impact, in the case of the latter. The different attributes were unweighted. Stress ratings for subregions of the intensive use zone are presented in Appendix 3.

Table 3. Attributes used to create the landscape stress rating. Attributes are arranged to indicate broad correlation in the attributes between intensive use zone and extensive use zone.

Intensive use zone	Extensive use zone
Current extent of native vegetation	Percent of subregion with least impact from total grazing pressures
Connectivity of native vegetation	
Percent of native vegetation in land tenures associated with conservative land use practices.	Percent of native vegetation in land tenures associated with conservative land use practices
Percent of ecosystems threatened	No equivalent attribute
Percent of native vegetation with high dryland salinity	No equivalent attribute
Density of weeds	Density of weeds
Density of feral animals	Density of feral animals
Number of threatened species	Number of threatened species

Figure 81. Decision tree table for determining an intensive use zone subregion landscape stress class. Attributes are hierarchical. Those used earlier in the assessment are considered more important and have a greater influence in determing the final landscape stress class.

Values recorded for condition attributes assessed, sequentially determine the interim stress class of a subregion. Poor condition attribute scores move the interim stress class to a higher stress class and condition attribute scores indicative of good landscape health can reduce the interim landscape stress class.

c1 extent of native vegetation class	**Interim stress class 1**	c4 continuity in native vegetation class	**Interim stress class 2**	c3b conservative land use class	**Interim stress class 3**	c8a threatened ecosystems class	**Interim stress class 4**
1	**3**	1,2	**3**	1,2,3	**3**	1,2	**2**
						3,4,5,6	**3**
2	4	1	**3**	1,2,3	**3**	1,2	**2**
						3,4,5,6	**3**
		2,3,4	**4**	1	**3**	1,2	**2**
						3,4,5,6	**3**
				2	**4**	1,2	**3**
						3,4	**4**
						5,6	**5**
				3,4,5,6	**5**	1,2	**4**
						3,4,5,6	**5**
3	**5**	2	**4**	1,2	**4**	1,2,3	**4**
						4,5,6	**5**
				3,4,5,6	**5**	1,2,3	**4**
						4,5,6	**5**
		3,4	**5**	1	**4**	1,2,3	**4**
						4,5,6	**5**
				2,3	**5**	1,2,3	**4**
						4,5,6	**5**
				4,5,6	**6**	1,2,3	**5**
						4,5,6	**6**
4,5,6	**6**	2	**5**	1	**4**	1,2,3	**4**
						4,5,6	**5**
				2,3	**5**	1,2,3	**4**
						4,5,6	**5**
				4,5,6	**6**	1,2,3	**5**
						4,5,6	**6**
		3,4,5	**6**	1,2	**5**	1,2	**4**
						3,4	**5**
						5,6	**6**
				3,4,5,6	**6**	1,2,3	**5**
						4,5,6	**6**

c7a weed density summary* class	**Interim stress class 5**	c5b salinity risk/ hazard in native vegetation summary* class	**Interim stress class 6**	c7a feral vertebrate density summary* class	**Interim stress class 7**	c8bc number threatened species summary* class	**Intensive use zone landscape stress class**
high density, increase interim stress class 4 by one		high risk or hazard, increase interim stress class 5 by one		high density, increase increase interim stress class 6 by one interim stress class 7 by one		high number, increase increase interim stress class 7 by one	
low density, no change to interim stress class 4		low risk or hazard, no change to interim stress class 5		low density, no change to interim stress class 6		low number, no change to interim stress class 7	

Extensive use zone

The decision table used to determine landscape stress in the extensive use zone is shown in Figure 82. Initial stress ratings were based on the relative classes of the percent of a subregion within grazing impact classes and the percent of a subregion's native vegetation in land tenures associated with conservative land uses. These attributes broadly indicate the relative grazing intensities and consequent likely impacts on biodiversity across subregions. They were considered by the working group to be primary determinants of remaining biodiversity. Other attributes including distribution and density of introduced weed species, distribution and density of introduced vertebrate species, threatened plants and threatened vertebrate animals were considered by the working group to reflect the major threatening processes on remaining biodiversity. They were simplified to a high or low rating, which increased the stress rating by one in the case of the former, or had no impact, in the case of the latter. The different attributes were unweighted. Extensive use zone stress ratings are shown in Appendix 3.

Figure 82. Decision tree table for determining an extensive use zone subregion landscape stress class. Attributes are hierarchical. Those used earlier in the assessment are considered more important and have a greater influence in determing the final landscape stress class.

Values recorded for condition attributes assessed, sequentially determine the interim stress class of a subregion. Poor condition attribute scores move the interim stress class to a higher stress class and condition attribute scores indicative of good landscape health can reduce the interim landscape stress class.

c3a least grazing impact class	**Interim stress class 1**	c3b conservative land use class	**Interim stress class 2**	c7a weed density summary* class	**Interim stress class 3**	c7b feral vertebrate density summary* class	**Interim stress class 4**	c8bc number threatened species summary* class	**Extensive use zone landscape stress class**
1	**2**	1,2,3,4,5,6	**2**	high density, increase interim stress class 2 by one		high density, increase interim stress class 3 by one		high numbers, increase interim stress class 4 by one	
2	**3**	1	**2**						
		2	**3**						
		3,4,5,6	**4**						
3	**4**	1,2	**3**	low density, no change to interim stress class 2		low density, no change to interim stress class 3		low numbers, no change to interim stress stress class 4	
		3,4,5,6	**4**						
4,5,6	**5**	1,2	**4**						
		3,4,5	**5**						

* Summary class data used in the decision tables for landscape stress classification is listed in the Australian Natural Resource Data Library but is not presented in Appendix 3 due to coverage and scale limitations at the subregional level.

Continental landscape stress

As the landscape stress ratings were derived for intensive and extensive use zones using slightly different information, landscape stress ratings derived for one cannot be directly compared with those derived for the other. To create a single continental assessment of landscape stress across the two zones, approximate equivalence between the five stress classes used in the extensive use zone and the six used in the intensive use zone wa assumed. The zone equivalence of these six continental stress classes, are shown in Table 4.

The intensive use zone contains the most degraded landscapes—37 subregions in the two highest landscape stress ratings having less than 30% of the original extent of their native vegetation remaining. This occurs mainly as small and discontinuous remnants, only a small proportion of which are managed conservatively. More than two-thirds of the ecosystems representative of these subregions have lost more than 70% of their original extent and are now at risk of collapse or total loss. There are no subregions in the extensive use zone that are in such poor health.

Subregions in the intensive use zone in the third highest landscape stress class usually have between 30% and 50% of the original extent of their native vegetation remaining, and although this is relatively fragmented, it has been cleared in such a way that moderate areas of most of the original ecosystems remain. The overall health of ecosystems in these subregions approximates that of the most heavily used subregions of the extensive use zone (those in the two highest extensive use zone stress classes), where although there has been little or no clearing, more than 70% of their area typically has a history of relatively high total grazing pressures. Decreasing grazing pressures in subregions in the remaining extensive use zone stress classes roughly correspond to decreasing land use pressures in the remaining intensive use zone stress classes.

The results of collating the intensive use zone and extensive use zone stress ratings into the continental stress rating are summarised in Figures 83 and 84.

Figure 83. Continental landscape stress.

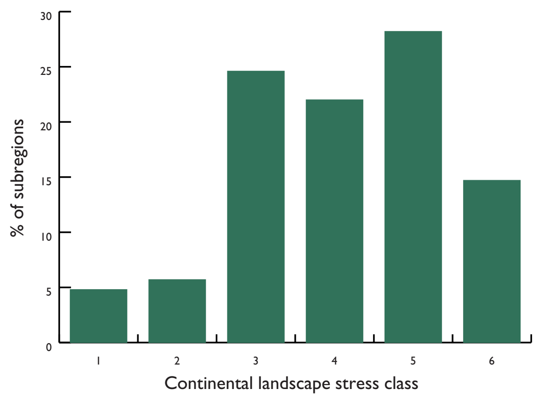
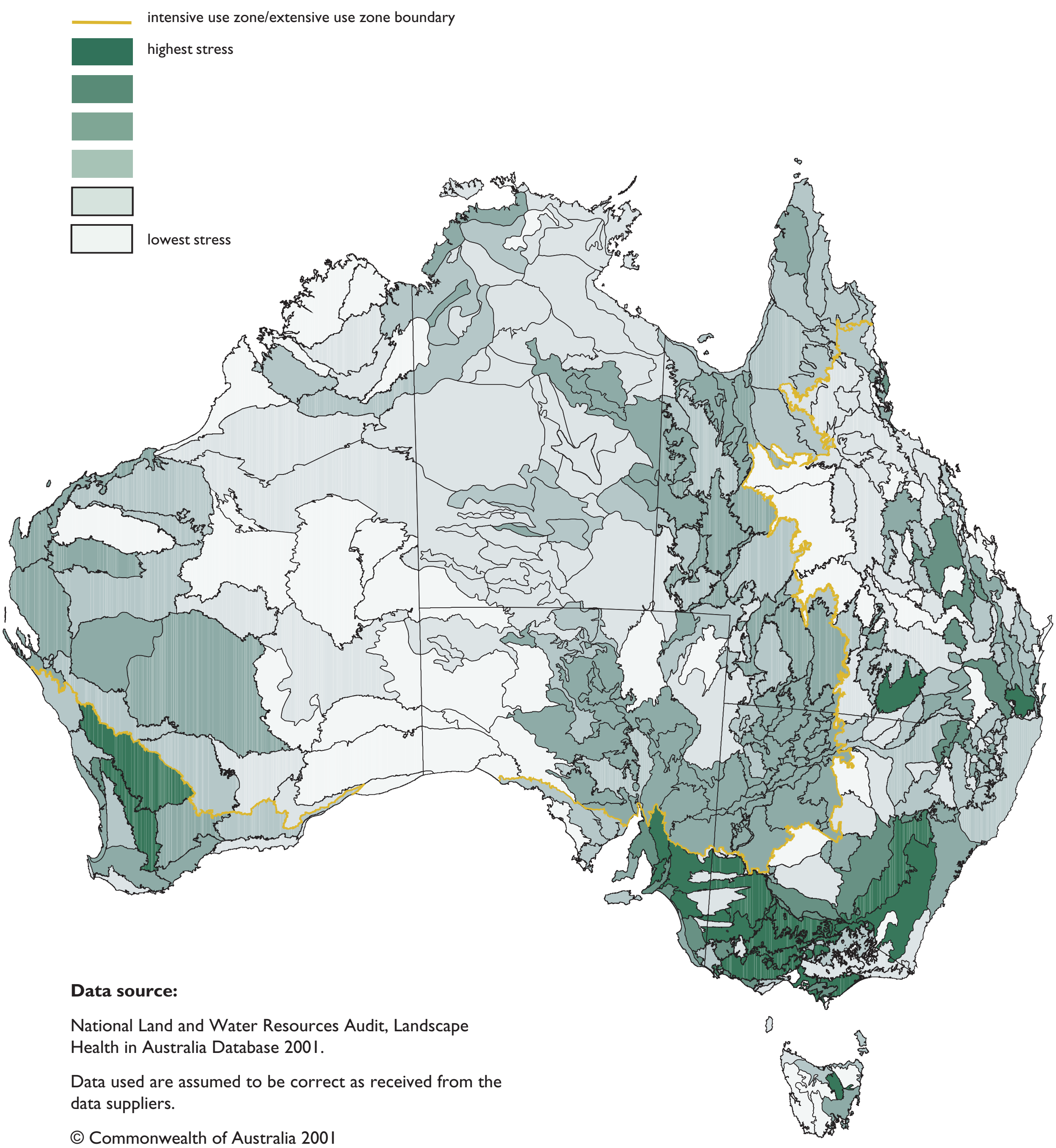


Table 4. Equivalence between the continental landscape stress classes and the intensive use zone and extensive use zone landscape stress classes

Continental stress classes		Intensive use zone stress classes	Extensive use zone stress classes
1	most stressed	1	–
2		2	–
3		3	1,2
4		4	3
5		5	4
6	least stressed	6	5

Figure 84. Continental landscape stress.



Data source:

National Land and Water Resources Audit, Landscape Health in Australia Database 2001.

Data used are assumed to be correct as received from the data suppliers.

- 37 subregions (10.5%) are in the two highest stress classes with 17 in the highest stress class.

  The most stressed subregions are concentrated in the south east, with south-eastern South Australia and most of Victoria falling into the highest class. The Avon Wheatbelt in south-west Western Australia also falls into this class, as do the Tasmanian Midlands and two subregions in southern Queensland, the West Balone Plains in the Mulga Lands bioregion within the Murray–Darling Basin and the Morton Basin within the South East Queensland bioregion. Two bioregions in tropical Queensland—the Brigalow Belt and the Wet Tropics—have subregions within the second highest stress class. In New South Wales the Upper Slopes of the South Western Slopes bioregion, and the adjacent South Eastern Highlands also fall into the highest stress class. These are the subregions where little natural vegetation remains, and the vegetation that does remain is under increasing stress from a variety of threatening processes.

  Within these subregions landscape scale responses are needed to prevent further decline and to maximise the protection of landscape health and remaining subregional biodiversity. Highest priority should be given to protecting and managing the remaining native vegetation and to revegetation strategies that concentrate on restoring or enhancing connectivity and increasing the area of the more significant remnants.

- 87 subregions (24.6%) fall into the third highest stress class, including the 58 most stressed subregions of the extensive use zone.

  In the intensive use zone these subregions occur where natural vegetation remains to a slightly greater extent, but connectivity is marginal. Threatening processes already initiated—and in most cases continuing—mean that these subregions are on the edge of major declines in biodiversity. In the extensive use zone these are the subregions that are relatively heavily grazed, usually over more than 90% of their area, and have high densities of weeds and/or feral animals. They include the western parts of the arid pastoral lands of Western Australia, the semi-arid parts of the Great Artesian Basin, the western semi-arid grazing areas of the Murray Darling Basin, the Barkley Tableland, the central-southern subregions of the Gulf Plains and north-western Cape York.

  The landscape health decline in the subregions of this stress class can probably be reversed with concerted effort. Clearing should cease, and grazing pressures on native vegetation reduced through extended pasture spelling, strategic stocking and through the protection of viable areas in conservative tenures. Strategic weed and feral animal control is needed to maintain the areas of greatest biodiversity value.

- 78 subregions (22%) fall into the fourth stress class, equally shared between the intensive use zone and the extensive use zone.

  In the intensive use zone subregions in this class are the 'intermediate' subregions where although moderate areas of native vegetation remain, including most of the subregional ecosystems, connectivity in native vegetation is typically low and relatively little of the native vegetation is conservatively managed.

  In the extensive use zone these subregions are those where grazing pressures are moderate and only limited areas are in conservative tenures. A significant number of subregions are threatened by weeds.

  Subregions in this stress class are those where it is likely that landscape processes and remaining biodiversity can be sustained through the general maintenance of the status quo, supported by strategic conservation initiatives including more detailed species level information gathering.

- 152 subregions (43%) are in the two lowest stress classes and are considered to be in relatively good health.

  Generally speaking these subregions are of lower suitability for agriculture or pastoralism, and are distributed equally across the intensive use zone and the extensive use zone. Relative to the other subregions, weeds and feral animals are not yet a major threat to biodiversity and landscape health. In the intensive use zone continuing clearing of these subregions is the major cause of concern.

FUTURE DIRECTIONS

Limitations of the study

Major limitations of this study relate to the:

- sources of data used, and hence its repeatability; and
- currency of the data used.

The absence of relevant or current data for some attributes meant that expert knowledge was the most suitable data to provide this snapshot of current relativities in landscape health. This means that:

- some of the attribute data presented cannot be reliably compared with the results of subsequent subregional assessments to determine trends;
- some data is not strictly comparable between States. This also applies to some of the more quantitative data used, which was collected differently by the different States and Territory, and sometimes was collected over different time periods.

In general these issues of relativity between the various data sources for a particular attribute have been minimised by using classed data in the analyses. Where the particular attribute class for a subregion is critical for a particular decision, the primary data needs to be checked to determine how close to the class threshold the subregion lies and how accurate that data is. Any final assessment should then be made in that context.

Data needs

The fundamental constraints to this study are the absence of appropriate data sets to determine current landscape health, and the lack of monitoring data through time that would enable trends in health to be identified and quantified. In the absence of this data, it has been necessary to use surrogate indicators that, although clearly linked to landscape health and the status of subregional biodiversity, are not underpinned by a body of clear and irrefutable scientific literature that demonstrates the landscape or ecosystem scale processes involved. In particular:

- there is no ecological basis for identifying clear thresholds for the long-term landscape changes that are the focus of this study; and
- the ecology of Australian landscapes and their biota is an area requiring urgent, coordinated and intensive study.

Fundamental data sets to support the study of landscape ecology are also conspicuously lacking. These include:

A consistent map of the major land types of the continent.

This is one of the principle data sets required for landscape health assessments. It would identify the elements of the geomorphic patterns of the continent, and the associated vegetation and soil types, and provide the necessary framework for ecological studies into landscape processes. The most appropriate scale in the short to medium term would vary between 1:100 000 or larger in the intensive use zone, and 1:250 000 in the extensive use zone.

Extent of native vegetation

For the purposes of improving reporting within the framework established by this project a fundamental requirement is for current information. Queensland has the most current (1999) state-wide map of the remaining extent of native vegetation in the intensive use zone. Queensland is also the only jurisdiction regularly mapping state-wide change in the extent of native vegetation, and is therefore the only State in which it is possible to track rates of clearing.

Soil condition

No State or Territory has a soil map that shows change in soil characteristics due to European land use; most do not have a soil map of a suitable scale to investigate such change. The absence of suitable land use maps is also a major constraint, the national land use coverage used having considerable limitations of scale, particularly with regard to the extent of cultivated areas.

Grazing intensity

The 'Biophysical Naturalness' cover used as an indicator of grazing intensity requires updating to incorporate new watering points, vegetation mapping and land use change.

Species level information

Accurate information at the species level is also required, to more confidently describe the distribution, density and trend of threatened native species, and of significant introduced species. This information is particularly limiting in the extensive use zone.

Institutional issues

Overriding all these information constraints is the problem that where information concerning a particular attribute has been collected over time, it has rarely been assessed using the same methods. This is due to changing technology, and to the lack of continuity in funding of particular work groups or organisations. To improve the capacity for national landscape health assessments both increased levels of resourcing and institutional leadership are required.

Further data analysis

Values allocated to attributes are based on the best information available within the constraints of the project. A broader review of some of the expert data (e.g. distribution, densities and trends in weeds and feral animals) would refine the analysis, adding to its value, particularly for State-level uses. Any changes are likely to be minor without the collection of new field data.

While the continental landscape stress synthesis provides a general overview of relativities in landscape health and biodiversity in Australia, it reflects attributes selected as indicators, and thresholds used. A sensitivity analysis to explore the impact of changes in classes or thresholds on relativities between subregions would be desirable for this report to be used to guide Commonwealth priorities in its environmental initiatives.

Other combinations of attributes, and the introduction of weighting, could be explored. For example the relative number of threatened species recently recorded in a subregion may be less an indicator of stress than the number of locally extinct species (i.e. those no longer present in the subregion) and could be dropped from the stress analysis. Similarly the relative significance of the different attributes as indicators of biodiversity decline, and any associated thresholds, may differ between subregions. Attributes are also likely to differ in significance as a subregion becomes more stressed. For example the impact of weeds on biodiversity in a fragmented natural landscape is likely to increase rapidly as remnant size falls below particular thresholds.

To gain a more accurate understanding of relativities between subregions, the attributes need to be assessed individually for each subregion, and the differences assessed on this basis.

The subregions also provide a framework to characterise and assess wetlands, suites of particular wetlands being characteristic of particular subregions. The likely health of lacustrine, riverine and estuarine wetlands could be approximated by using the condition attributes of the subregions within their catchments, or, if their catchments lie within a single subregion, the condition attributes of that subregion. This is akin to the assessment methods that have been employed in the Audit's Catchment Condition project.

Improving Australia's capacity to assess landscape health.

The subregions used in this study provide a robust framework for national, landscape-scale reporting. However, consultation and refinement is required if they are to be accepted by all agencies within the jurisdictions. This will need collaboration between the agencies responsible for biodiversity assessment, and those with responsibility for soil and land survey. Refinement is not just necessary for its broader relevance, but also to ensure that the reporting framework is relatively stable at a suitable scale for national reporting.

Deficiencies that need to be addressed in the shorter term to enable the framework to be more useful for other land assessment and planning purposes include:

- delineation of equivalent subregions in the bioregions of eastern New South Wales; and
- review and delineation of subregions at a larger scale in the Northern Territory.

If ecosystem-scale issues are to be used in national reporting, a national map of integrated mapping units that reflect the major land types of the continent will be necessary to ensure uniformity and consistency.

With these fundamental, hierarchical mapping units in place and stable, the major needs in reporting would be:

- national consistency in attributes;
- consistency in the methods of collection and assessment of relevant information; and
- regularity in collection.

While appropriate attributes are defined within the national State of the Environment framework, consistency and regularity of data collection in some attributes remains a significant obstacle—mainly due to frequent policy and organisational changes. This lack of continuity in the collection of nationally relevant landscape information needs to be addressed Australia wide. The current development of the Australian Collaborative Rangelands Information System may provide some direction to this critical issue.

Potential applications

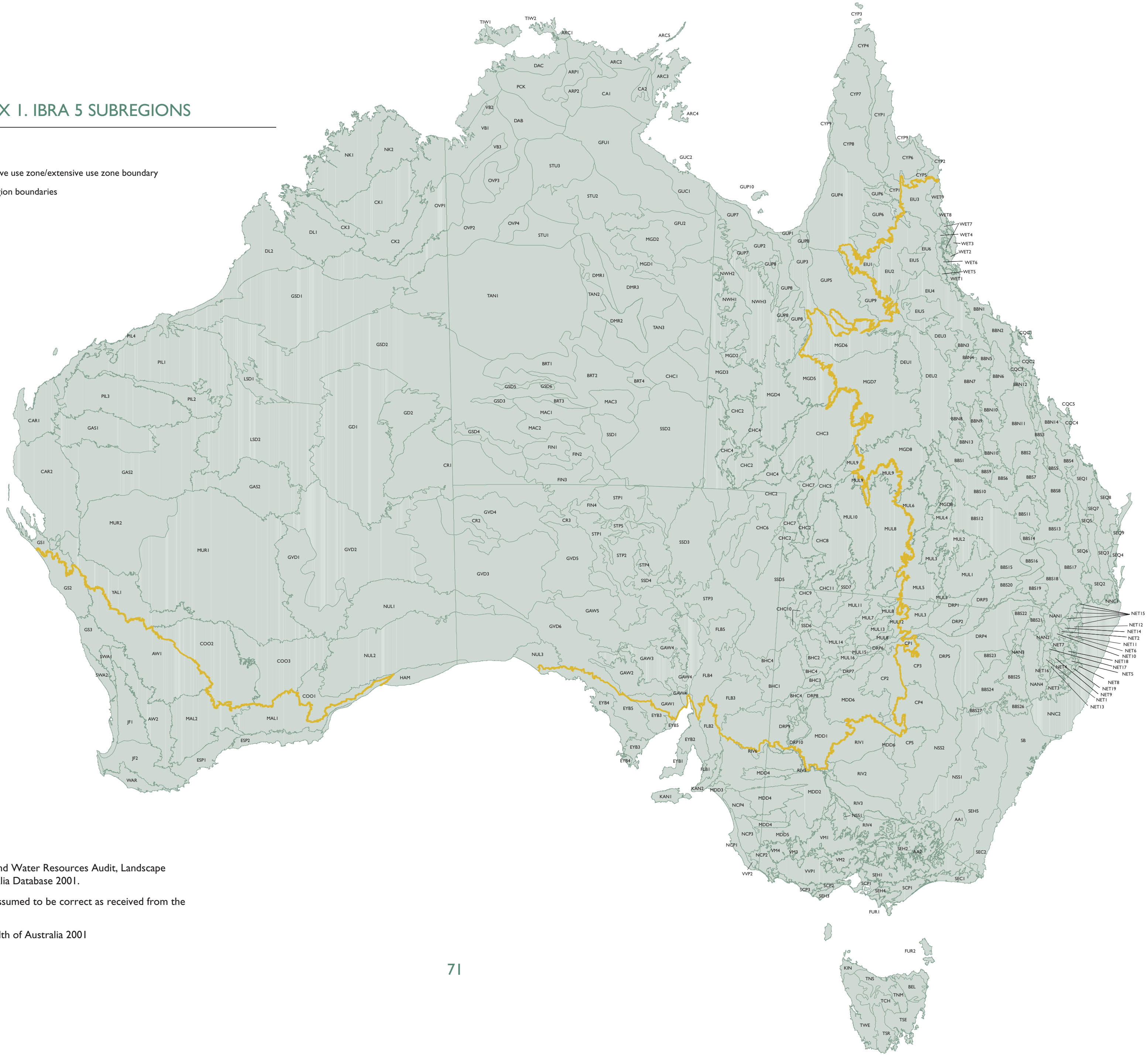
This study indicates the relative significance of issues associated with landscape health in general and biodiversity status in particular for each subregion of Australia's bioregions. It shows the geographic distribution of these issues, and their relative magnitude. It provides a broad indication of the scale of the challenges Australia faces in maintaining or restoring landscape health, yet enables these challenges to be broken down into geographic extents that can be used to develop and guide responses.

Each subregion requires specific institutional or on-ground responses that can only be determined by more detailed subregional assessments. This study provides the context and priorities for that closer assessment, and a framework for the extrapolation of its results across subregions with similar issues or needs. This analysis would provide a more precise estimate of the needs and costs of sustaining regional landscapes in Australia, and provide clear directions for community and government to do so.

APPENDIX 1. IBRA 5 SUBREGIONS

Intensive use zone/extensive use zone boundary

Subregion boundaries



Data source:

National Land and Water Resources Audit, Landscape Health in Australia Database 2001.

Data used are assumed to be correct as received from the data suppliers.

IBRA 5 subregions legend

Australian Alps
- AA1 New South Wales Alps
- AA2 Victorian Alps

Arnhem Coast
- ARC1 Arnhem Coast P1
- ARC2 Arnhem Coast P2
- ARC3 Arnhem Coast P3
- ARC4 Arnhem Coast P4 Groote
- ARC5 Arnhem Coast P5 Wessels

Arnhem Plateau
- ARP1 Arnhem Plateau P1
- ARP2 Arnhem Plateau P2

Avon Wheatbelt
- AW1 Avon Wheatbelt 1
- AW2 Avon Wheatbelt 2

Brigalow Belt North
- BBN1 Townsville Plains
- BBN2 Bogie River Hills
- BBN3 Cape River Hills
- BBN4 Beucazon Hills
- BBN5 Wyarra Hills
- BBN6 Northern Bowen Basin
- BBN7 Belyando Downs
- BBN8 Upper Belyando Floodout
- BBN9 Anakie Inlier
- BBN10 Basalt Downs
- BBN11 Isaac - Comet Downs
- BBN12 Nebo - Connors Ranges
- BBN13 South Drummond Basin
- BBN14 Marlborough Plains

Brigalow Belt South
- BBS1 Claude River Downs
- BBS2 Woorabinda
- BBS3 Boomer Range
- BBS4 Mount Morgan Ranges
- BBS5 Callide Creek Downs
- BBS6 Arcadia
- BBS7 Dawson River Downs
- BBS8 Banana - Auburn Ranges
- BBS9 Buckland Basalts
- BBS10 Carnarvon Ranges
- BBS11 Taroom Downs
- BBS12 Southern Downs
- BBS13 Barakula
- BBS14 Dulacca Downs
- BBS15 Weribone High
- BBS16 Tara Downs
- BBS17 Eastern Darling Downs
- BBS18 Inglewood Sandstones
- BBS19 Moonie R. - Commoron Creek
- BBS20 Moonie - Barwon Interfluve
- BBS21 Northern Basalts
- BBS22 Northern Outwash
- BBS23 Pilliga Outwash
- BBS24 Pilliga
- BBS25 Liverpool Plains
- BBS26 Liverpool Range
- BBS27 Talbragar Valley

Broken Hill Complex
- BHC1 Barrier Range
- BHC2 Mootwingee Downs
- BHC3 Scopes Range
- BHC4 Barrier Range Outwash

Burt Plain
- BRT1 Burt Plain P1
- BRT2 Burt Plain P2
- BRT3 Burt Plain P3
- BRT4 Burt Plain P4

Central Arnhem
- CA1 Central Arnhem P1
- CA2 Central Arnhem P2

Carnarvon
- CAR1 Cape Range
- CAR2 Wooramel

Channel country
- CHC1 Toko Plains
- CHC2 Sturt Stony Desert
- CHC3 Goneaway Tablelands
- CHC4 Diamantina-Eyre
- CHC5 Cooper Plains
- CHC6 Coongie
- CHC7 Lake Pure
- CHC8 Noccundra Slopes
- CHC9 Tibooburra Downs
- CHC10 Core Ranges
- CHC11 Bulloo

Central Kimberley
- CK1 Pentecost
- CK2 Hart
- CK3 Mount Eliza

Coolgardie
- COO1 Mardabilla
- COO2 Southern Cross
- COO3 Eastern Goldfield

Cobar Peneplain
- CP1 Boorindal Plains
- CP2 Barnato Downs
- CP3 Canbelego Downs
- CP4 Nymagee-Rankins Springs
- CP5 Lachlan Plains

Central Mackay Coast
- CQC1 Whitsunday
- CQC2 Proserpine - Sarina Lowlands
- CQC3 Clarke - Connors Ranges
- CQC4 Byfield
- CQC5 Manifold

Central Ranges
- CR1 Mann-Musgrave Block
- CR2 Wataru
- CR3 Everard Block

Cape York Peninsula
- CYP1 Coen - Yamba Inlier
- CYP2 Starke Coastal Lowlands
- CYP3 Cape York - Torres Strait
- CYP4 Jardine - Pascoe Sandstones
- CYP5 Battle Camp Sandstones
- CYP6 Laura Lowlands
- CYP7 Weipa Plateau
- CYP8 (Northern) Holroyd Plain
- CYP9 Coastal Plains

Daly Basin
- DAB Daly Basin

Darwin Coastal
- DAC Darwin Coastal

Desert Uplands
- DEU1 Prairie - Torrens Creeks Alluvials
- DEU2 Alice Tableland
- DEU3 Cape-Campaspe Plains

Dampierland
- DL1 Fitzroy Trough
- DL2 Pindanland

Davenport Murchison Ranges
- DMR1 Davenport Murchison Range P1
- DMR2 Davenport Murchison Range P2
- DMR3 Davenport Murchison Range P3

Darling Riverine Plains
- DRP1 Culgoa-Bokhara
- DRP2 Narran-Lightning Ridge
- DRP3 Warrambool-Moonie
- DRP4 Castlereagh-Barwon
- DRP5 Bogan-Macquarie
- DRP6 Louth Plains
- DRP7 Wilcannia Plains
- DRP8 Menindee
- DRP9 Great Darling Anabranch
- DRP10 Pooncarie-Darling

Einasleigh Uplands
- EIU1 Georgetown - Croydon
- EIU2 Kidston
- EIU3 Hodgkinson Basin
- EIU4 Broken River
- EIU5 Undara - Toomba Basalts
- EIU6 Herberton - Wairuna

Esperance Plains
- ESP1 Fitzgerald
- ESP2 Recherche

Eyre Yorke Block
- EYB1 Southern Yorke
- EYB2 St Vincent
- EYB3 Eyre Hills
- EYB4 Talia
- EYB5 Eyre Mallee

Finke
- FIN1 Finke P1
- FIN2 Finke P2
- FIN3 Tieyon
- FIN4 Pedirka

Flinders Lofty Block
- FLB1 Mount Lofty Ranges
- FLB2 Broughton
- FLB3 Olary Spur
- FLB4 Southern Flinders
- FLB5 Northern Flinders

Flinders
- FUR1 Wilsons Promontory
- FUR2 Flinders

Gasgoyne
- GAS1 Ashburton
- GAS2 Carnegie
- GAS3 Augustus

Gawler
- GAW1 Myall Plains
- GAW2 Gawler Volcanics
- GAW3 Gawler Lakes
- GAW4 Arcoona Plateau
- GAW5 Kingoonya

Gibson Desert
- GD1 Lateritic Plain
- GD2 Dune Field

Gulf Fall and Uplands
- GFU1 McArthur - South Nicholson Basins
- GFU2 Gulf Fall and Uplands P2

Geraldton Sandplains
- GS1 Edel
- GS2 Geraldton Hills
- GS3 Leseur Sandplain

Great Sandy Desert
- GSD1 McLarty
- GSD2 Mackay
- GSD3 Great Sandy Desert P3
- GSD4 Great Sandy Desert P4
- GSD5 Great Sandy Desert P5
- GSD6 Great Sandy Desert P6

Gulf Coastal
- GUC1 Gulf Coastal P1
- GUC2 Gulf Coastal P2 Pellews

Gulf Plains
- GUP1 Karumba Plains
- GUP2 Armraynald Plains
- GUP3 Woondoola Plains
- GUP4 Mitchell - Gilbert Fans
- GUP5 Claraville Plains
- GUP6 Holroyd Plain - Red Plateau
- GUP7 Doomadgee Plains
- GUP8 Donors Plateau
- GUP9 Gilberton Plateau
- GUP10 Wellesley Islands

Great Victoria Desert
- GVD1 Shield
- GVD2 Central
- GVD3 Maralinga
- GVD4 Kintore
- GVD5 Tallaringa
- GVD6 Yellabinna

Hampton
- HAM Hampton

Jarrah Forrest
- JF1 Northern Jarrah Forest
- JF2 Southern Jarrah Forest

Kanmantoo
- KAN1 Kangaroo Island
- KAN2 Fleurieu

Little Sandy Desert
- LSD1 Rudall
- LSD2 Trainor

MacDonnell Ranges
- MAC1 MacDonnell Ranges P1
- MAC2 MacDonnell Ranges P2
- MAC3 MacDonnell Ranges P3

Mallee
- MAL1 Eastern Mallee
- MAL2 Western Mallee

Murray Darling Depression
- MDD1 South Olary Plain
- MDD2 Murray Mallee
- MDD3 Murray Lakes and Coorong
- MDD4 Lowan Mallee
- MDD5 Wimmera
- MDD6 Darling Depression

Mitchell Grass Downs
- MGD1 Mitchell Grass Downs P1
- MGD2 Barkly Tableland
- MGD3 Georgina Limestone
- MGD4 Southwestern Downs
- MGD5 Kynuna Plateau
- MGD6 Northern Downs
- MGD7 Central Downs
- MGD8 Southern Wooded Downs

Mulga Lands
- MUL1 West Balonne Plains
- MUL2 Eastern Mulga Plains
- MUL3 Nebine Plains
- MUL4 North Eastern Plains
- MUL5 Warrego River Plains
- MUL6 Langlo Plains
- MUL7 Cuttaburra-Paroo
- MUL8 West Warrego
- MUL9 Northern Uplands
- MUL10 West Bulloo
- MUL11 Urisino Sandplains
- MUL12 Warrego Sands
- MUL13 Kerribree Basin
- MUL14 White Cliffs Plateau
- MUL15 Paroo Overflow
- MUL16 Paroo-Darling Sands

Murchison
- MUR1 Eastern Murchison
- MUR2 Western Murchison

Nandewar
- NAN1 Northern Complex
- NAN2 Inverell Basalts
- NAN3 Kaputar
- NAN4 Peel

Naracoorte Coastal Plain
- NCP1 Bridgewater
- NCP2 Glenelg Plain
- NCP3 Lucindale
- NCP4 Tintinara

New England Tableland
- NET1 Bundarra Downs
- NET2 Beardy River Hills
- NET3 Walcha Plateau
- NET4 Armidale Plateau
- NET5 Wongwibinda Plateau
- NET6 Deepwater Downs
- NET7 Glenn Innes-Guyra Basalts
- NET8 Ebor Basalts
- NET9 Moredun Volcanics
- NET10 Severn River Volcanics
- NET11 Northeast Forest Lands
- NET12 Tenterfield Plateau
- NET13 Yarrowyck-Kentucky Downs
- NET14 Binghi Plateau
- NET15 Stanthorpe Plateau
- NET16 Eastern Nandewars
- NET17 Tingha Plateau
- NET18 Nightcap
- NET19 Round Mountain

Northern Kimberley
- NK1 Mitchell
- NK2 Berkeley

NSW North Coast
- NNC1 Scenic Rim
- NNC2 NSW North Coast 2

NSW South Western Slopes
- NSS1 Upper Slopes
- NSS2 Lower Slopes

Nullabor
- NUL1 Carlisle
- NUL2 Nullabor Plain
- NUL3 Yalata

Mount Isa Inlier
- NWH1 Southwestern Plateaus & Floodouts
- NWH2 Thorntonia
- NWH3 Mount Isa Inlier

Ord Victoria Plain
- OVP1 Ord
- OVP2 South Kimberley Interzone
- OVP3 Ord-Victoria Plains P3
- OVP4 Ord-Victoria Plains P4

Pine Creek
- PCK Pine Creek

Pilbara
- PIL1 Chichester
- PIL2 Fortescue
- PIL3 Hamersley
- PIL4 Roebourne

Riverina
- RIV1 Lachlan
- RIV2 Murrumbidgee
- RIV3 Murray Fans
- RIV4 Victorian Riverina
- RIV5 Robinvale Plains
- RIV6 Murray Scroll Belt

Sydney Basin
- SB Sydney Basin

South East Coastal Plain
- SCP1 Gippsland Plain
- SCP2 Otway Plain
- SCP3 Warrnambool Plain

South East Corner
- SEC1 East Gippsland Lowlands
- SEC2 South East Coastal Ranges

South Eastern Highlands
- SEH1 Highlands-Southern Fall
- SEH2 Highlands-Northern Fall
- SEH3 Otway Ranges
- SEH4 Strzelecki Ranges
- SEH5 South Eastern Highlands

South Eastern Queensland
- SEQ1 Burnett - Curtis Hills and Ranges
- SEQ2 Moreton Basin
- SEQ3 Southeast Hills and Ranges
- SEQ4 Southern Coastal Lowlands
- SEQ5 Brisbane - Barambah Volcanics
- SEQ6 South Burnett
- SEQ7 Gympie Block
- SEQ8 Burnett - Curtis Coastal Lowlands
- SEQ9 Great Sandy

Simpson-Strzelecki Dunefields
- SSD1 Simpson-Strzelecki Dunefields P1
- SSD2 Simpson Desert
- SSD3 Dieri
- SSD4 Warriner
- SSD5 Strzelecki Desert
- SSD6 Central Depression
- SSD7 Bulloo Dunefields

Stony Plains
- STP1 Breakaways
- STP2 Oodnadatta
- STP3 Murnpeowie
- STP4 Peake-Dennison Inlier
- STP5 Macumba

Sturt Plateau
- STU1 Sturt Plateau P1
- STU2 Sturt Plateau P2
- STU3 Sturt Plateau P3

Swan Coastal Plain
- SWA1 Dandarragan Plateau
- SWA2 Perth

Tanami
- TAN1 Tanami P1
- TAN2 Tanami P2
- TAN3 Tanami P3

Tasmania (bioregions only)
- BEL Ben Lomond
- KIN King
- TCH Tasmanian Central Highlands
- TMI Tasmanian Northern Midlands
- TNS Tasmanian Northern Slopes
- TSE Tasmanian South East
- TSR Tasmanian Southern Ranges
- TWE Tasmanian West

Tiwi Coburg
- TIW1 Tiwi-Cobourg P1
- TIW2 Tiwi-Cobourg P2

Victoria Bonaparte
- VB1 Victoria Bonaparte P1
- VB2 Victoria Bonaparte P2
- VB3 Victoria Bonaparte P3

Victorian Midlands
- VM1 Goldfields
- VM2 Central Victorian Uplands
- VM3 Greater Grampians
- VM4 Dundas Tablelands

Victorian Volcanic Plain
- VVP1 Victorian Volcanic Plain
- VVP2 Mount Gambier

Warren
- WAR Warren

Wet Tropics
- WET1 Herbert
- WET2 Tully
- WET3 Innisfail
- WET4 Atherton
- WET5 Paluma - Seaview
- WET6 Kirrama - Hinchinbrook
- WET7 Bellenden Ker - Lamb
- WET8 Macalister
- WET9 Daintree - Bloomfield

Yalgoo
- YAL Yalgoo

APPENDIX 2. CONDITION, TREND AND STRESS ATTRIBUTE CLASSES

1. Condition attributes

c1 Current extent of native vegetation (intensive use zone only)

Class	% of subregion
1	0 – 10
2	10 –30
3	30 – 50
4	50 – 70
5	70 –90
6	90 – 100

c2 Current use of native vegetation

2a Class	% of subregion in conservation reserves
1	0 – 2
2	2 – 5
3	5 – 10
4	10 – 30
5	> 30

2b Class	% of native vegetation remaining outside conservation reserves
1	> 90
2	70 – 90
3	50 – 70
4	30 – 50
5	10 – 30
6	< 10

c3a Percent of subregion with least impact from total grazing pressures (extensive use zone only)

Condition classes are based on a grouping of the five biophysical naturalness (Bn) ratings of the National Wilderness Inventory into three condition classes. Condition class 3 (i.e. Bn classes 3,4 and 5, see table below) is the near natural (least impact) class.

c3b Percent of native vegetation in land tenures associated with conservative land use practices

Land tenures are based on the CAPAD (2000b) data set and the BRS (1999) land use coverage. The land uses considered conservative are shown in the table below.

c3a,b Class	% of subregion
1	0 – 10
2	10 – 30
3	30 – 50
4	50 – 70
5	70 – 90
6	90 – 100

Table A1 Groupings of biophysical naturalness (Bn) classes used for condition attributes C3a and C3b.

Grouped Bn	Biophysical naturalness (Bn) class	BRS land use class
1. Major modification	1. Modified natural landcover : intensive grazing (exotic and native grasses) or clear-fell logged.	Cultivation Plantation Freehold (intensive grazing)
2. Minor modification	2. Relatively natural environments : light/moderate grazing or repeated selective logging.	Grazing leasehold Grazing freehold State Forest Mining reserves Lakes and watercourses
		Conservative land uses
3. Near natural (least important from grazing pressure class)	3. Relatively natural environments : irregular grazing or single selective logging. 4. Relatively natural environments : marginal grazing and/or no recent logging/grazing. 5. Natural environments : natural vegetation, swamp, salt lake, dune/naturally bare area, unlogged or ungrazed.	Conservation reserves Protected areas (IUCN classes I–VI) World Heritage areas VCL and Crown reserves Aboriginal reserves Armed forces reserves

c4 Degree of connectivity in native vegetation (intensive use zone only)

Class Description

1. Largely developed, with small and isolated remnants. **Very little connectivity** (relictual).
2. Largely disconnected remnants, but **some connectivity associated with major landscape features** such as ranges and watercourses. Internal heterogeneity of remnants low (fragmented).
3. Some isolated remnants, but provincial **connectivity** still **high** (variegated).
4. Essentially intact, but **selective clearing of small areas**, or limited clearing for infrastructure (intact).
5. **Unmodified by significant clearing** (intact).

c5a % of subregion with high salinity risk or hazard (intensive use zone only)

c5b % of native vegetation in subregion with high salinity risk or hazard (intensive use zone only)

Class	% of subregion (c5a) or native vegetation (c5b) with high risk or hazard of dry land salinity
1	> 30
2	10 – 30
3	5 – 10
4	1 – 5
5	< 1

c6 Degree of changed hydrological conditions.

Class Description

1. **Moderate to major change**, including changes in infiltration and run-off due to soil modification by extensive cultivation, or due to soil degradation caused by mainly intensive livestock grazing on developed pastures. Widespread disruption of drainage and flow paths by land surface modification (e.g. laser levelling, contour banking) for intensive cultivation, or by numerous farm dams associated with closer settlement. Moderate to intensive use of local groundwater.
2. **Moderate change**, including changes in infiltration and run-off due to soil degradation caused by mainly extensive livestock grazing, with limited areas of cultivation and limited use of local groundwater.
3. **Moderate to minor change**, largely restricted to changes in infiltration and run-off due to soil degradation caused by extensive livestock grazing.
4. **Minor change** in hydrology.

c7 Distribution and density of non-indigenous plant species (weeds, c7a) and non-indigenous vertebrate species (feral animals, c7b) of national importance

Class	Density
0	absent
1	occasional or localised
2	common and widespread
3	abundant and widespread
nd	no data

c8a At risk ecological communities (intensive use zone only)

Class	% of total ecosystems at risk in subregion
1	90 –100
2	70 – 90
3	50 – 70
4	30 – 50
5	10 – 30
6	0 – 10

c8b Threatened plants

Class	Total number of threatened plants
1	> 49
2	30 – 49
3	10 – 29
4	5 – 9
5	< 5

c8c Threatened terrestrial vertebrate animals

Class	Total number of threatened terrestrial vertebrate animals
1	>19
2	10 – 19
3	5 – 9
4	< 5

c8d Threatened marine and pelagic vertebrate animals

Class	Total number of threatened marine and pelagic vertebrate animals
1	>19
2	10 – 19
3	5 – 9
4	< 5

Trend attributes

t1a, t1b, t1c Area of woody native vegetation cleared per annum for 1990–95, 1995–97 and 1997–99 periods respectively (intensive use zone only)

Class	Area of woody native vegetation cleared annually (ha)
1	> 20 000
2	10 000 – 20 000
3	5 000 – 10 000
4	1 000 – 5 000
5	< 1 000

t1d Change in annual rate of clearing between 1995 to 1997 and 1997 to 1999 (intensive use zone only)

Class	Description
1	Increasing – rate of clearing increasing
2	Constant – clearing occurring but rate of clearing constant
3	Decreasing – rate of clearing decreasing
4	No clearing, or regeneration exceeds clearing

t3 and t4 Trend in density of non-indigenous plant species (weeds, t3) and non-indigenous vertebrate species (feral animals, t4) of national importance. Trend classes (longer term, not seasonal) for weeds and feral animals are :

Class	Description
D	decreasing density
S	stable – relatively constant density
I	increasing density
nd	no known records

t5a % of subregion with high salinity risk or hazard in 2050 (intensive use zone only)

t5b % of native vegetation in subregion with high salinity risk or hazard in 2050 (intensive use zone only)

Class	% of the subregion (t5a) or of native vegetation (t5b) with high salinity risk or hazard in 2050
1	> 30
2	10 – 30
3	5 – 10
4	1 – 5
5	< 1

t5c : trend in high salinity risk or hazard in subregion between 2000 and 2050 (intensive use zone only)

t5d : trend in high salinity risk or hazard in native vegetation between 2000 and 2050 (intensive use zone only)

Class	Trend in subregion and in native vegetation
D	decreasing hazard or risk
S	stable (relatively constant hazard or risk)
I	increasing hazard or risk

Landscape stress

Class	
1	highest stress
2	
3	
4	
5	
6	lowest stress

APPENDIX 3. CONDITION ATTRIBUTE VALUES BY SUBREGION

Intensive use zone

Subregion	Area (ha)	Attribute class values C1	C2a	C2b	C3a	C3b	C4	C6	C8a	C8b	C8c	C8d	Landscape stress
Australian Alps													
AA1	470 025	6	5	5	–	6	4	3	5	4	2	5	6
AA2	323 521	6	5	4	–	4	4	3	5	3	2	5	6
Avon Wheatbelt													
AW1	5 177 496	2	1	1	–	2	1	1	3	1	3	5	1
AW2	4 202 911	2	1	1	–	2	1	1	3	1	2	5	1
Brigalow Belt North													
BBN1	719 278	4	3	2	–	2	3	1	4	4	3	2	5
BBN2	1 061 100	5	2	1	–	1	4	3	4	4	2	5	5
BBN3	735 490	5	1	1	–	1	4	3	5	5	3	5	6
BBN4	102 219	5	1	1	–	1	2	3	4	5	3	5	5
BBN5	376 445	5	1	1	–	1	4	3	5	5	3	5	6
BBN6	1 338 049	4	1	1	–	1	3	2	4	4	3	5	5
BBN7	1 800 649	3	1	1	–	1	2	1	3	5	3	5	3
BBN8	438 648	3	1	1	–	1	2	2	2	5	3	5	4
BBN9	355 547	5	1	1	–	1	4	3	5	5	3	5	6
BBN10	1 238 537	3	1	1	–	1	2	1	4	4	3	5	4
BBN11	2 701 119	2	1	1	–	1	2	1	3	3	2	5	2
BBN12	542 091	4	1	1	–	1	2	3	5	4	3	5	4
BBN13	1 018 601	3	1	1	–	2	3	2	5	5	3	5	5
BBN14	1 124 985	4	1	1	–	3	3	2	4	3	2	5	6
Brigalow Belt South													
BBS1	1 053 243	4	2	1	–	1	3	2	3	4	3	5	5
BBS2	764 037	4	2	1	–	1	4	3	5	3	3	2	6
BBS3	211 286	3	4	2	–	2	3	2	4	5	3	5	4
BBS4	1 293 528	3	1	1	–	1	2	3	4	2	2	5	3
BBS5	298 166	2	1	1	–	1	1	1	1	4	3	5	2
BBS6	707 868	3	4	2	–	2	3	2	4	4	3	5	5
BBS7	987 664	2	1	2	–	2	2	1	1	4	2	5	2
BBS8	1 535 116	3	1	1	–	1	2	2	4	3	2	5	4
BBS9	290 363	6	5	3	–	3	4	3	4	4	3	5	6
BBS10	2 298 941	5	3	2	–	2	4	3	5	3	2	5	6
BBS11	644 090	1	1	1	–	1	1	1	2	4	3	5	2
BBS12	4 269 566	3	1	1	–	1	2	2	4	3	3	5	5
BBS13	1 295 654	4	1	1	–	1	3	3	4	3	2	5	5
BBS14	162 271	2	1	1	–	1	1	2	5	5	3	2	3

Subregion	Area (ha)	Attribute class values C1	C2a	C2b	C3a	C3b	C4	C6	C8a	C8b	C8c	C8d	Landscape stress
Brigalow Belt South													
BBS15	993 821	3	1	1	–	1	2	2	3	5	3	5	4
BBS16	449 466	1	1	1	–	1	1	1	3	4	3	5	3
BBS17	1 639 400	2	1	1	–	1	1	1	3	3	1	5	2
BBS18	1 328 073	4	1	1	–	1	3	3	5	3	2	5	6
BBS19	802 963	2	1	1	–	1	2	1	4	4	3	5	3
BBS20	721 053	2	1	1	–	1	2	2	4	5	4	5	3
BBS21	545 396	2	1	1	–	1	1	1	1	4	3	5	2
BBS22	700 495	2	1	1	–	1	1	2	2	4	3	5	2
BBS23	534 948	4	1	1	–	1	3	2	4	3	3	5	5
BBS24	1 733 674	3	3	2	–	2	3	3	3	3	3	5	4
BBS25	938 859	3	1	1	–	1	2	1	5	3	3	5	5
BBS26	522 282	2	2	1	–	2	2	3	2	3	3	5	3
BBS27	205 342	2	1	1	–	1	1	1	1	4	3	5	2
Ben Lomond													
BEL	657 503	4	4	2	–	1	3	2	5	3	3	4	6
Cobar Peneplain													
CP3	1 974 971	5	1	1	–	1	3	3	5	4	4	5	6
CP4	2 069 909	4	1	1	–	1	3	3	4	4	3	5	5
CP5	1 138 066	2	1	1	–	1	2	1	4	3	3	5	3
Central Mackay Coast													
CQC1	93 653	5	5	4	–	4	4	4	4	4	3	2	6
CQC2	614 458	3	2	1	–	2	3	1	4	4	2	2	4
CQC3	520 575	6	4	2	–	2	4	4	5	4	2	3	6
CQC4	193 886	5	2	1	–	5	4	3	4	5	3	2	6
CQC5	20 218	6	4	2	–	5	5	4	6	5	3	3	6
Desert Uplands													
DEU1	1 592 171	6	2	1	–	1	3	3	3	5	4	5	5
DEU2	4 430 894	5	2	1	–	1	3	3	3	4	3	5	5
DEU3	1 009 239	5	1	1	–	1	3	3	3	5	3	5	5
Darling Riverine Plains													
DRP1	1 052 307	5	2	1	–	1	4	2	3	–	4	5	5
DRP2	533 867	5	1	1	–	1	3	3	4	–	4	5	5
DRP3	1 087 712	4	1	1	–	1	2	1	3	5	4	5	4
DRP4	4 398 049	3	1	1	–	1	2	1	3	3	2	5	4
DRP5	2 097 454	3	1	1	–	1	2	1	4	4	4	5	5
Einasleigh Uplands													
EIU1	913 942	6	1	1	–	1	4	4	4	5	4	5	5
EIU2	2 990 944	6	1	1	–	1	5	3	4	3	3	5	5

Subregion	Area	Attribute class values											
	(ha)	C1	C2a	C2b	C3a	C3b	C4	C6	C8a	C8b	C8c	C8d	Landscape stress
Einasleigh Uplands													
EIU3	1 700 156	6	1	1	–	1	4	3	4	2	2	5	4
EIU4	3 240 487	6	1	1	–	1	4	3	4	3	2	5	5
EIU5	2 255 445	6	3	1	–	1	5	4	3	4	3	5	5
EIU6	750 977	6	3	1	–	1	4	3	3	3	2	5	5
Esperance Plains													
ESP1	1 573 028	3	4	2	–	5	3	1	3	1	2	2	3
ESP2	1 333 298	2	4	2	–	4	2	1	3	3	2	2	5
Eyre Yorke Block													
EYB1	436 512	2	2	2	–	2	2	2	2	3	4	5	3
EYB2	1 085 599	1	1	1	–	1	1	2	2	3	3	5	2
EYB3	1 171 636	2	3	2	–	2	2	1	3	3	3	5	4
EYB4	1 089 152	4	4	2	–	2	3	1	5	3	3	5	6
EYB5	2 295 667	3	4	3	–	2	2	1	3	3	3	5	4
Flinders Lofty Block													
FLB1	300 385	2	2	1	–	1	2	1	1	3	3	5	1
FLB2	1 032 917	1	1	1	–	1	1	1	1	3	2	5	1
Flinders													
FUR1	40 564	6	5	6	–	6	5	4	6	4	3	5	6
FUR2	472 720	3	4	2	–	3	2	2	3	3	2	1	4
Geraldton Sandplains													
GS2	1 968 412	2	4	2	–	3	2	1	3	3	3	5	4
GS3	1 173 488	3	4	2	–	4	2	1	3	1	4	5	4
Jarrah Forest													
JF1	1 899 636	4	3	1	–	2	3	3	2	2	3	5	4
JF2	2 607 681	4	2	1	–	2	3	3	2	1	2	2	3
Kanmantoo													
KAN1	439 986	3	4	3	–	3	3	1	3	3	4	3	4
KAN2	370 588	1	2	1	–	1	2	1	1	3	2	5	2
King													
KIN	417 327	4	4	2	–	2	3	1	4	3	3	2	5
Mallee													
MAL1	2 457 035	2	4	2	–	6	3	2	2	3	3	4	4
MAL2	4 937 706	2	3	1	–	5	2	1	2	2	3	5	3
Murray Darling Depression													
MDD2	5 520 000	2	3	3	–	3	1	1	2	2	1	5	1
MDD3	249 132	1	4	1	–	1	1	3	2	3	2	5	2
MDD4	2 333 192	4	5	5	–	5	4	3	4	2	2	5	5
MDD5	1 694 285	1	2	2	–	2	1	1	2	2	2	5	1

Subregion	Area	Attribute class values											
	(ha)	C1	C2a	C2b	C3a	C3b	C4	C6	C8a	C8b	C8c	C8d	Landscape stress
Mitchell Grass Downs													
MGD6	3 527 184	6	1	1	–	1	4	4	5	5	4	5	6
MGD7	6 793 577	6	1	1	–	1	4	4	5	4	4	5	6
MGD8	4 079 309	5	1	1	–	1	3	3	6	4	4	5	6
Mulga Lands													
MUL1	2 066 000	2	1	1	–	1	2	3	2	5	4	5	1
MUL2	1 558 974	4	1	1	–	1	3	3	3	5	4	5	4
MUL3	1 986 511	5	1	1	–	1	3	3	4	5	4	5	4
MUL4	669 981	4	1	1	–	1	4	3	2	5	4	5	3
MUL5	2 492 979	6	1	1	–	1	4	3	5	–	4	5	5
MUL6	1 276 628	5	1	1	–	1	4	3	4	5	4	5	4
Nandewar													
NAN1	958 237	3	1	1	–	1	2	2	4	2	2	5	4
NAN2	230 958	2	1	1	–	1	1	1	3	3	3	5	3
NAN3	84 443	5	5	4	–	4	4	3	4	4	3	5	6
NAN4	1 424 181	3	1	1	–	1	2	2	3	3	3	5	4
Naracoorte Coastal Plains													
NCP1	457 798	1	3	1	–	1	2	2	3	3	2	3	3
NCP2	631 332	3	3	2	–	2	3	1	2	3	2	5	4
NCP3	741 085	2	1	1	–	1	2	1	1	3	3	5	2
NCP4	708 059	2	3	2	–	2	1	1	2	3	2	5	1
New England Tableland													
NET1	151 864	2	1	1	–	1	2	2	3	3	3	5	3
NET2	24 624	5	1	1	–	2	3	3	3	3	3	5	5
NET3	476 492	3	3	2	–	2	2	2	3	3	2	5	4
NET4	291 246	2	2	2	–	2	2	1	3	3	2	5	4
NET5	106 250	3	3	2	–	2	2	2	3	3	2	5	4
NET6	97 770	2	1	1	–	1	2	2	3	3	2	5	3
NET7	277 293	2	1	1	–	1	1	1	3	3	2	5	3
NET8	35 420	3	3	2	–	2	2	2	3	3	3	5	4
NET9	117 458	3	2	1	–	1	3	3	3	3	3	5	4
NET10	150 105	4	3	2	–	2	3	2	3	3	2	5	5
NET11	205 456	5	5	3	–	3	3	3	3	3	2	5	5
NET12	139 541	3	1	1	–	1	2	3	3	3	2	5	4
NET13	65 133	2	1	1	–	1	1	2	3	4	3	5	3
NET14	63 888	6	1	1	–	3	4	4	3	3	3	5	5
NET15	268 413	4	4	2	–	2	3	3	3	2	2	5	4
NET16	320 573	4	2	1	–	1	3	3	3	3	3	5	5
NET17	78 438	4	1	1	–	2	3	3	3	3	3	5	5

Subregion	Area	Attribute class values											
	(ha)	C1	C2a	C2b	C3a	C3b	C4	C6	C8a	C8b	C8c	C8d	Landscape stress
New England Tableland													
NET18	113 612	3	1	1	–	1	2	3	3	3	2	5	4
NET19	20 606	5	5	4	–	4	4	4	3	3	3	5	5
NSW North Coast													
NNC1	230 408	4	4	3	–	3	3	4	4	1	2	5	5
NNC2	5 700 979	4	4	2	–	2	3	2	3	1	1	4	4
NSW South Western Slopes													
NSS1	4 641 744	2	2	2	–	2	2	1	2	2	2	4	1
NSS2	4 032 204	2	1	1	–	1	1	1	2	3	3	5	2
Riverina													
RIV1	2 150 581	6	1	1	–	1	4	3	5	4	2	5	6
RIV2	3 051 105	5	1	1	–	1	3	1	4	3	2	5	5
RIV3	2 059 561	2	1	1	–	1	4	1	2	3	2	5	2
RIV4	1 781 989	1	1	2	–	2	1	1	1	2	2	5	1
RIV5	154 358	4	4	2	–	2	4	1	3	4	3	5	5
RIV6	376 074	3	4	2	–	3	2	1	4	4	3	5	5
Sydney Basin													
SB	3 596 202	4	5	3	–	4	3	2	3	1	2	4	3
South East Coastal Plain													
SCP1	1 201 674	2	3	2	–	2	1	1	2	3	2	2	1
SCP2	261 788	2	3	2	–	3	2	1	4	3	2	4	4
SCP3	234 268	1	2	2	–	2	1	1	2	3	2	5	2
South East Corner													
SEC1	647 511	5	4	2	–	2	4	4	4	3	2	2	5
SEC2	2 056 143	5	5	3	–	3	3	4	4	1	2	5	5
South Eastern Highlands													
SEH1	1 452 184	5	4	3	–	3	4	4	4	2	1	4	5
SEH2	1 675 958	5	4	2	–	2	4	4	3	3	1	5	4
SEH3	150 030	5	4	2	–	2	4	4	4	3	3	5	5
SEH4	344 326	2	1	1	–	1	2	2	1	3	2	2	2
SEH5	5 121 114	3	3	2	–	2	2	3	3	1	1	4	1
South Eastern Queensland													
SEQ1	990 674	4	2	1	–	1	3	3	4	3	2	3	5
SEQ2	784 980	2	1	1	–	1	2	1	4	2	2	5	1
SEQ3	527 777	3	2	1	–	1	3	3	4	1	1	5	3
SEQ4	343 335	3	3	2	–	2	2	1	4	2	2	2	3
SEQ5	806 790	2	1	1	–	1	2	2	3	3	2	5	3
SEQ6	563 873	2	2	1	–	1	2	2	4	3	2	5	3
SEQ7	858 703	3	1	1	–	1	3	2	4	2	1	4	4

Subregion	Area	Attribute class values											
	(ha)	C1	C2a	C2b	C3a	C3b	C4	C6	C8a	C8b	C8c	C8d	Landscape stress
South Eastern Queensland													
SEQ8	698 878	3	3	2	–	2	3	2	4	3	2	3	4
SEQ9	368 878	5	5	5	–	5	4	3	5	3	2	3	6
Swan Coastal Plain													
SWA1	383 453	2	3	1	–	2	1	1	3	3	4	5	2
SWA2	1 128 926	3	4	2	–	3	2	1	4	1	3	3	3
Tasmania													
TCH	767 853	5	5	4	–	4	3	3	5	3	3	4	6
TMI	415 437	2	2	2	–	1	1	1	2	3	3	5	1
TNS	622 664	3	4	2	–	2	2	1	4	3	3	4	4
TSE	1 086 482	4	4	2	–	2	2	2	4	2	3	3	3
TSR	774 679	5	5	4	–	3	3	3	5	3	3	3	6
TWE	1 546 429	6	5	5	–	5	4	4	6	3	3	4	6
Victorian Midlands													
VM1	1 681 675	2	2	2	–	2	2	1	1	2	2	5	1
VM2	1 335 967	2	2	2	–	2	2	1	2	2	2	5	1
VM3	274 241	5	5	5	–	5	4	3	4	2	2	5	5
VM4	490 205	2	1	2	–	2	1	1	2	3	2	5	2
Victorian Volcanic Plain													
VVP1	2 077 943	1	1	2	–	2	1	1	2	2	2	1	1
VVP2	84 193	1	1	1	–	1	1	1	1	4	3	5	2
Warren													
WAR	844 026	5	5	3	–	3	4	3	4	3	2	2	5
Wet Tropics													
WET1	221 085	3	2	1	–	2	2	1	3	3	2	3	3
WET2	146 628	3	4	3	–	3	2	1	3	3	2	2	3
WET3	201 845	3	3	2	–	2	2	1	3	2	2	2	2
WET4	168 028	4	3	2	–	2	2	1	2	2	2	5	3
WET5	275 102	6	4	2	–	2	4	4	4	3	2	3	5
WET6	239 696	6	5	3	–	3	4	4	5	3	2	3	6
WET7	255 408	6	4	2	–	2	5	4	6	2	2	2	5
WET8	116 331	5	2	1	–	1	3	4	5	3	2	2	6
WET9	360 379	6	4	2	–	2	4	4	5	2	2	2	5

Extensive use zone

Subregion	Area (ha)	Attribute class values C1	C2a	C2b	C3a	C3b	C4	C6	C8a	C8b	C8c	C8d	Landscape stress
Arnhem Coast													
ARC1	107 041	6	1	–	6	1	–	4	–	5	3	2	5
ARC2	1 710 401	6	1	–	6	1	–	3	–	5	3	2	5
ARC3	1 127 551	6	1	–	6	1	–	4	–	5	3	2	5
ARC4	254 082	6	1	–	6	1	–	4	–	5	4	2	5
ARC5	39 561	6	1	–	6	1	–	4	–	5	4	2	5
Arnhem Plateau													
ARP1	1 038 639	6	5	–	6	3	–	4	–	4	3	5	6
ARP2	1 267 426	6	3	–	6	1	–	4	–	5	3	5	5
Broken Hill Complex													
BHC1	2 778 482	6	1	–	2	1	–	3	–	4	4	5	3
BHC2	654 524	6	4	–	3	2	–	3	–	5	4	5	4
BHC3	299 809	6	1	–	2	1	–	3	–	4	4	5	3
BHC4	1 966 346	6	1	–	1	1	–	3	–	3	3	5	3
Burt Plain													
BRT1	2 931 097	6	1	–	3	1	–	4	–	–	3	5	4
BRT2	3 531 137	6	1	–	3	1	–	4	–	5	3	5	4
BRT3	390 973	6	1	–	1	1	–	4	–	5	3	5	3
BRT4	526 577	6	2	–	4	1	–	4	–	–	–	5	5
Central Arnhem													
CA1	3 135 465	6	1	–	6	1	–	4	–	5	3	4	5
CA2	324 458	6	1	–	6	1	–	4	–	5	4	5	5
Carnarvon													
CAR1	2 352 970	6	2	–	2	1	–	3	–	5	4	2	3
CAR2	6 023 915	6	2	–	3	1	–	3	–	5	3	3	3
Channel Country													
CHC1	2 825 338	6	1	–	3	1	–	4	–	–	4	5	4
CHC10	139 047	6	1	–	3	2	–	3	–	5	4	5	4
CHC11	1 074 263	6	1	–	2	1	–	4	–	5	4	5	3
CHC2	6 993 567	6	2	–	3	1	–	4	–	5	3	5	4
CHC3	5 383 828	6	3	–	3	1	–	4	–	5	4	5	4
CHC4	3 284 118	6	3	–	2	1	–	4	–	5	3	5	3
CHC5	1 844 455	6	1	–	2	1	–	4	–	5	4	5	3
CHC6	2 096 956	6	5	–	4	3	–	4	–	5	4	5	6
CHC7	1 055 103	6	3	–	5	1	–	4	–	–	4	5	5
CHC8	2 507 327	6	1	–	3	1	–	4	–	5	–	5	4
CHC9	1 245 790	6	4	–	2	2	–	4	–	5	4	5	4

Subregion	Area	Attribute class values											
	(ha)	C1	C2a	C2b	C3a	C3b	C4	C6	C8a	C8b	C8c	C8d	Landscape stress
Central Kimberley													
CK1	4 397 285	6	1	–	5	2	–	4	–	5	3	5	5
CK2	2 324 678	6	1	–	4	1	–	3	–	–	3	5	5
CK3	953 656	6	1	–	5	3	–	4	–	5	3	5	6
Coolgardie													
COO1	1 843 082	6	4	–	5	5	–	4	–	5	4	5	5
COO2	6 010 675	6	4	–	5	5	–	4	–	3	3	5	4
COO3	5 058 123	6	2	–	4	4	–	3	–	4	3	5	5
Cobar Peneplain													
CP1	388 728	6	2	–	1	1	–	3	–	5	4	5	3
CP2	1 778 446	6	2	–	1	1	–	3	–	4	3	5	3
Central Ranges													
CR1	9 178 178	6	1	–	5	4	–	4	–	5	3	5	6
CR2	423 360	6	1	–	6	1	–	4	–	–	4	5	5
CR3	518 495	6	1	–	2	1	–	4	–	5	4	5	3
Cape York Peninsula													
CYP1	2 395 283	6	3	–	5	1	–	4	–	2	2	2	4
CYP2	423 368	6	5	–	5	3	–	4	–	3	2	2	4
CYP3	67 816	6	1	–	3	1	–	4	–	3	4	2	4
CYP4	1 425 861	6	4	–	6	2	–	4	–	3	3	2	4
CYP5	573 236	6	2	–	5	2	–	4	–	3	2	2	4
CYP6	1 640 822	6	4	–	5	3	–	4	–	2	2	3	4
CYP7	2 754 561	6	4	–	5	2	–	4	–	3	3	3	3
CYP8	2 574 669	6	1	–	5	1	–	4	–	5	3	5	4
CYP9	262 089	6	4	–	4	2	–	4	–	4	3	3	5
Daly Basin													
DAB	2 092 256	6	2	–	5	1	–	4	–	–	3	5	5
Darwin Coastal													
DAC	2 782 511	6	4	–	1	2	–	3	–	5	3	2	3
Dampierland													
DL1	3 429 588	6	1	–	3	1	–	3	–	–	2	2	4
DL2	4 941 545	6	1	–	5	3	–	4	–	5	3	2	6
Davenport Murchison Ranges													
DMR1	1 218 560	6	1	–	5	1	–	4	–	–	4	5	5
DMR2	1 589 604	6	3	–	5	1	–	4	–	–	4	5	5
DMR3	2 996 996	6	1	–	6	1	–	4	–	–	4	5	5
Darling River Plains													
DRP10	89 083	6	1	–	1	2	–	3	–	4	3	5	3
DRP6	287 584	6	1	–	1	1	–	3	–	5	–	5	3

Subregion	Area (ha)	Attribute class values C1	C2a	C2b	C3a	C3b	C4	C6	C8a	C8b	C8c	C8d	Landscape stress
Darling River Plains													
DRP7	463 754	6	1	–	1	1	–	3	–	5	4	5	3
DRP8	488 837	6	3	–	1	2	–	3	–	4	4	5	3
DRP9	157 003	6	2	–	1	1	–	3	–	4	3	5	3
Finke													
FIN1	2 257 081	6	1	–	5	1	–	4	–	5	3	5	5
FIN2	1 520 287	6	1	–	4	1	–	4	–	5	3	5	5
FIN3	2 762 175	6	1	–	4	1	–	4	–	5	3	5	5
FIN4	843 695	6	1	–	4	1	–	4	–	5	3	5	5
Flinders Lofty Block													
FLB3	2 034 858	6	1	–	1	1	–	2	–	4	3	5	3
FLB4	2 067 039	6	3	–	1	1	–	2	–	3	3	5	3
FLB5	1 690 914	6	4	–	1	1	–	2	–	4	3	5	3
Gasgoyne													
GAS1	3 686 853	6	2	–	3	2	–	3	–	5	4	5	3
GAS2	4 718 577	6	1	–	4	3	–	4	–	–	4	5	5
GAS3	9 669 376	6	2	–	2	2	–	3	–	5	3	5	4
Gawler													
GAW1	977 952	6	3	–	1	1	–	3	–	3	3	5	3
GAW2	1 786 907	6	1	–	2	1	–	3	–	4	3	5	3
GAW3	3 439 491	6	5	–	3	3	–	3	–	3	3	5	4
GAW4	1 190 336	6	1	–	2	1	–	3	–	5	3	5	3
GAW5	4 966 088	6	1	–	2	1	–	3	–	4	3	5	3
Gibson Desert													
GD1	12 714 687	6	4	–	6	5	–	4	–	–	3	5	6
GD2	2 914 090	6	1	–	6	4	–	4	–	–	4	5	6
Gulf Fall and Uplands													
GFU1	9 340 813	6	2	–	4	1	–	4	–	5	3	5	5
GFU2	2 517 001	6	1	–	5	1	–	4	–	–	4	5	5
Geraldton Sandplains													
GS1	183 710	6	3	–	4	1	–	4	–	4	2	3	3
Great Sandy Desert													
GSD1	12 316 702	6	1	–	6	1	–	4	–	–	3	5	5
GSD2	26 737 944	6	2	–	6	1	–	4	–	–	2	5	5
GSD3	375 672	6	1	–	6	1	–	4	–	–	3	5	5
GSD4	722 851	6	1	–	6	1	–	4	–	–	3	5	5
GSD5	289 546	6	1	–	4	1	–	4	–	–	3	5	5
GSD6	82 932	6	1	–	6	1	–	4	–	–	4	5	5

Subregion	Area (ha)	Attribute class values C1	C2a	C2b	C3a	C3b	C4	C6	C8a	C8b	C8c	C8d	Landscape stress
Gulf Coastal													
GUC1	2 617 226	6	1	–	5	1	–	4	–	–	3	3	5
GUC2	60 716	6	3	–	5	1	–	4	–	–	4	2	5
Gulf Plains													
GUP1	1 072 137	6	1	–	5	1	–	4	–	5	3	2	4
GUP10	124 364	6	1	–	6	1	–	4	–	–	–	2	4
GUP2	1 589 464	6	1	–	1	1	–	4	–	5	3	5	3
GUP3	2 358 319	6	1	–	1	1	–	4	–	–	3	5	3
GUP4	5 201 796	6	3	–	5	1	–	4	–	5	3	5	4
GUP5	3 789 787	6	1	–	4	1	–	4	–	5	4	5	4
GUP6	2 207 827	6	3	–	6	1	–	4	–	5	3	5	4
GUP7	1 833 466	6	1	–	4	1	–	4	–	5	3	5	4
GUP8	2 450 009	6	1	–	2	1	–	3	–	–	3	5	3
GUP9	1 315 699	6	1	–	5	1	–	4	–	5	4	5	4
Great Victoria Desert													
GVD1	4 741 619	6	3	–	6	5	–	4	–	5	3	5	6
GVD2	12 590 678	6	3	–	6	1	–	4	–	5	3	5	5
GVD3	11 431 690	6	4	–	6	4	–	4	–	5	3	5	6
GVD4	4 944 136	6	1	–	6	2	–	4	–	–	3	5	5
GVD5	3 650 214	6	5	–	5	3	–	4	–	5	3	5	6
GVD6	4 516 997	6	4	–	6	4	–	4	–	4	3	5	6
Hampton													
HAM	1 087 185	6	4	–	4	3	–	4	–	–	4	4	6
Little Sandy Desert													
LSD1	991 275	6	5	–	6	6	–	4	–	–	4	5	6
LSD2	10 098 549	6	1	–	6	6	–	4	–	–	3	5	6
MacDonnell Ranges													
MAC1	1 483 972	6	4	–	5	2	–	4	–	4	3	5	5
MAC2	1 092 779	6	4	–	5	2	–	4	–	4	3	5	5
MAC3	1 352 689	6	1	–	3	1	–	4	–	4	4	5	4
Murray Darling Depression													
MDD1	6 141 322	6	3	–	3	1	–	3	–	3	2	5	3
MDD6	3 798 454	6	2	–	2	1	–	3	–	4	3	5	3
Mitchell Grass Downs													
MGD1	1 153 285	6	1	–	1	1	–	4	–	–	–	5	3
MGD2	8 917 351	6	1	–	2	1	–	4	–	–	3	5	3
MGD3	2 955 946	6	1	–	3	1	–	4	–	5	4	5	3
MGD4	3 765 089	6	3	–	2	1	–	4	–	5	3	5	3
MGD5	2 336 319	6	1	–	3	1	–	4	–	5	4	5	3

Subregion	Area	Attribute class values											
	(ha)	C1	C2a	C2b	C3a	C3b	C4	C6	C8a	C8b	C8c	C8d	Landscape stress
Mulga Lands													
MUL7	1 694 601	6	4	–	1	2	–	3	–	4	4	5	3
MUL8	4 695 151	6	1	–	2	1	–	3	–	4	–	5	3
MUL9	1 247 797	6	4	–	4	2	–	3	–	5	4	5	4
MUL10	2 884 099	6	1	–	3	1	–	3	–	5	–	5	3
MUL11	1 940 225	6	1	–	2	1	–	3	–	5	4	5	3
MUL12	456 823	6	1	–	1	1	–	3	–	5	–	5	3
MUL13	403 428	6	1	–	1	1	–	4	–	5	–	5	3
MUL14	1 072 315	6	1	–	1	1	–	3	–	5	4	5	3
MUL15	320 477	6	1	–	1	1	–	4	–	5	4	5	3
MUL16	532 115	6	1	–	2	1	–	3	–	5	4	5	3
Murchison													
MUR1	21 134 564	6	1	–	3	2	–	3	–	4	3	5	3
MUR2	6 985 342	6	1	–	3	1	–	3	–	5	4	5	3
Northern Kimberley													
NK1	5 942 702	6	3	–	5	4	–	4	–	5	2	2	6
NK2	2 446 279	6	4	–	6	5	–	4	–	5	3	2	6
Nullabor													
NUL1	5 788 573	6	5	–	6	5	–	4	–	–	3	5	6
NUL2	12 782 569	6	4	–	5	3	–	4	–	5	3	4	6
NUL3	1 148 737	6	5	–	5	3	–	4	–	5	4	5	6
Mount Isa Inlier													
NWH1	1 409 538	6	1	–	3	1	–	3	–	–	4	5	3
NWH2	763 135	6	4	–	6	2	–	4	–	5	4	5	4
NWH3	4 492 284	6	1	–	4	1	–	3	–	5	3	5	4
Ord Victoria Plain													
OVP1	3 236 695	6	4	–	4	3	–	3	–	5	3	5	6
OVP2	7 729 584	6	2	–	4	2	–	3	–	–	2	5	4
OVP3	749 831	6	5	–	3	3	–	4	–	–	3	5	5
OVP4	828 726	6	1	–	4	1	–	4	–	–	4	5	5
Pine Creek													
PCK	2 851 823	6	5	–	6	1	–	4	–	3	3	5	4
Pilbara													
PIL1	8 375 074	6	2	–	3	3	–	3	–	–	3	2	4
PIL2	1 875 468	6	1	–	3	2	–	4	–	5	4	5	4
PIL3	5 710 564	6	4	–	4	4	–	4	–	5	4	5	6
PIL4	1 891 818	6	2	–	2	2	–	4	–	–	3	2	3

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Summary

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Subregion	Area	Attribute class values											
	(ha)	C1	C2a	C2b	C3a	C3b	C4	C6	C8a	C8b	C8c	C8d	Landscape stress
Simpson-Strzelecki Dunefields													
SSD1	1 355 222	6	1	–	4	1	–	4	–	5	4	5	5
SSD2	13 607 604	6	4	–	6	2	–	4	–	5	2	5	5
SSD3	4 735 896	6	5	–	6	5	–	4	–	5	4	5	6
SSD4	951 543	6	2	–	2	1	–	4	–	5	4	5	3
SSD5	7 495 824	6	4	–	4	2	–	4	–	5	3	5	5
SSD6	309 649	6	1	–	1	1	–	3	–	5	4	5	3
SSD7	976 344	6	1	–	1	1	–	3	–	5	4	5	3
Stony Plains													
STP1	4 497 927	6	4	–	2	2	–	3	–	5	3	5	4
STP2	4 633 162	6	1	–	2	1	–	3	–	5	3	5	3
STP3	2 987 200	6	1	–	1	1	–	3	–	4	3	5	3
STP4	256 525	6	1	–	2	1	–	3	–	5	4	5	3
STP5	1 047 199	6	4	–	3	2	–	3	–	5	3	5	4
Sturt Plateau													
STU1	1 938 936	6	1	–	6	1	–	4	–	–	4	5	5
STU2	4 333 920	6	1	–	5	1	–	4	–	–	3	5	5
STU3	3 584 772	6	1	–	4	1	–	4	–	–	3	5	5
Tanami													
TAN1	20 772 903	6	1	–	6	1	–	4	–	–	2	5	5
TAN2	1 600 955	6	1	–	6	1	–	4	–	–	4	5	5
TAN3	3 627 223	6	1	–	5	2	–	4	–	–	4	5	5
Tiwi Coburg													
TIW1	723 512	6	1	–	6	1	–	4	–	5	3	2	5
TIW2	247 424	6	5	–	6	5	–	4	–	–	3	2	6
Victoria Bonaparte													
VB1	6 407 405	6	4	–	5	2	–	4	–	–	3	3	4
VB2	170 645	6	1	–	5	1	–	4	–	–	3	5	5
VB3	688 587	6	1	–	2	1	–	4	–	–	3	5	3
Yalgoo													
YAL	4 895 256	6	4	–	4	2	–	3	–	4	3	5	4

APPENDIX 4. ATTRIBUTE VALUES FOR TREND

Vegetation clearing, and condition and trend in high salinity risk or hazard by subregion by jurisdiction

Intensive use zone

Subregion	Area	Attribute class values									
	(ha)	c5a	c5b	t1a	t1b	t1c	t1d	t5a	t5b	t5c	t5d
Australian Alps											
AA1	470 025.2	5	5	5	–	–	–	4	4	1	1
AA2	323 520.9	5	5	5	–	–	–	5	5	S	S
Avon Wheatbelt											
AW1	5 177 495.5	2	2	4	–	–	–	2	2	1	1
AW2	4 202 911.2	2	2	4	–	–	–	1	1	1	1
Brigalow Belt North											
BBN1	719 277.8	5	5	5	4	4	1	4	5	1	1
BBN2	1 061 100.0	5	5	5	5	5	3	5	5	1	1
BBN3	735 489.7	4	4	5	4	4	1	4	4	1	1
BBN4	102 219.2	5	5	5	5	5	1	4	4	1	1
BBN5	376 444.5	5	5	5	5	5	2	5	5	1	1
BBN6	1 338 049.1	5	5	4	3	4	3	5	5	1	1
BBN7	1 800 649.2	5	5	2	2	2	3	5	5	1	1
BBN8	438 648.2	5	5	2	2	4	3	5	5	1	1
BBN9	355 547.0	5	5	5	4	4	1	5	5	1	1
BBN10	1 238 536.9	4	4	4	4	4	3	3	4	1	1
BBN11	2 701 119.0	5	5	1	1	1	1	4	5	1	1
BBN12	542 091.0	5	5	5	4	4	3	5	5	1	1
BBN13	1 018 601.2	5	5	3	2	3	3	4	4	1	1
BBN14	1 124 984.6	5	5	4	4	4	1	5	5	1	1
Brigalow Belt South											
BBS1	1 053 242.9	5	5	2	3	3	3	5	5	1	1
BBS2	764 037.1	5	5	4	4	4	1	5	5	1	1
BBS3	211 285.8	5	5	5	5	5	1	5	5	1	1
BBS4	1 293 527.7	4	5	4	5	4	1	4	5	1	1
BBS5	298 165.9	5	5	5	5	5	1	4	5	1	1
BBS6	707 867.9	5	5	4	4	4	1	5	5	1	1
BBS7	987 663.5	5	5	4	4	4	1	4	4	1	1
BBS8	1 535 115.6	5	5	4	4	4	1	5	5	1	1
BBS9	290 362.9	5	5	5	5	5	3	5	5	1	1
BBS10	2 298 940.7	5	5	4	3	2	1	5	5	1	1
BBS11	644 090.4	4	5	4	4	4	1	4	4	1	1

Subregion	Area (ha)	Attribute class values c5a	c5b	t1a	t1b	t1c	t1d	t5a	t5b	t5c	t5d
Brigalow Belt South											
BBS12	4 269 566.1	5	5	1	1	1	1	5	5	1	1
BBS13	1 295 654.0	5	5	4	4	3	1	5	5	1	1
BBS14	162 271.5	5	5	5	4	5	3	4	5	1	1
BBS15	993 820.9	5	5	4	2	1	1	5	5	1	1
BBS16	449 465.9	5	5	4	4	4	1	4	4	1	1
BBS17	1 639 399.6	4	5	5	4	4	3	4	4	1	1
BBS18 NSW	86 502.7	5	5	–	–	–	–	5	5	S	S
BBS18 Qld	1 241 570.0	5	5	4	3	3	1	5	5	1	1
BBS19	802 963.1	5	5	4	4	3	1	4	4	1	1
BBS20 NSW	71 598.2	5	5	5	–	–	–	5	5	S	S
BBS20 Qld	649 455.1	5	5	4	3	2	1	4	5	1	1
BBS21	545 395.8	5	5	5	–	–	–	5	5	1	1
BBS22	700 494.6	5	5	5	–	–	–	5	5	1	1
BBS23	534 947.9	5	5	5	–	–	–	4	4	1	1
BBS24	1 733 674.4	5	5	5	–	–	–	4	4	1	1
BBS25	938 859.0	5	5	5	–	–	–	4	4	1	1
BBS26	522 282.3	5	5	5	–	–	–	4	5	1	1
BBS27	205 342.5	4	4	5	–	–	–	2	2	1	1
Ben Lomond											
BEL	657 503.5	5	5	5	2	–	–	5	5	1	1
Cobar Peneplain											
CP3	1 974 970.7	5	5	5	–	–	–	5	5	S	S
CP4	2 069 909.1	5	5	5	–	–	–	5	5	1	1
CP5	1 138 066.4	5	5	5	–	–	–	5	5	1	1
Central Mackay Coast											
CQC1	93 652.7	5	5	5	5	5	4	5	5	1	1
CQC2	614 457.9	4	5	4	4	4	3	4	4	1	1
CQC3	520 574.7	5	5	5	5	5	3	5	5	1	1
CQC4	193 886.4	5	5	5	5	5	2	4	5	1	1
CQC5	20 217.9	5	5	5	5	5	–	5	5	1	1
Desert Uplands											
DEU1	1 592 171.1	5	5	3	4	3	1	5	5	1	1
DEU2	4 430 893.7	5	5	1	1	1	1	5	5	1	1
DEU3	1 009 239.5	5	5	4	4	4	3	5	5	1	1
Darling Riverine Plains											
DRP1 NSW	683 817.3	5	5	5	–	–	–	5	5	S	S
DRP1 Qld	368 489.3	5	5	5	3	2	1	5	5	1	1
DRP2 NSW	527 878.7	5	5	5	–	–	–	5	5	S	S

Subregion	Area (ha)	Attribute class values									
		c5a	c5b	t1a	t1b	t1c	t1d	t5a	t5b	t5c	t5d
Darling Riverine Plains											
DRP2 Qld	5 987.9	5	5	5	3	2	1	5	5	1	S
DRP3 NSW	513 951.8	5	5	5	–	–	–	5	5	S	S
DRP3 Qld	573 760.1	5	5	5	3	2	1	5	5	1	1
DRP4 NSW	4 091 460.0	5	5	5	–	–	–	4	5	1	1
DRP4 Qld	306 589.4	5	5	5	4	4	1	5	5	1	1
DRP5	2 097 454.4	5	5	5	–	–	–	5	5	S	S
Einasleigh Uplands											
EIU1	913 941.9	5	5	5	5	5	4	5	5	1	1
EIU2	2 990 944.2	5	5	5	5	5	4	5	5	1	1
EIU3	1 700 156.0	5	5	4	4	4	3	5	5	1	1
EIU4	3 240 487.4	5	5	5	5	5	2	4	4	1	1
EIU5	2 255 445.3	5	5	5	4	5	3	4	4	1	1
EIU6	750 977.0	5	5	5	5	5	2	5	5	1	1
Esperance Plains											
ESP1	1 573 028.4	2	2	5	–	–	–	1	2	1	1
ESP2	1 333 297.6	3	3	5	–	–	–	1	1	1	1
Eyre Yorke Block											
EYB1	436 512.1	4	4	5	–	–	–	4	4	S	S
EYB2	1 085 598.8	4	4	5	–	–	–	4	4	S	S
EYB3	1 171 635.6	4	4	5	–	–	–	4	4	S	S
EYB4	1 089 151.7	5	5	5	–	–	–	5	5	S	S
EYB5	2 295 667.2	5	5	5	–	–	–	5	5	S	S
Flinders Lofty Block											
FLB1	300 384.5	5	5	5	–	–	–	5	5	S	S
FLB2	1 032 917.0	5	5	5	–	–	–	5	5	S	S
Flinders											
FUR1	40 564.2	5	5	5	–	–	–	5	5	1	1
FUR2	472 719.8	4	5	5	5	–	–	4	4	1	1
Geraldton Sandplains											
GS2	1 968 412.2	5	5	3	–	–	–	5	5	1	1
GS3	1 173 488.3	5	5	3	–	–	–	4	5	1	1
Jarrah Forest											
JF1	1 899 635.9	4	5	4	–	–	–	1	1	1	1
JF2	2 607 681.2	3	4	4	–	–	–	1	1	1	1
Kanmantoo											
KAN1	439 986.3	5	5	5	–	–	–	5	5	S	S
KAN2	370 588.3	5	5	5	–	–	–	5	5	S	S

Subregion	Area					Attribute class values					
	(ha)	c5a	c5b	t1a	t1b	t1c	t1d	t5a	t5b	t5c	t5d
King											
KIN	417 326.7	5	5	5	5	–	–	5	5	S	S
Mallee											
MAL1	2 457 035.4	4	4	5	–	–	–	2	2	1	1
MAL2	4 937 706.1	2	2	2	–	–	–	1	2	1	1
Murray Darling Depression											
MDD2 SA	2 121 933.5	5	5	5	–	–	–	5	5	1	1
MDD2 Vic	3 398 066.1	4	5	5	–	–	–	3	5	1	1
MDD3	249 131.7	3	3	5	–	–	–	2	2	1	1
MDD4 SA	960 623.9	5	5	5	–	–	–	5	5	S	S
MDD4 Vic	1 372 567.9	5	5	5	–	–	–	5	5	1	1
MDD5 SA	132 796.1	5	5	5	–	–	–	5	5	S	S
MDD5 Vic	1 561 489.1	4	4	5	–	–	–	3	4	1	1
MGD6	3 527 183.7	5	5	5	5	4	1	5	5	1	1
MGD7	6 793 576.6	5	5	3	4	4	1	5	5	1	1
MGD8	4 079 309.2	5	5	2	2	2	2	5	5	1	1
Mulga Lands											
MUL1	2 066 000.2	5	5	2	1	1	1	5	5	1	1
MUL2	1 558 974.1	5	5	1	2	2	1	5	5	1	1
MUL3 NSW	760 355.3	5	5	5	–	–	–	5	5	S	S
MUL3 Qld	1 226 156.1	5	5	2	4	4	1	5	5	1	1
MUL4	669 981.1	5	5	3	3	2	1	5	5	1	1
MUL5 NSW	324 826.2	5	5	5	–	–	–	5	5	S	S
MUL5 Qld	2 168 153.0	5	5	4	4	4	1	5	5	S	S
MUL6	1 276 628.1	5	5	3	4	4	1	5	5	S	S
Nandewar											
NAN1 NSW	329 559.2	5	5	5	–	–	–	4	4	1	1
NAN1 Qld	628 677.6	4	5	4	4	4	2	4	4	1	1
NAN2	230 958.0	5	5	5	–	–	–	5	5	S	S
NAN3	84 443.4	5	5	5	–	–	–	4	4	1	1
NAN4	1 424 180.9	5	5	5	–	–	–	5	5	1	1
Naracoorte Coastal Plain											
NCP1 SA	445 049.3	3	2	5	–	–	–	2	2	1	1
NCP1 Vic	12 748.8	5	5	5	–	–	–	2	3	1	1
NCP2 SA	141 193.1	5	5	5	–	–	–	5	5	S	S
NCP2 Vic	490 138.6	5	5	5	–	–	–	2	4	1	1
NCP3	741 084.8	3	3	5	–	–	–	2	1	1	1
NCP4	708 059.0	2	2	5	–	–	–	2	1	1	1

Subregion	Area	Attribute class values									
	(ha)	c5a	c5b	t1a	t1b	t1c	t1d	t5a	t5b	t5c	t5d
New England Tableland											
NET1	151 864.3	5	5	5	–	–	–	5	5	S	S
NET2	24 624.4	5	5	5	–	–	–	5	5	S	S
NET3	476 491.8	5	5	5	–	–	–	5	5	S	S
NET4	291 246.1	5	5	5	–	–	–	5	5	S	S
NET5	106 250.5	5	5	5	–	–	–	5	5	S	S
NET6	97 770.3	5	5	5	–	–	–	5	5	S	S
NET7	277 292.9	5	5	5	–	–	–	5	4	1	1
NET8	35 420.4	5	5	5	–	–	–	5	5	S	S
NET9	117 458.3	5	5	5	–	–	–	5	5	S	S
NET10	150 105.4	5	5	5	–	–	–	5	5	S	S
NET11	205 456.2	5	5	5	–	–	–	5	5	1	1
NET12 NSW	131 725.4	5	5	5	–	–	–	2	2	1	1
NET12 Qld	7 815.5	5	5	5	5	5	1	5	5	1	1
NET13	65 133.3	5	5	5	–	–	–	5	5	S	S
NET14	63 888.0	5	5	5	–	–	–	2	2	1	1
NET15 NSW	132 981.9	5	5	5	–	–	–	5	5	S	S
NET15 Qld	135 430.8	5	5	5	5	5	3	5	5	1	1
NET16	320 573.0	5	5	5	–	–	–	5	5	S	S
NET17	78 438.3	5	5	5	–	–	–	5	5	1	1
NET18	113 611.7	5	5	5	–	–	–	5	5	S	S
NET19	20 605.7	5	5	5	–	–	–	5	5	S	S
NSW North Coast											
NNC1	230 408.5	5	5	5	5	5	2	5	5	1	1
NNC2	5 700 979.4	5	5	4	–	–	–	5	5	1	1
NSW South Western Slopes											
NSS1 NSW	4 055 207.6	4	5	5	–	–	–	2	3	1	1
NSS1 Vic	586 536.0	3	4	5	–	–	–	2	4	1	1
NSS2	4 032 203.7	5	5	5	–	–	–	4	4	1	1
Riverina											
RIV1	2 150 580.8	5	5	5	–	–	–	5	5	S	S
RIV2	3 051 105.2	5	5	5	–	–	–	5	5	1	1
RIV3 NSW	1 704 550.5	5	5	5	–	–	–	3	3	1	1
RIV3 Vic	355 010.4	5	5	5	–	–	–	2	3	1	1
RIV4	1 781 989.1	4	4	5	–	–	–	1	2	1	1
RIV5 NSW	88 420.7	5	5	5	–	–	–	5	5	1	1
RIV5 Vic	65 937.4	4	4	5	–	–	–	3	4	1	1
RIV6 NSW	93 125.9	5	5	5	–	–	–	5	5	1	1
RIV6 Vic	173 690.1	5	5	5	–	–	–	5	5	1	1

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Subregion	Area (ha)	Attribute class values c5a	c5b	t1a	t1b	t1c	t1d	t5a	t5b	t5c	t5d
Riverina											
RIV6 NSW	109 258.3	2	2	5	–	–	–	2	2	1	1
Sydney Basin											
SB	3 596 201.9	4	5	3	–	–	–	4	4	1	1
South East Coastal Plain											
SCP1	1 201 673.7	4	5	4	–	–	–	3	4	1	1
SCP2	261 788.1	4	5	5	–	–	–	1	3	1	1
SCP3	234 268.1	4	5	5	–	–	–	1	2	1	1
South East Corner											
SEC1 NSW	66 962.6	5	5	5	–	–	–	5	5	S	S
SEC1 Vic	580 548.8	5	5	4	–	–	–	4	5	1	1
SEC2 NSW	1 235 499.3	5	5	5	–	–	–	5	5	1	1
SEC2 Vic	820 643.4	5	5	4	–	–	–	5	5	1	1
South Eastern Highlands											
SEH1	1 452 184.0	5	5	4	–	–	–	5	5	1	1
SEH2	1 675 957.9	5	5	5	–	–	–	5	5	1	1
SEH3	150 029.7	5	5	5	–	–	–	4	4	1	1
SEH4	344 325.8	5	5	5	–	–	–	5	5	1	1
SEH5 NSW	5 089 184.9	5	5	4	–	–	–	4	4	S	S
SEH5 Vic	31 928.9	5	5	5	–	–	–	5	5	1	1
South Eastern Queensland											
SEQ1	990 673.9	5	5	5	5	4	1	4	5	1	1
SEQ2	784 980.2	5	5	4	4	4	2	4	5	1	1
SEQ3	527 777.5	5	5	4	4	4	2	4	5	1	1
SEQ4	343 335.0	5	5	4	4	4	3	5	5	1	1
SEQ5	806 790.3	5	5	5	5	5	3	5	5	1	1
SEQ6	563 873.4	4	5	5	5	4	1	4	5	1	1
SEQ7	858 703.0	5	5	5	4	4	2	5	5	1	1
SEQ8	698 878.0	4	5	4	4	4	1	4	4	1	1
SEQ9	368 877.7	5	5	5	4	4	3	5	5	1	1
Swan Coastal Plain											
SWA1	383 452.5	1	1	5	–	–	–	1	1	1	1
SWA2	1 128 925.7	2	3	4	–	–	–	1	1	1	1
Tasmania (bioregions only)											
TCH	767 852.6	5	5	4	5	–	–	5	5	1	1
TMI	415 437.3	4	4	5	1	–	–	4	4	1	1
TNS	622 663.6	5	5	5	2	–	–	5	5	S	S
TSE	1 086 482.3	4	4	5	1	–	–	3	4	1	1

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Subregion	Area	Attribute class values									
	(ha)	c5a	c5b	t1a	t1b	t1c	t1d	t5a	t5b	t5c	t5d
Tasmania (bioregions only)											
TSR	774 678.5	5	5	5	5	–	–	5	5	I	I
TWE	1 546 428.7	5	5	5	5	–	–	5	5	S	S
Victorian Midlands											
VM1	1 681 674.6	3	4	5	–	–	–	2	4	I	I
VM2	1 335 966.7	3	5	5	–	–	–	2	4	I	I
VM3	274 241.1	4	5	5	–	–	–	2	4	I	I
VM4	490 205.1	2	4	5	–	–	–	1	2	I	I
Victorian Volcanic Plain											
VVP1	2 077 942.8	4	5	5	–	–	–	1	3	I	I
VVP2	84 193.4	5	5	5	–	–	–	5	5	S	S
Warren											
WAR	844 026.4	2	2	5	–	–	–	2	2	I	I
Wet Tropics											
WET1	221 085.3	4	5	–	–	–	–	4	4	I	I
WET2	146 628.3	4	5	–	–	–	–	4	4	I	I
WET3	201 844.7	4	5	–	–	–	–	3	4	I	I
WET4	168 027.6	4	5	–	–	–	–	3	4	I	I
WET5	275 101.9	5	5	–	–	–	–	5	5	I	I
WET6	239 695.9	5	5	–	–	–	–	5	5	I	I
WET7	255 408.3	5	5	–	–	–	–	5	5	I	I
WET8	116 330.7	5	5	–	–	–	–	4	5	I	I
WET9	360 379.4	5	5	–	–	–	–	5	5	I	I

Extensive use zone

Subregion	Area (ha)	Attribute class values c5a	c5b	t1a	t1b	t1c	t1d	t5a	t5b	t5c	t5d
Arnhem Coast											
ARC1	107 041.4	5	5	–	–	–	–	–	–	–	–
ARC2	1 710 400.8	5	5	–	–	–	–	–	–	–	–
ARC3	1 127 551.5	5	5	–	–	–	–	–	–	–	–
ARC4	254 082.1	5	5	–	–	–	–	–	–	–	–
ARC5	39 561.0	5	5	–	–	–	–	–	–	–	–
Arnhem Plateau											
ARP1	1 038 638.8	5	5	–	–	–	–	–	–	–	–
ARP2	1 267 426.0	5	5	–	–	–	–	–	–	–	–
Broken Hill Complex											
BHC1 NSW	1 685 330.8	5	5	–	–	–	–	–	–	–	–
BHC1 SA	1 093 150.7	5	5	–	–	–	–	–	–	–	–
BHC2	654 524.2	5	5	–	–	–	–	–	–	–	–
BHC3	299 808.7	5	5	–	–	–	–	–	–	–	–
BHC4 NSW	1 176 147.5	5	5	–	–	–	–	–	–	–	–
BHC4 SA	790 198.6	5	5	–	–	–	–	–	–	–	–
Burt Plain											
BRT1	2 931 096.7	5	5	–	–	–	–	–	–	–	–
BRT2	3 531 136.6	5	5	–	–	–	–	–	–	–	–
BRT3	390 972.7	5	5	–	–	–	–	–	–	–	–
BRT4	526 577.2	5	5	–	–	–	–	–	–	–	–
Central Arnhem											
CA1	3 135 465.3	5	5	–	–	–	–	–	–	–	–
CA2	324 457.8	5	5	–	–	–	–	–	–	–	–
Carnarvon											
CAR1	2 352 970.2	5	5	–	–	–	–	–	–	–	–
CAR2	6 023 915.4	5	5	–	–	–	–	–	–	–	–
Channel Country											
CHC1 NT	2 329 708.6	5	5	–	–	–	–	–	–	–	–
CHC1 Qld	495 629.8	5	5	–	–	–	–	–	–	–	–
CHC2 Qld	4 702 758.9	5	5	–	–	–	–	–	–	–	–
CHC2 SA	2 290 808.4	5	5	–	–	–	–	–	–	–	–
CHC3	5 383 827.8	5	5	–	–	–	–	–	–	–	–
CHC4 Qld	2 443 440.2	5	5	–	–	–	–	–	–	–	–
CHC4 SA	840 677.9	5	5	–	–	–	–	–	–	–	–
CHC5	1 844 455.0	5	5	–	–	–	–	–	–	–	–
CHC6	2 096 956.1	5	5	–	–	–	–	–	–	–	–

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Subregion	Area	Attribute class values									
	(ha)	c5a	c5b	t1a	t1b	t1c	t1d	t5a	t5b	t5c	t5d
Channel Country											
CHC7 Qld	985 078.7	5	5	–	–	–	–	–	–	–	–
CHC7 SA	70 024.4	5	5	–	–	–	–	–	–	–	–
CHC8	2 507 327.2	5	5	–	–	–	–	–	–	–	–
CHC9 NSW	832 245.8	5	5	–	–	–	–	–	–	–	–
CHC9 Qld	413 544.3	5	5	–	–	–	–	–	–	–	–
CHC10	139 047.3	5	5	–	–	–	–	–	–	–	–
CHC11 NSW	456 324.2	5	5	–	–	–	–	–	–	–	–
CHC11 Qld	617 938.6	5	5	–	–	–	–	–	–	–	–
Central Kimberley											
CK1	4 397 284.8	5	5	–	–	–	–	–	–	–	–
CK2	2 324 678.2	5	5	–	–	–	–	–	–	–	–
CK3	953 656.4	5	5	–	–	–	–	–	–	–	–
Coolgardie											
COO1	1 843 081.8	5	5	–	–	–	–	–	–	–	–
COO2	6 010 675.1	5	5	–	–	–	–	–	–	–	–
COO3	5 058 123.4	5	5	–	–	–	–	–	–	–	–
Cobar Peneplain											
CP1	388 727.6	5	5	–	–	–	–	–	–	–	–
CP2	1 778 446.1	5	5	–	–	–	–	–	–	–	–
Central Ranges											
CR1 NT	2 593 531.4	5	5	–	–	–	–	–	–	–	–
CR1 SA	1 885 967.9	5	5	–	–	–	–	–	–	–	–
CR1 WA	4 698 679.1	5	5	–	–	–	–	–	–	–	–
CR2	423 360.3	5	5	–	–	–	–	–	–	–	–
CR3	518 494.8	5	5	–	–	–	–	–	–	–	–
Cape York Peninsula											
CYP1	2 395 282.7	5	5	–	–	–	–	–	–	–	–
CYP2	423 368.3	5	5	–	–	–	–	–	–	–	–
CYP3	67 816.1	5	5	–	–	–	–	–	–	–	–
CYP4	1 425 861.0	5	5	–	–	–	–	–	–	–	–
CYP5	573 236.5	5	5	–	–	–	–	–	–	–	–
CYP6	1 640 821.7	5	5	–	–	–	–	–	–	–	–
CYP7	2 754 561.1	5	5	–	–	–	–	–	–	–	–
CYP8	2 574 669.2	5	5	–	–	–	–	–	–	–	–
CYP9	262 089.1	5	5	–	–	–	–	–	–	–	–
Daly Basin											
DAB	2 092 256.5	5	5	–	–	–	–	–	–	–	–

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Subregion	Area (ha)	Attribute class values c5a	c5b	t1a	t1b	t1c	t1d	t5a	t5b	t5c	t5d
Darwin Coastal											
DAC	2 782 511.2	5	5	–	–	–	–	–	–	–	–
Dampierland											
DL1	3 429 588.4	5	5	–	–	–	–	–	–	–	–
DL2	4 941 544.8	5	5	–	–	–	–	–	–	–	–
Davenport Murchison Ranges											
DMR1	1 218 559.5	5	5	–	–	–	–	–	–	–	–
DMR2	1 589 603.7	5	5	–	–	–	–	–	–	–	–
DMR3	2 996 995.5	5	5	–	–	–	–	–	–	–	–
Darling Riverine Plains											
DRP6	287 584.1	5	5	–	–	–	–	–	–	–	–
DRP7	463 753.8	5	5	–	–	–	–	–	–	–	–
DRP8	488 836.7	5	5	–	–	–	–	–	–	–	–
DRP9	157 003.0	5	5	–	–	–	–	–	–	–	–
DRP10	89 083.5	5	5	–	–	–	–	–	–	–	–
Finke											
FIN1	2 257 081.0	5	5	–	–	–	–	–	–	–	–
FIN2	1 520 287.0	5	5	–	–	–	–	–	–	–	–
FIN3 NT	1 660 885.5	5	5	–	–	–	–	–	–	–	–
FIN3 SA	1 101 289.2	5	5	–	–	–	–	–	–	–	–
FIN4	843 694.5	5	5	–	–	–	–	–	–	–	–
Flinders Lofty Block											
FLB3	2 034 857.7	5	5	–	–	–	–	–	–	–	–
FLB4	2 067 039.0	5	5	–	–	–	–	–	–	–	–
FLB5	1 690 914.0	5	5	–	–	–	–	–	–	–	–
Gascoyne											
GAS1	3 686 853.1	5	5	–	–	–	–	–	–	–	–
GAS2	4 718 576.8	5	5	–	–	–	–	–	–	–	–
GAS3	9 669 375.5	5	5	–	–	–	–	–	–	–	–
Gawler											
GAW1	977 952.0	5	5	–	–	–	–	–	–	–	–
GAW2	1 786 907.5	5	5	–	–	–	–	–	–	–	–
GAW3	3 439 491.3	5	5	–	–	–	–	–	–	–	–
GAW4	1 190 335.8	5	5	–	–	–	–	–	–	–	–
GAW5	4 966 087.6	5	5	–	–	–	–	–	–	–	–
Gibson Desert											
GD1	12 714 687.2	5	5	–	–	–	–	–	–	–	–
GD2	2 914 089.8	5	5	–	–	–	–	–	–	–	–

Subregion	Area (ha)	Attribute class values c5a	c5b	t1a	t1b	t1c	t1d	t5a	t5b	t5c	t5d
Gulf Fall and Upland											
GFU1 NT	8 750 029.8	5	5	–	–	–	–	–	–	–	–
GFU1 Qld	590 782.9	5	5	–	–	–	–	–	–	–	–
GFU2	2 517 000.9	5	5	–	–	–	–	–	–	–	–
Geraldton Sandplains											
GS1	183 709.6	5	5	–	–	–	–	–	–	–	–
Great Sandy Desert											
GSD1	12 316 702.0	5	5	–	–	–	–	–	–	–	–
GSD2 NT	8 518 307.8	5	5	–	–	–	–	–	–	–	–
GSD2 WA	18 219 636.7	5	5	–	–	–	–	–	–	–	–
GSD3	375 672.0	5	5	–	–	–	–	–	–	–	–
GSD4	722 851.3	5	5	–	–	–	–	–	–	–	–
GSD5	289 545.7	5	5	–	–	–	–	–	–	–	–
GSD6	82 931.6	5	5	–	–	–	–	–	–	–	–
Gulf Coastal											
GUC1	2 617 225.7	5	5	–	–	–	–	–	–	–	–
GUC2	60 716.0	5	5	–	–	–	–	–	–	–	–
Gulf Plains											
GUP1	1 072 137.0	5	5	–	–	–	–	–	–	–	–
GUP2	1 589 463.7	5	5	–	–	–	–	–	–	–	–
GUP3	2 358 319.4	5	5	–	–	–	–	–	–	–	–
GUP4	5 201 796.3	5	5	–	–	–	–	–	–	–	–
GUP5	3 789 786.8	5	5	–	–	–	–	–	–	–	–
GUP6	2 207 826.8	5	5	–	–	–	–	–	–	–	–
GUP7 NT	149 255.2	5	5	–	–	–	–	–	–	–	–
GUP7 Qld	1 684 210.6	5	5	–	–	–	–	–	–	–	–
GUP8	2 450 009.3	5	5	–	–	–	–	–	–	–	–
GUP9	1 315 699.0	5	5	–	–	–	–	–	–	–	–
GUP10	124 363.6	5	5	–	–	–	–	–	–	–	–
Great Victoria Desert											
GVD1	4 741 618.9	5	5	–	–	–	–	–	–	–	–
GVD2	12 590 678.1	5	5	–	–	–	–	–	–	–	–
GVD3 SA	7 545 634.1	5	5	–	–	–	–	–	–	–	–
GVD3 WA	3 886 055.6	5	5	–	–	–	–	–	–	–	–
GVD4 SA	4 369 546.0	5	5	–	–	–	–	–	–	–	–
GVD4 WA	574 590.2	5	5	–	–	–	–	–	–	–	–
GVD5	3 650 213.7	5	5	–	–	–	–	–	–	–	–
GVD6	4 516 997.0	5	5	–	–	–	–	–	–	–	–

Subregion	Area	Attribute class values									
	(ha)	c5a	c5b	t1a	t1b	t1c	t1d	t5a	t5b	t5c	t5d
Hampton											
HAM SA	44 361.8	5	5	–	–	–	–	–	–	–	–
HAM WA	1 042 822.9	5	5	–	–	–	–	–	–	–	–
Little Sandy Desert											
LSD1	991 275.2	5	5	–	–	–	–	–	–	–	–
LSD2	10 098 549.2	5	5	–	–	–	–	–	–	–	–
Little Sandy Desert											
MAC1	1 483 971.5	5	5	–	–	–	–	–	–	–	–
MAC2	1 092 778.8	5	5	–	–	–	–	–	–	–	–
MAC3	1 352 689.3	5	5	–	–	–	–	–	–	–	–
Murray Darling Depression											
MDD1 NSW	4 247 550.1	5	5	–	–	–	–	–	–	–	–
MDD1 SA	1 893 771.5	5	5	–	–	–	–	–	–	–	–
MDD6	3 798 453.8	5	5	–	–	–	–	–	–	–	–
Mitchell Grass Downs											
MGD1	1 153 285.5	5	5	–	–	–	–	–	–	–	–
MGD2 NT	7 254 910.4	5	5	–	–	–	–	–	–	–	–
MGD2 Qld	1 662 440.2	5	5	–	–	–	–	–	–	–	–
MGD3 NT	912 606.5	5	5	–	–	–	–	–	–	–	–
MGD3 Qld	2 043 339.6	5	5	–	–	–	–	–	–	–	–
MGD4	3 765 088.7	5	5	–	–	–	–	–	–	–	–
MGD5	2 336 318.9	5	5	–	–	–	–	–	–	–	–
Mulga Lands											
MUL7 NSW	1 031 940.9	5	5	–	–	–	–	–	–	–	–
MUL7 Qld	662 659.8	5	5	–	–	–	–	–	–	–	–
MUL8 NSW	552 494.9	5	5	–	–	–	–	–	–	–	–
MUL8 Qld	4 142 655.8	5	5	–	–	–	–	–	–	–	–
MUL9	1 247 796.8	5	5	–	–	–	–	–	–	–	–
MUL10	2 884 099.1	5	5	–	–	–	–	–	–	–	
MUL11 NSW	1 097 832.0	5	5	–	–	–	–	–	–	–	–
MUL11 Qld	842 392.6	5	5	–	–	–	–	–	–	–	–
MUL12	456 823.3	5	5	–	–	–	–	–	–	–	–
MUL13	403 428.2	5	5	–	–	–	–	–	–	–	–
MUL14	1 072 315.1	5	5	–	–	–	–	–	–	–	–
MUL15	320 476.7	5	5	–	–	–	–	–	–	–	–
MUL16	532 114.9	5	5	–	–	–	–	–	–	–	–
Murchison											
MUR1	21 134 563.9	5	5	–	–	–	–	–	–	–	–
MUR2	6 985 342.4	5	5	–	–	–	–	–	–	–	–

Subregion	Area	Attribute class values									
	(ha)	c5a	c5b	t1a	t1b	t1c	t1d	t5a	t5b	t5c	t5d
Northern Kimberley											
NK1	5 942 702.1	5	5	–	–	–	–	–	–	–	–
NK2	2 446 279.3	5	5	–	–	–	–	–	–	–	–
Nullabor											
NUL1 SA	723 585.0	5	5	–	–	–	–	–	–	–	–
NUL1 WA	5 064 988.3	5	5	–	–	–	–	–	–	–	–
NUL2 SA	4 111 735.2	5	5	–	–	–	–	–	–	–	–
NUL2 WA	8 670 833.6	5	5	–	–	–	–	–	–	–	–
NUL3	1 148 737.0	5	5	–	–	–	–	–	–	–	–
Mount Isa Inlier											
NWH1	1 409 538.1	5	5	–	–	–	–	–	–	–	–
NWH2 NT	23 548.9	5	5	–	–	–	–	–	–	–	–
NWH2 Qld	739 586.3	5	5	–	–	–	–	–	–	–	–
NWH3	4 492 284.4	5	5	–	–	–	–	–	–	–	–
Ord Victoria Plain											
OVP1 NT	1 070 668.2	5	5	–	–	–	–	–	–	–	–
OVP1 WA	2 166 026.7	5	5	–	–	–	–	–	–	–	–
OVP2 NT	4 395 216.1	5	5	–	–	–	–	–	–	–	–
OVP2 WA	3 334 368.1	5	5	–	–	–	–	–	–	–	–
OVP3	749 831.2	5	5	–	–	–	–	–	–	–	–
OVP4	828 726.4	5	5	–	–	–	–	–	–	–	–
Pine Creek											
PCK	2 851 822.9	5	5	–	–	–	–	–	–	–	–
Pilbara											
PIL1	8 375 074.4	5	5	–	–	–	–	–	–	–	–
PIL2	1 875 467.5	5	5	–	–	–	–	–	–	–	–
PIL3	5 710 564.2	5	5	–	–	–	–	–	–	–	–
PIL4	1 891 817.5	5	5	–	–	–	–	–	–	–	–
Simpson-Strzelecki Dunefields											
SSD1	1 355 222.3	5	5	–	–	–	–	–	–	–	–
SSD2 NT	9 145 147.7	5	5	–	–	–	–	–	–	–	–
SSD2 Qld	2 296 133.4	5	5	–	–	–	–	–	–	–	–
SSD2	2 166 323.4	5	5	–	–	–	–	–	–	–	–
SSD3 NT	48 247.9	5	5	–	–	–	–	–	–	–	–
SSD3 Qld	13 512.8	5	5	–	–	–	–	–	–	–	–
SSD3	4 674 135.1	5	5	–	–	–	–	–	–	–	–
SSD4	951 543.3	5	5	–	–	–	–	–	–	–	–
SSD5 NSW	1 159 698.5	5	5	–	–	–	–	–	–	–	–
SSD5 Qld	1 158 500.9	5	5	–	–	–	–	–	–	–	–

Subregion	Area	Attribute class values									
	(ha)	c5a	c5b	t1a	t1b	t1c	t1d	t5a	t5b	t5c	t5d
Simpson-Strzelecki Dunefields											
SSD5 SA	5 177 624.2	5	5	–	–	–	–	–	–	–	–
SSD6	309 648.9	5	5	–	–	–	–	–	–	–	–
SSD7 NSW	651 381.4	5	5	–	–	–	–	–	–	–	–
SSD7 Qld	324 963.0	5	5	–	–	–	–	–	–	–	–
Stony Plains											
STP1 NT	134 840.9	5	5	–	–	–	–	–	–	–	–
STP1 SA	4 363 086.0	5	5	–	–	–	–	–	–	–	–
STP2	4 633 162.0	5	5	–	–	–	–	–	–	–	–
STP3	2 987 200.4	5	5	–	–	–	–	–	–	–	–
STP4	256 525.0	5	5	–	–	–	–	–	–	–	–
STP5 NT	40 216.5	5	5	–	–	–	–	–	–	–	–
STP5 SA	1 006 982.0	5	5	–	–	–	–	–	–	–	–
Sturt Plateau											
STU1	1 938 936.4	5	5	–	–	–	–	–	–	–	–
STU2	4 333 920.1	5	5	–	–	–	–	–	–	–	–
STU3	3 584 772.2	5	5	–	–	–	–	–	–	–	–
Tanami											
TAN1 NT	17 755 599.9	5	5	–	–	–	–	–	–	–	–
TAN1 WA	3 017 303.2	5	5	–	–	–	–	–	–	–	–
TAN2	1 600 955.2	5	5	–	–	–	–	–	–	–	–
TAN3	3 627 222.9	5	5	–	–	–	–	–	–	–	–
Tiwi Coburg											
TIW1	723 511.6	5	5	–	–	–	–	–	–	–	–
TIW2	247 423.5	5	5	–	–	–	–	–	–	–	–
Victoria Bonaparte											
VB1 NT	4 533 838.4	5	5	–	–	–	–	–	–	–	–
VB1 WA	1 873 566.4	5	5	–	–	–	–	–	–	–	–
VB2	170 644.9	5	5	–	–	–	–	–	–	–	–
VB3	688 587.4	5	5	–	–	–	–	–	–	–	–
Yalgoo											
YAL	4 895 256.5	5	5	–	–	–	–	–	–	–	–

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