Approved Area Management Plan

Title	Dirranbandi Thinning Area Management Plan
Reference no.	2012/004180
Approved	29 July 2012
Entity/ies	Alina Butler AgForward PO Box 1967 ARMIDALE NSW 2350 Duncan Banks "Dunwold" DIRRANBANDI QLD 4486
Area	Dirranbandi Thinning Area Management Plan is based in the Balonne Shire and covers an area consisting of 45 contiguous properties and landholders listed on page 2.
Relevant purpose	☐ To control non-native plants or declared pests ☐ To ensure public safety ☐ To establish a necessary fence, firebreak, road or vehicular track ☐ To clear an encroachment ☒ For thinning ☐ For fodder harvesting, other than on a part of the proposed area that is restricted (fodder harvesting) land
Plan period	For 1o years from the approval date
Mandatory condition(s)	Not applicable
Additional condition(s)	1. Landholders intending to thin regional ecosystem 11.3.17 must, when giving an area management clearing notification, specify the clearing zone where thinning in the regional ecosystem 11.3.17 will occur on the property and provide aerial photography or other imagery which shows the historic (1950s-1960s) dense areas of *Acacia harpophylla* (brigalow) and/or *Casuarina cristata* (belah) and sparse areas of *Eucalyptus populnea* (poplar box) to which thinning operations will restore the floristic composition of the regional ecosystem. 2. Landholders must only use chemical thinning methods for *Acacia harpophylla* (brigalow) when thinning in regional ecosystem 11.3.17. Ground applied or root absorbed chemical application must not be used. 3. Thinning in regional ecosystem 11.3.17 must not target other vegetation than that identified as target species in the Dirranbandi Thinning Area Management Plan, except where clearing is for removing native plants not indigenous to the bioregion.

Landholders

Refer Area Management Plan Map

Property Name	Lot/Plan	Shire
Dunwold	4BLM1093 5BEL5361	Balonne
Carinya	4BLM500	Balonne
Calooma	11BLM369 12BLM39 2BLM39 3BLM1049	Balonne
Trafalgar	2BLM137 35BLM460 3SP108587 40RP910696	Balonne
Hoolavale Ooraine Somerset	1SP211204 2BLM272 7BLM386 10BLM499	Balonne
Wynella	1BLM1196	Balonne
Cunnabri Koomalah Nulky	2BLM1147 3BLM1061 8BLM387 6SP220275 7SP220275 9BLM388	Balonne
Braemore Park	6BLM712	Balonne
Booligar	1AP3781 4BLM39 5BLM1003 6BLM685	Balonne
Balgi Euraba Lowland Nee Nee	8BLM458 1BLM662 2BLM368 3BLM368 8SP109535 10BLM369	Balonne
Boorumbirra	52RP912711	Balonne
Beverleigh Moorenbah Beverleigh	1BLM273 2SP178719 3BLM345	Balonne
Nindi-thana	1BLM683 2BLM711 8BLM1199	Balonne
Cawildi Kilcummin	9BLM985 10SP108587	Balonne
Wyralla	6BLM264 7BLM264 8BLM963 9BLM369	Balonne
Kenmore	2RP910052	Balonne
Dunroman	1BLM1056 2BLM493	
Honeycombe Narine	5BLM499 1RP910052	Balonne
Cavillon	1AP5788 4BLM1021	Balonne

Clyde Kirrima Rebank	1BEL5376 1BLM271 1RP67015 2BEL5376 3BEL5376 4BEL5376 52BEL5376 5BEL5375 5BLM367 AAP19821 4SP129702 1AP5787 5BLM284 6BLM367	
Hamilton	5BLM759	Balonne
Eurah Nelyambo	3BLM270 9BLM838	Balonne
Yamburgan	10BEL53127 11BEL53144 12BLM1095 13BLM1096 2BEL53159 3BLM756 4BEL53159 7BLM804890 8BLM1094	Balonne
Bookalong	17BLM758 18BLM14 2BLM275 4BLM383	Balonne
Glendalough	4BLM1070 7BLM501	Balonne
Tooroora	2BEL53140	Balonne
Bonathorne Bonnie Doon Culbokie	12BLM1070 13BLM857 4BLM345 5BLM600 2BLM274 1SP101418	Balonne
Boyanda Pooloomoodool Wilgunya	3BLM1060 6BLM506 6BLM505 7BLM504	Balonne

Management Intent

The Dirranbandi Landcare group appreciates the chance to participate in this pilot thinning AMP project. This group manages a diverse range of landscapes and has varying degrees of remnant vegetation mapped on their holdings ranging from less than 10% to greater than 70%, with woodlands make up the majority of the application area. The Dirranbandi Landcare group strives to achieve healthy grazing land ecosystems, adopting sound ecological approaches to grazing land management where optimum productivity and healthy landscapes are ensured. This AMP is a tool that will assist producers in the Dirranbandi area to restore regional ecosystems back to their natural floristic composition.

Woodlands are critical when managing grazing land ecosystems. They provide habitat for native fauna and flora, they provide key ecosystem functions such as water and nutrient cycling whilst acting as a carbon sink. Woodland management must strike a healthy tree grass balance to be sustainable and compatible with broader environmental issues. To achieve a balanced outcome it is necessary to have a productive landscape that can sustain healthy pastures on functioning soils with a natural cover of timber.

The future sustainability of the QLD rangelands relies on the development of a regenerative production system based on sound ecological, social and economic goals. These key factors are vital for the sustainable management of thickening invasive native shrubs. A balanced approached to this issue needs to be brought back into the political sphere. Profitable land managers are in the best position to effectively manage the landscape to achieve the best outcomes for the land and the environment. The Dirranbandi Landcare group recognise that the eradication of native shrubs is neither desirable nor feasible. It is not the aim of any treatment as these shrubs form part of a complex regional ecosystem. The principal aim of this thinning AMP is to manage thickening vegetation (particularly invasive native species) and to restore ecosystem structure and functioning to enhance biodiversity and production. Under the current vegetation codes in QLD both are in rapid decline.

The current requirements under the Regional Vegetation Management Codes to apply for a thinning permit are complicated, complex and time consuming; the process needs to be simplified. As thickening has occurred across the landscape for decades, rather than spending hours proving that country has thickened, the group has constituted what a healthy and balanced landscape (Regional Ecosystem) should look like. If the country thickens beyond the trigger densities, thinning can occur. A healthy landscape should be one that the stem density of trees allows good groundcover to be maintained in a range of seasons, ensuring biodiversity outcomes and sustainability are met over the long term.

A cooperative partnership between DERM and the Dirranbandi Landcare group will achieve a simplified, practical and workable area management plan that will meet the requirements of both parties. A landscape that is healthy and in balance will benefit all those who rely on it.

Management Goal 1: *To restore a regional ecosystem to the floristic composition and range of densities typical of the regional ecosystem surrounding that locality.*

Management Outcome 1:

Over the last 60 years vegetation within this application area has progressively thickened. Thickening is not isolated to particular regional ecosystems, it is due to particular species acting invasively, dominating regional ecosystems to a point where biodiversity and pasture production is compromised. Landholders are noticing soil erosion, changes to soil surface hydrology, biodiversity decline and reduced ground cover in areas where vegetation is acting invasively. Reduced groundcover has left bare soil surface areas which are vulnerable to noxious weed invasions from weeds such as Lipia and Parthenium (Refer to appendix 1- photo of Lippia invasion).

Woodland density and structure is continuously changing in response to natural and artificial disturbance such as climate, rainfall, fire and grazing. Two major disturbances that have occurred within the application area include ring barking and major flood events. Ring barking was carried out in the 1940's and 50's. Since ring barking, considerable thickening has occurred throughout the application area. There have been ten major flood events over the last 60 years (1950, 1956, 1974, 1976, 1983, 1988, 1990, 2010, 2011 and 2012). After each flood there has been prolific seedling germination, resulting in extensive thickening. Many of these flood years were preceded by extended droughts in the mid 1960's, mid 1970's, 1979-1982, early 1990's and much of the 2000's. At a time when there was little ground cover, soils were vulnerable to seedling germination. The majority of the application area was watered by bore-drains resulting in uneven grazing pressure which has now been largely rectified by the GABSI Scheme. Factors such as low wool prices and wild dog predation have forced landholders to change their grazing practices away from sheep to cattle. Browsing by livestock, particularly sheep, can limit the establishment and growth of invasive native species.

Given that the life of the AMP is for 10 years, to identify areas that have thickened is not practical due to the size of the application; landholders want to be able to proceed with thinning when it is necessary to achieve landscape objectives. Woody vegetation thickening is not isolated to individual properties or regional ecosystems, it is occurring across the landscape throughout the rangelands region. There are five distinct land types found within the application area. They are:

- 1.**Coolibah-myall** country (semi-open mitchell grass country)
- 2.**Floodplains** (heavy flooded country)
- 3.**Sandy country** (cypress, ironbark, carbeen, sandalwood)
- 4. **Red country** – clay pans (Wilga, leopard wood, box, whitewood,
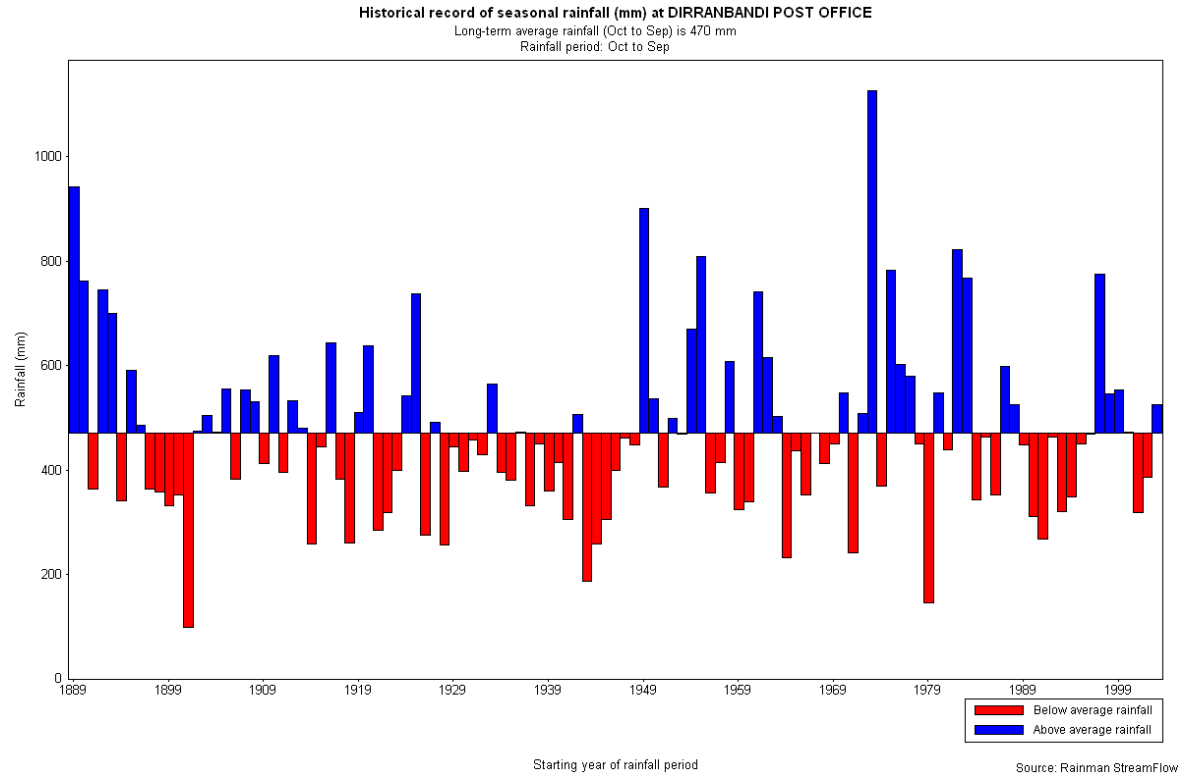- 5. **Ironstone Ridges** (pine, sandalwood, ironbark, mulga, box)

Each of the listed land types have thickened extensively with invasive native species over the last 60 years.

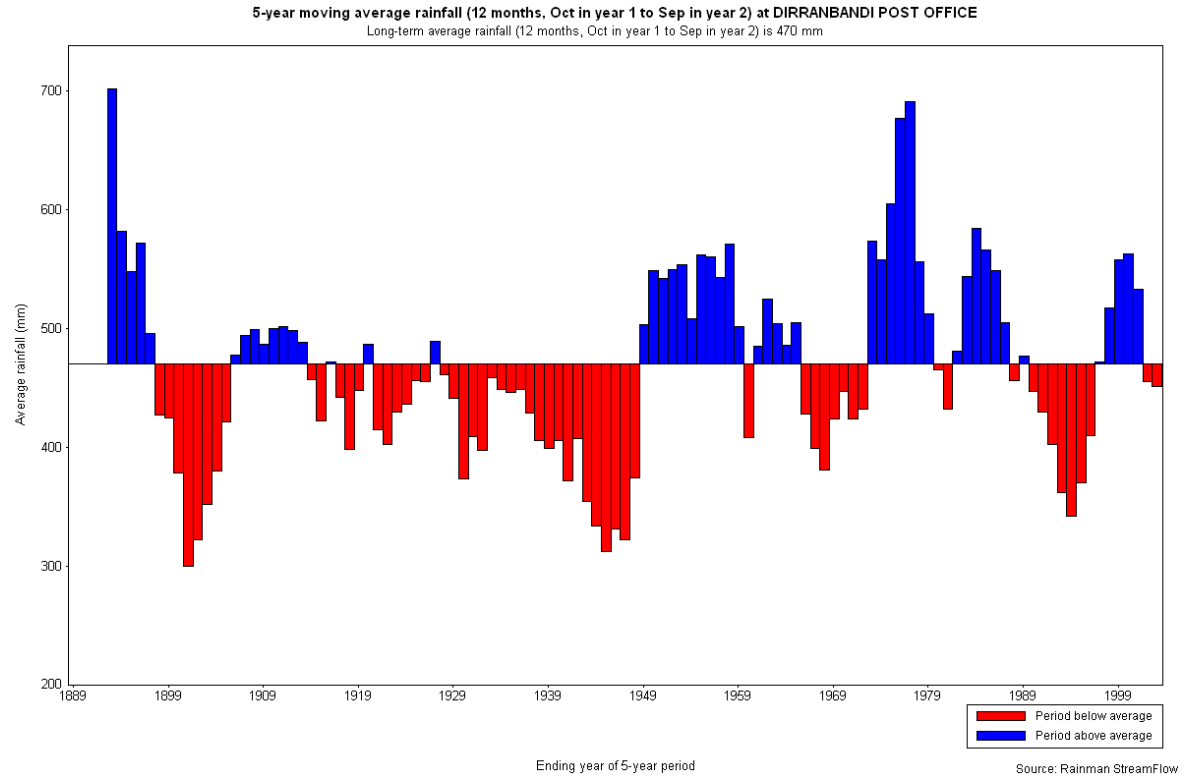**Species acting invasively in each land type include:**

1. **Coolibah- Myall Country:** False sandalwood, coolibah, leopardwood, needle-wood, lime bush, myall, booneree
2. **Floodplains:** Black wattle, coolibah, dogwood, lignum, belah,
3. **Sand Country:** Cypress pine, needle-wood, ironwood, false sandalwood
4. **Red Country:** False sandalwood, leopard wood, whitewood, needle-wood, wilga, gidgee
5. **Ironstone Ridges:** Pine, mulga, false sandalwood, needlewood, ironbark, wilga, poplar box

Defining a natural density at any time is difficult, as the population will vary. It is futile to argue what the natural balance actually is or what it should be. Instead, the aim of this AMP is to focus on the balance that meets production and environmental objectives at the property and catchment level. Supplementary data such as Neldna (1983) has been used as a guide to base recommended stem densities for each regional ecosystem. Landholders felt the recommended stem densities listed in the supplementary data was representative of stem densities found in areas of higher rainfall such as Goondiwindi. Graph 1 outlines the historical seasonal rainfall for Dirranabandi and Graph 2 represents a 5 year moving average of rainfall in Dirranbandi. The median annual rainfall for Dirranbandi is 477mm (19.1 inches) where as the median annual rainfall for Goondiwindi is 590mm.

Graph 1: Historical record of seasonal rainfall for Dirranbandi

Historical record of seasonal rainfall (mm) at DIRRANBANDI POST OFFICE
Long-term average rainfall (Oct to Sep) is 470 mm
Rainfall period: Oct to Sep

Starting year of rainfall period

Source: Rainman StreamFlow

Graph 2: 5 year moving average rainfall for Dirranbandi

5-year moving average rainfall (12 months, Oct in year 1 to Sep in year 2) at DIRRANBANDI POST OFFICE
Long-term average rainfall (12 months, Oct in year 1 to Sep in year 2) is 470 mm

Ending year of 5-year period

Source: Rainman StreamFlow

For every property across the application area, the amount of rainfall varies from year to year and consequently the regeneration rate of trees and pasture growth varies. It is important to take into consideration variable rainfall data when looking at recommended stem densities for regional ecosystems. Based on the median annual rainfall for Dirranbandi and their local knowledge of the area, landholders have listed recommended stem densities suitable for each regional ecosystem at that locality in the application area (Refer to Table 1). These are not arbitory figures but ones carefully considered by the Dirranbandi Landcare group who have lived in the district all their lives. The relationship between stem spacing, stems per hectare and approximate crown cover table was used to obtain recommended stem densities and spacings. Bruce Wilson from the QLD herbarium provided this information to the group specifically for this AMP.

In order to achieve a healthy balanced landscape that prevents the loss of biodiversity, maintains ecological processes and improves land condition, the recommended stem densities and clearing widths outlined in Table 1 and Table 2, should be adopted for this AMP. In the T1 layers, if mature tree densities meet the recommended densities, landholders will have the option to thin all immature trees in the T1 layer. Further thinning of immature stems would be appropriate as they grow and develop larger crown/stem sizes. Trigger density's for each regional ecosystem have been calculated based on an increase of 30% of the average trees/ha for each regional ecosystem.

Table 1. *Regional Ecosystems within the application area where thinning can occur:*

Regional Ecosystem	Supplementary Data and Recommended densities	Target Layers, Target Species, Trigger Density and Conditions
6.5.2 Poplar box (*Eucalyptus populnea*), mulga (*Acacia aneura*) and/or silver-leaved ironbark (*Eucalyptus melanophloia*) woodland on Quaternary sediments.	Floristic association 43 (Neldna). Woodland to open forest. Recommended density for the T1 layer is 50-75trees/ha. **Av-62.5 stems/ha Required Spacing 12.5m apart.**	*Target Layers: T1 and Shrub layer* *T1 Target Species: Poplar Box, Mulga and Silver leaved ironbark (where it occurs). Clearing will only occur when the regional ecosystem reaches 80 stems/ha or more.* *Shrub Layer Target Species: False Sandalwood, Brigalow and Wilga. Recommended density 1-30% PFC. Shrubs will be thinned back to 20% crown cover 8-11 metre spacing, 83-204 stems/ha.* *Clearing activities will maintain the natural floristic composition and range of sizes found in each regional ecosystem. Each species within the regional ecosystem will be evenly spaced across the application area.* ***Mature trees will be retained (Refer to Table A in Glossary of terms).***
Regional Ecosystem	Supplementary Data and Recommended densities	Target Layers, Target Species, Trigger Density and Conditions
6.5.5 Poplar box (*Eucalyptus populnea*) with or without *E. intertexta* with or without Mulga (*Acacia aneura*) with or without cypress pine (*Callitris glaucophylla*) woodland on Quaternary sediments.	Floristic association 50 (Neldna). Woodland to open woodland. Recommended density is 50-250 trees/ha. **Recommended density for the T1 layer at this locality is 130 stems/ha. Required spacing is 9m.**	*Target Layers: T1, T2 and shrub layer* *T1 Target Species: Poplar Box, Mulga and Pine. Clearing will only occur when the regional ecosystem reaches 170stems/ha or more.* ***Trees will be thinned back to 130 stems/ha at a required spacing of 9m apart.*** *T2 Target Species: Wilga, False Sandalwood and Boonerie. Recommended density 10-35% PFC. Shrubs will be thinned back to 20% crown cover, 7-10m metre spacing, 100-200 stems/ ha.* ***Shrub Layer Target Species: Silver Cassia, Desert Cassia, Narrow leaved hopbush, Ellangowen Poison bush. Recommended density <1-15% PFC. Shrubs will be thinned back to 4% crown cover, 5 metre spacing, 400 stems per ha.*** *Clearing activities will maintain the natural floristic composition and range of sizes found in each regional ecosystem. Each species within the regional ecosystem will be evenly spaced across the application area.*

		Mature trees will be retained (Refer to Table A in Glossary of terms).
Regional Ecosystem	**Supplementary Data and Recommended densities**	**Target Layers, Target Species, Trigger Density and Conditions**
6.5.17 Poplar box (*Eucalyptus populnea*) with or without silver-leaved ironbark (*Eucalyptus melanophloia*) with or without cypress pine (*Callitris glaucophylla*) with or without mulga (*Acacia aneura*) woodland on sand plains.	Floristic association 49 (Neldna) Woodland, rarely open-forest. Recommended density for the T1 layer is 200-350 trees/ha. *Av of the T1 is 275stems/ha Required Spacing is 6m.*	*Target Layers: T1 and Tall shrub Layer* *T1 Target Species: Poplar Box, Silver Leaf Ironbark, Pine and Mulga. Clearing will only occur when the regional ecosystem reaches 350 stems/ha or more. Trees will be thinned back to between 200-350 stems/ha at a required spacing of 6m apart.* *Tall Shrub Layer Target Species: Wilga, False Sandalwood, Boonery. Recommended density < 5-20% PFC. Shrubs will be thinned back to 15% crown cover, 13 metre spacing, 55 stems per ha* *Low Shrub Layer- Hopbush, PFC<1%. . Shrubs will be thinned back to 0.2% crown cover at 21stems/ha at a required spacing of 22m.* *Clearing activities will maintain the natural floristic composition and range of sizes found in each regional ecosystem. Each species within the regional ecosystem will be evenly spaced across the application area.* *Mature trees will be retained (Refer to Table A in Glossary of terms).*
Regional Ecosystem	**Supplementary Data and Recommended densities**	**Target Layers, Target Species, Trigger Density and Conditions**
6.5.19 Cypress pine (*Callitris glaucophylla*) with or without coolabah apple (*Angophora melanoxylon*) with or without silver-leaved ironbark (*Eucalyptus melanophloia*) with or without Baradine red gum (*Eucalyptus chloroclada*) open woodland on	Floristic association 145 (Neldna) Open- woodland. Recommended density for the T1is 25 stems/ha. *Required Spacing for the T1 is 20m.*	*Target Layers: T1, T2 & shrub layer.* *T1 Target Species: Cypress Pine and Silver Leaf Ironbark. Clearing will only occur when the regional ecosystem reaches 32.5trees/ha or more. Trees will be thinned back to 25stems/ha at a required spacing of 20m apart.*

Regional Ecosystem	Supplementary Data and Recommended densities	Target Layers, Target Species, Trigger Density and Conditions
Cainozoic sediments derived from old alluvial levees and dunes.		*T2 Target Species: Bull Oak, Wattle and Honeysuckle. Recommended density is 10-35% PFC. Shrubs will be thinned back to 2-8% crown cover, 6-8 metre spacing, 225 (204-250) stems per ha* *Shrub Layer Target Species: Hopbush,, Silver Cassia. Recommended density is 10-25% PFC. Shrubs will be thinned back to 4% crown cover; 400 stems per ha at a required spacing of 5m.* *Clearing activities will maintain the natural floristic composition and range of sizes found in each regional ecosystem. Each species within the regional ecosystem will be evenly spaced across the application area.* **Mature trees will be retained (Refer to Table A in Glossary of terms).**
Regional Ecosystem	**Supplementary Data and Recommended densities**	**Target Layers, Target Species, Trigger Density and Conditions**
6.5.3 Poplar box (*Eucalyptus populnea*), mulga (*Acacia aneura*) with or without false sandlewood (*Eremophila mitchellii*) woodland within mulga (*Acacia aneura*) communities.	Floristic association 43 (Neldna) Box and Mulga Woodland. Density 50-75 trees/ha. ***Av- 63 stems/ha Required Spacing for the T1 is 12.5m.***	*Target Layers: T1 and T2* *T1 Target Species: Poplar Box, Silver Leaf Ironbark, Mulga and Ironwood. Clearing will only occur when the regional ecosystem reaches 82trees/ha or more.* **Trees in the T1 layer will be thinned back to 63trees/ha at a required spacing of 12.5m apart.** *T2 Target Species: Wilga and False Sandalwood. Recommended density is 1-30% PFC. Species will be thinned back to 20% crown cover; 83 stems/ha at a required spacing of 11m.* *Shrub Layer Target Species: Hopbush. Recommended density is 1-15% PFC Species will be thinned back to 2-8% crown cover; 225 (204-250) stems per ha at a required spacing of 6 to 8m.* *Clearing activities will maintain the natural floristic composition and range of sizes found in each regional ecosystem. Each species within the regional ecosystem will be evenly spaced across the application area.* **Mature trees will be retained (Refer to Table A in Glossary of terms).**

Regional Ecosystem	Supplementary Data and Recommended densities	Target Layers, Target Species, Trigger Density and Conditions
11.3.19 Cypress pine (*Callitris glaucophylla*), *Corymbia* spp. and/or silver-leaved ironbark (*Eucalyptus melanophloia)* woodland on Cainozoic alluvial plains.	Floristic association 63 at this location (Neldna) Cypress pine open forest 250-350 trees/ha. **Av- 300 trees/ha Required Spacing for the T1 is 6m.**	*Target Layers: T1 and T2* *T1 Target Species: Cypress pine, Bull Oak, Silver Leaved Ironbark, Poplar Box, Moreton Bay Ash. Clearing will only occur when the regional ecosystem reaches 390trees/ha or more.* ***Trees in the T1 layer will be thinned back to 300trees/ha at a required spacing of 6m apart.*** *T2 Target Species: Cypress Pine, False Sandalwood, Ironwood & Silver Leaved Ironbark. Recommended density is 16stems/ha. Shrubs will be thinned back to 6.2-11%% crown cover; 25-44 stems/ha at a required spacing of between 15-20m.* *Low Shrub Layer Target Species- Hopbush at 0.7%; 69 stems/ha at a required spacing of 12m.* *Clearing activities will maintain the natural floristic composition and range of sizes found in each regional ecosystem. Each species within the regional ecosystem will be evenly spaced across the application area.* *Mature trees will be retained (Refer to Table A in Glossary of terms).*
Regional Ecosystem	Supplementary Data and Recommended densities	Target Layers, Target Species, Trigger Density and Conditions
11.3.2 Poplar box (*Eucalyptus populnea*) woodland on alluvial plains.	Floristic association 42 (Neldna) Poplar Box Woodland to low open woodland. Recommended density is 120trees/ha. *Av- 120 stems/ha Required spacing for the T1 is 9m.*	*Target Layers: T1 & T2* *T1 & T2 Target Species: Poplar Box, Mulga, False Sandalwood, Silver Leaved Ironbark, Wilga and Myrtle. Clearing will only occur when the T1 & T2 layers reach 157stems/ha or more. The regional ecosystem will* ***be thinned back to 120stems/ha with a required spacing of 9m between stems.*** *Clearing activities will maintain the natural floristic composition and range of sizes found in each regional ecosystem. Each species within the regional ecosystem will be evenly spaced across the application area.* *Mature trees will be retained (Refer to Table A in Glossary of terms).*

Regional Ecosystem	Supplementary Data and Recommended densities	Target Layers, Target Species, Trigger Density and Conditions
11.5.13 Poplar box (*Eucalyptus populnea*) with or without mulga (*Acacia aneura*) with or without silver-leaved ironbark (*E. melanophloia*) woodland on Cainozoic sand plains/remnant surfaces.	Floristic association 43 (Neldna) Woodland to Open forest. Recommended density 50-75 trees/ha. ***Av-62.5 trees/ha*** ***Required Spacing for the T1 is 12.5m***	*Target Layers: T1 & T2* ***T1 Target Species:*** *Poplar Box, Mulga, Ironwood and Silver Leaved Ironbark. Clearing will only occur when the regional ecosystem reaches 80trees/ha or more.* ***Trees will be thinned back to 63stems/ha at a required spacing of 12.5m apart.*** ***T2 Target Species:*** *Myrtle False Sandalwood, Wilga . Recommended density is 1-30% PFC. . Species will be thinned back to 2-8% crown cover; 44-51 stems per ha at a required spacing of 14-15m spacing.* *Clearing activities will maintain the natural floristic composition and range of sizes found in each regional ecosystem. Each species within the regional ecosystem will be evenly spaced across the application area.* ***Mature trees will be retained (Refer to Table A in Glossary of terms).***
Regional Ecosystem	Supplementary Data and Recommended densities	Target Layers, Target Species, Trigger Density and Conditions
11.3.20 Forb/grassland with or without scattered whitewood (*Atalaya hemiglauca*), leopardwood (*Flindersia **maculosa***), *Acacia* spp. on alluvial plains.	Floristic association 38 (Neldna) is wooded sparse to open woodland, recommended density is <100 trees/ha. Areas with Poplar Box, the stem density will be higher around 55-60 stems/ha. **Recommended density 55 stems/ha.** **Required Spacing for the T1 13m**	*Target Layers: T1 & T2* ***T1 Target Species:*** *Poplar Box, Leopardwood and Whitewood, False sandalwood. Clearing will only occur when the stem density reaches 72stems/ha or more.* ***Trees in the T1 layer will be thinned back to 55stems/ha at a required spacing of 13-15m apart.*** *Clearing activities will maintain the natural floristic composition and range of sizes found in each regional ecosystem. Each species within the regional ecosystem will be evenly spaced across the application area.* ***Mature trees will be retained (Refer to Table A in Glossary of terms).***

Regional Ecosystem	Supplementary Data and Recommended densities	Target Layers, Target Species, Trigger Density and Conditions
11.3.21 Queensland bluegrass (*Dichanthium sericeum*) and/or *Astrebla* spp. grassland on alluvial plains. Cracking clay soils.	This is an exempt grassland; clearing woody vegetation within this RE is an exemption under the VMA 1999.	*Refer to* **_EPBC distribution advice._**

Regional Ecosystem	Supplementary Data and Recommended densities	Target Layers, Target Species, Trigger Density and Conditions
11.3.28 Belah (*Casuarina cristata*) with or without coolibah (*Eucalyptus coolabah*) open woodland on alluvial plains.	Floristic association 33 (Neldna) Open woodland, occasionally woodland. Recommended density is <180 trees/ha. *Please refer to the long description for this regional ecosystem as the short description does not accurately reflect the regional ecosystem.* *A mature Coolibah in this area would have a canopy width of 15m. In order to meet the density listed in Neldna, leaving a canopy of 30% is well above the recommend PFC%.* **Using the science presented in Neldna 6 stems/ha is the correct density for this locality**.	*Target Layers: T1, tall shrub layer and shrub layer.* *T1 Target Species: Coolibah, Belah & Leopardwood.* **Trees in the T1 layer will be thinned back to 6stems/ha at a required spacing of 40m apart.** *Tall Shrub layer: False Sandalwood, , Leopardwood, Sally wattle, Myal and Gunda Bluey. Recommended density is <1% PFC.* **T2 species will be thinned back to 25-44 stems/ha at a required spacing of 15-20m apart.** *Shrub Layer Target Species: Lignum & Turkeybush.* **Shrubs will be thinned back to 51 stems per ha at a required spacing of no greater than 14m apart.** *Clearing activities will maintain the natural floristic composition and range of sizes found in each regional ecosystem. Each species within the regional ecosystem will be evenly spaced across the application area.* **Mature trees will be retained (Refer to Table A in Glossary of terms).**

Regional Ecosystem	Supplementary Data and Recommended densities	Target Layers, Target Species, Trigger Density and Conditions
11.3.3 Coolibah (*Eucalyptus coolabah*) woodland on alluvial plains.	Floristic association 33 (Neldna) Open woodland. Recommended density <150 trees/ha. *We have used the regional ecosystem description and the supplementary data that*	*Target Layers: T1, tall shrub layer and shrub layer.* *T1 Target Species: Coolibah, Belah & Leopardwood.* **Trees in the T1 layer will be thinned back to 6stems/ha at a required spacing of 40m apart.**

	best describes the regional ecosystems in this locality. ***Recommended density 25 stems/ha.***	***Tall Shrub layer:*** *False Sandalwood, , Leopardwood, Sally wattle, Myal and Gunda Bluey. Recommended density is <1% PFC.* ***T2 species will be thinned back to 25-44 stems/ha at a required spacing of 15-20m apart.*** ***Shrub Layer Target Species:*** *Lignum & Turkeybush.* ***Shrubs will be thinned back to 51 stems per ha at a required spacing of no greater than 14m apart.*** *Clearing activities will maintain the natural floristic composition and range of sizes found in each regional ecosystem. Each species within the regional ecosystem will be evenly spaced across the application area.* ***Mature trees will be retained (Refer to Table A in Glossary of terms).***
Regional Ecosystem	**Supplementary Data and Recommended densities**	**Target Layers, Target Species, Trigger Density and Conditions**
11.5.5 Silver-leaved ironbark (*Eucalyptus melanophloia*), cypress pine (*Callitris glaucophylla*) woodland on Cainozoic sand plains/remnant surfaces. Deep red sands.	Floristic association 54 (Neldna) Woodland. Recommended density 125-175 trees/ha. **Recommended density 150 stems/ha.** **Required Spacing for the T1 8m.**	***Target Layers:*** *T1 & T2* ***T1 Target Species:*** *Cypress, Ironwood, Bull Oak, Poplar Box, Carbeen.* ***Trees in the T1 layer will be thinned back to 150stems/ha at a required spacing of 8m.*** ***T2 Target Species:*** *Myrtle, False Sandalwood & Wilga. Shrubs will be thinned back to a crown cover of 12%; 51 stems/ha with a required spacing of 14m.* *Clearing activities will maintain the natural floristic composition and range of sizes found in each regional ecosystem. Each species within the regional ecosystem will be evenly spaced across the application area.* ***Mature trees will be retained (Refer to Table A in Glossary of terms).***

The Dirranbandi Landcare group acknowledges that thinning cannot occur within regional ecosystem 11.3.17; However Regional Ecosystem 11.3.17 is atypical in this area of the bioregion. Dave Hinz and Andrew Franks (vegetation management officer DERM and botanist from the Herbarium) conclude from field work carried out in early January that 11.3.17 does not exist within the AMP application area. Dave Hinz and Andrew Franks are in the process of correcting the mapping which will not be incorporated in Version 7 regional ecosystem mapping, soon to be released. With this in mind, the AMP group has decided to include 11.3.17 in the application. In the event that 11.3.17 does exist on a landholder's property, the group would like to have the option under this AMP to thin this regional ecosystem back to a poplar box woodland. Thinning at this locality will restore the regional ecosystem to it's natural floristic composition and range of densities. This regional ecosystem is naturally a Poplar Box woodland with Brigalow and Belah occurring in patches. Patches of Brigalow and or Belah will be maintained in their natural state, they will not be targeted during a thinning regime.

If the density of trees is above the recommended density as listed in Nelda, thinning should be permitted.When the regional ecosystem is out of balance, invasive native species outcompete and choke out natural vegetation, creating issues such as erosion, decline in land condition and pasture decline. Invasive native species found in these regional ecosystems include:

- False sandalwood
- Leopard wood
- Ironwood
- Wilga
- Poplar Box
- Cypress Pine

Table 2:Proposed regional ecosystem thinning

Regional Ecosystem	Supplementary Data and Recommended densities	Target Layers, Target Species, Trigger Density and Conditions
11.3.17 Poplar box (*Eucalyptus populnea*) woodland with brigalow (*Acacia harpophylla*) and/or belah (*Casuarina cristata*) on alluvial plains.	Floristic association 47 (Neldna). Density 40-280 trees/ha **Av-160 trees/ha** **Required Spacing- 8m**	*Field inspections indicate regional ecosystem 11.3.17 is not evident within the application area. Where present it is found within mixed polygons.* *Target Layers: T1 & T2* *T1 Target Species: Belah, Box and Brigalow in places.* ***Trees will be thinned back to 160stems/ha at a required spacing of 8m.*** *T2 Target Species: Ironwood, Whitewood, Myrtle, Boonaree. Species will be thinned back to 25-51% crown cover; 100-204 stems/ha at a required spacing of 7-10m.* ***Original thick clumps of Belah will be retained. All fringing vegetation will be thinned to represent a woodland.*** *Clearing activities will maintain the natural floristic composition and range of sizes found in*

		each regional ecosystem. Each species within the regional ecosystem will be evenly spaced across the application area.
		Mature trees will be retained (Refer to Table A in Glossary of terms).

The applicant is required to decide the suitable machinery and the type of thinning technique that meets the conditions for each targeted regional ecosystem. This decision must be outlined to DERM when individual landholders trigger the AMP. To ensure maximum flexibility and to cater for individual landholders within in the application area the following thinning options have been agreed on by the members of the Dirrandbandi land care group. Landholders may choose to incorporate all techniques or only one technique across their property. This will depend on the regional ecosystems they are thinning in and how they intend to meet the required conditions placed on each regional ecosystem.

1. **Selective Thinning:** This technique will be used where tree density is limited and mature trees are fairly widely spaced. Selective thinning involves removing individual trees to achieve a set number of retained trees spread evenly over the area. In areas where mature trees are widely spaced, it will be possible to use a dozer to selectively push individual trees to achieve the desired spacing of immature trees. Suitable machinery for selective thinning includes chopper roller, wheeled dozer and or a wheeled tractor with a blade or stick rake mounted on the front.

2. **Line Thinning:** Involves a machine clearing an irregular path through a thickened area. The thinning machine dodges around mature trees and has set widths of cleared and retained vegetation. Retained tree densities are achieved by setting the width of the cleared and retained strip. The retained width will relate to the ecosystem structure as stipulated in the regional ecosystem table below. The minimum width of retained vegetation will be no less than 5 metres. Suitable machinery for line thinning includes dozer with cutter bar or blade plough, wheeled dozer or tractor with blade or stick rake and or a chopper roller.

3. **Checkerboard Thinning:** Involves a machine running lines across the thickened area at angles of 60-90 degrees to create the checkerboard appearance. This method is effective in instances where there is very dense but relatively small immature trees and the machine can walk the vegetation down. It can achieve a very even distribution of retained trees. Vegetation will not be stacked against or in the retained vegetation. Suitable machinery for checkerboard thinning includes dozer with cutter bar or blade plough, wheeled dozer or tractor with blade or stock rake and or chopper roller.

All Landholders within the Dirranbandi Landcare group are encouraged to implement monitoring in their property management plan, focusing on the whole of property as well as those areas affected by invasive native species. Monitoring of treatments will enable land managers to determine if or when follow up treatments are required to further improve pasture condition and ecosystem stability and biodiversity. QMDC (Queensland Murray Darling Committee) have agreed to run a biodiversity and pasture monitoring field day in early 2012 to assist landholders.

Management Goal 2: *To protect and maintain the integrity of wetlands and riparian areas.*

Management Outcome 2:

In order to protect and maintain the integrity of wetlands and riparian areas, thinning will not occur within the natural *wetlands* or *significant wetlands* as indicated on the supporting maps. Landholders in the AMP group agree to leave a buffer of 100m around the wetlands and 200m around significant wetlands.

The Dirranbandi Landcare group acknowledge that mechanical thinning cannot occur in regional ecosystems listed in Table 3 under the regional vegetation management codes. However in order to prevent the loss of biodiversity, maintain ecological processes and to maintain land condition, conditions have been applied to each regional ecosystem which will allow landholders to thin the nominated regional ecosystems outside the stream protection zones.

Table 3:Regional Ecosystems where mechanical thinning is limited

Regional Ecosystem	Supplementary Data and Recommended densities	Target Layers, Target Species, Trigger Density and Conditions
11.3.15 Coolibah (*Eucalyptus coolabah*), river cooba (*Acacia stenophylla*), lignum (*Muehlenbeckia cunninghamii)* fringing woodland on alluvial plains.	Floristic association 31 (Neldna) Woodland to low woodland. Recommended foliage projective cover <1-8% which equates to 6 stems/ha with 40m spacing between T1 trees.	*Target Layers: T1 & T2* *T1 Target Species: Coolibah and River Red Gum,Dogwood.* ***Trees will be thinned back to 4-6stems/ha at a required spacing of 40-50mapart*** *Low Shrub Layer Target Species: Lignum & River Cooba.* ***Species will be thinned to 204stem/ ha at a required spacing of 7m apart.*** *Clearing will only occur outside the stream protection zones when the regional ecosystem reaches more than 8stems/ha.* *Assessable vegetation associated with any watercourse is protected by limiting mechanical thinning within the recommended buffers placed on each stream order. Thinning vegetation outside the stream protection zones will not cause land degradation because thinning will improve soil heath and promote grass and pasture growth stabalising the soil. Thinning will enhance biodiversity as monocultures of trees will be minimized and the natural floristic composition of the regional ecosystem will be restored maintaining ecological processes.* *Clearing activities will maintain the natural floristic composition and range of sizes found in each regional ecosystem. Each species within the regional ecosystem will be evenly spaced across the application area.*

<table>
<tr><td></td><td></td><td>Mechanical thinning will not occur within:
• 50m for stream order 1-2
• 100m for stream order 3-4
• 200m for stream order 5 and above.

In cases where assessable vegetation must be thinned within the listed stream orders, methods other than machinery will be used to control invasive native species such as:
• Chainsaw
• Stem injection
• Ringbarking
• Cut stump applications
• Brush-cutter
• Poisoning-Tordon
• Excludes root absorbed herbicides

Within the stream protection zones, trees will be left standing after treatment, the roots of the remaining trees will ensure bank stability and protect against bank erosion. Selective treatment will promote grass and ground cover protecting against erosion as well as acting as filters for the riparian area. There will be no soil disturbance therefore water quality, aquatic habitat and terrestrial habitat will not be affected. Vegetation and the root systems left along the riparian area post treatment will prevent soil erosion, protect water quality by acting as filters and provide habitat for aquatic and terrestrial animals. Trees will also act as habitat trees forming hollows for nesting birds and animals.</td></tr>
<tr><td>Regional Ecosystem</td><td>Supplementary Data and Recommended densities</td><td>Target Layers, Target Species, Trigger Density and Conditions</td></tr>
<tr><td>11.3.37
Coolibah (Eucalyptus coolabah) fringing woodland on alluvial plains.</td><td>Floristic association 25 (Neldna). Woodland rarely open forest. Recommended density is 100-125 stems/ha.

Average stem density for the T1 is 115 stems/ha. Required spacing 9m.</td><td>Target Layers: T1 & T2

T1 /Tall Shrub LayerTarget Species: Coolibah and River Red, Coolibah, Coobah, Sallywattle, Wild OrangeGum. Trees will be thinned back to a density of around 115 stems/ha at a required spacing of 9m.

Low Shrub Layer Target Species: QLD Blue Bush, Ruby Salt Bush, Dogwood, Lignum and Turkey Bush. T2 species will be thinned back to 278stems/ha at a required spacing of 6m apart.

Clearing will only occur outside the stream protection zones when the regional ecosystem reaches more than 150 stems/ha.</td></tr>
</table>

		Assessable vegetation associated with any watercourse is protected by limiting mechanical thinning within the recommended buffers placed on each stream order. Thinning vegetation outside the stream protection zones will not cause land degradation because thinning will improve soil heath and promote grass and pasture growth stabilising the soil. Thinning will enhance biodiversity as monocultures of trees will be minimized and the natural floristic composition of the regional ecosystem will be restored maintaining ecological processes. *Clearing activities will maintain the natural floristic composition and range of sizes found in each regional ecosystem. Each species within the regional ecosystem will be evenly spaced across the application area.* *Mechanical thinning will not occur within:* • *50m for stream order 1-2* • *100m for stream order 3-4* • *200m for stream order 5 and above.* *In cases where assessable vegetation must be thinned within the listed stream orders, methods other than machinery will be used to control invasive native species such as:* • *Chainsaw* • *Stem injection* • *Ringbarking* • *Cut stump applications* • *Brush-cutter* • *Poisoning-Tordon* • *Excludes root absorbed herbicides* *Within the stream protection zones, trees will be left standing after treatment, the roots of the remaining trees will ensure bank stability and protect against bank erosion. Selective treatment will promote grass and ground cover protecting against erosion as well as acting as filters for the riparian area. There will be no soil disturbance therefore water quality, aquatic habitat and terrestrial habitat will not be affected. Vegetation and the root systems left along the riparian area post treatment will prevent soil erosion, protect water quality by acting as filters and provide habitat for aquatic and terrestrial animals. Trees will also act as habitat trees forming hollows for nesting birds and animals.*	

		Mature trees will be retained (Refer to Table A in Glossary of terms).
Regional Ecosystem	**Supplementary Data and Recommended densities**	**Target Layers, Target Species, Trigger Density and Conditions**
11.3.25 Blue gum (*Eucalyptus tereticornis*) or river red gum (*E. camaldulensis*) woodland fringing drainage lines. *Same as above*	Floristic sssociation 25 (Neldna). Woodland rarely open forest. Recommended density is 100-125 stems/ha. Average stem density for the T1 is 115 stems/ha. Required spacing 9m. **Average 115 stems/ha. Required spacing for thinning 9m.**	*Target Layers: T1 & T2* *T1 Target Species: Coolibah and River Red Gum.* **Trees will be thinned back to a density of around 115 stems/ha at a required spacing of 9m.** *T2 /Shrub Layer Target Species: QLD Blue Bush, Ruby Salt Bush, Dogwood, Lignum and Turkey Bush.* **T2 species will be thinned back to 100 stems/ha at a required spacing of 10m apart.** *Clearing will only occur outside the stream protection zones when the regional ecosystem reaches more than 150 stems/ha.* *Assessable vegetation associated with any watercourse is protected by limiting mechanical thinning within the recommended buffers placed on each stream order. Thinning vegetation outside the stream protection zones will not cause land degradation because thinning will improve soil heath and promote grass and pasture growth stabalising the soil. Thinning will enhance biodiversity as monocultures of trees will be minimized and the natural floristic composition of the regional ecosystem will be restored maintaining ecological processes.* *Clearing activities will maintain the natural floristic composition and range of sizes found in each regional ecosystem. Each species within the regional ecosystem will be evenly spaced across the application area.* *Mechanical thinning will not occur within:* • *50m for stream order 1-2* • *100m for stream order 3-4* • *200m for stream order 5 and above.* *In cases where assessable vegetation must be thinned within the listed stream orders, methods other than machinery will be used to control invasive native species such as:* • *Chainsaw* • *Stem injection* • *Ringbarking* • *Cut stump applications* • *Brush-cutter* • *Poisoning-Tordon*

		• *Excludes root absorbed herbicides* *Within the stream protection zones, trees will be left standing after treatment, the roots of the remaining trees will ensure bank stability and protect against bank erosion. Selective treatment will promote grass and ground cover protecting against erosion as well as acting as filters for the riparian area. There will be no soil disturbance therefore water quality, aquatic habitat and terrestrial habitat will not be affected. Vegetation and the root systems left along the riparian area post treatment will prevent soil erosion, protect water quality by acting as filters and provide habitat for aquatic and terrestrial animals. Trees will also act as habitat trees forming hollows for nesting birds and animals.* ***Mature trees will be retained (Refer to Table A in Glossary of terms).***

Management Goal 3: *Conserving soil health*

Management Outcome 3:

The application area contains stable soils; Vertosols, Chromosols with hard setting qualities & Tenosols, with less than 15% slope (with the exception of gully erosion from thickening of sandalwood) in relation to Table 15 (Regional Code for Brigalow Belt) it classifies these soils as being stable. Landholders are encouraged to retain fallen timber in areas that are at risk to erosion. To our knowledge there are no acid sulphate soils within the application area. Thinning will be carried out after summer rains when the soil is strong enough to support machinery and the soil moisture is sufficient to regenerate ground cover by the following summer.

1. **Fire:** The timing, intensity, and lighting pattern of fire will be controlled to ensure that retained trees are not inadvertently damaged or destroyed. In some very dense situations some form of mechanical thinning will be necessary before fire can used. Burning will be done under a permit under the Fire Rescue and Safety Act 1990.

Management Goal 4: *Maintaining the Regional Ecosystem*

Management Outcome 4: Fuel Hazard Reduction

In order to maintain and protect the integrity of the regional ecosystem fuel hazard reduction burns are recommended. Fuel hazard reduction burns will be conducted in the winter months to promote a cool burn to reduce fuel load. All burning will be done under permit in accordance with the Fire Rescure and Safety Act 1990.

Glossary of terms

EPBC Distribution Advice-
http://www.environment.gov.au/biodiversity/threatened/communities/pubs/88-listing-advice.pdf

FA- Floristic Association as sited in Neldner 1984.

Invasive Native Species- Are species that
- invades plant communities where it has not been known to occur previously OR a species that regenerates densely following natural or artificial disturbance, *and*
- the invasion and/or dense regeneration of the species results in change of structure and/or composition of a vegetation community, *and*
- the species is within its natural geographic range or distribution.

Mature Trees: Trees or shrubs which are over the size limits specified in Table A.

PFC: Spacing between canopies.

Table A: Mature tree size limits

Genus	Diameter at 1.3m high
Eucalyptus, Corymbia, Angophora, Lophostemon	>30cm
Genera other than Eucalyptus, Corymbia, Angophora and Lophostemon	>20cm

References

Neldna,V.J. (1984) *Vegetation Survey of Queensland- South Central Queensland.* Queensland Department of Primary Industries, Brisbane, Australia.