

# NSW Vegetation Classification - Vegetation ID

## Vegetation Community ID 77

**Common Name:** Yarran shrubland of the NSW central to northern slopes and plains

**Scientific Name:** *Acacia homalophylla* - *Casuarina cristata* / *Rhagodia spinescens* - *Enchylaena tomentosa* - *Senna form taxon 'zygophylla'* - *Eremophila deserti* / *Enteropogon acicularis* - *Atriplex spinibractea* - *Ptilotus semilanatus* - *Einadia nutans* subsp. *nutans*

**Veg. Comm. ID.:** 77 **Original Entry:** John Benson 31/12/2005

**Last Modified:** John Benson 5/06/2007

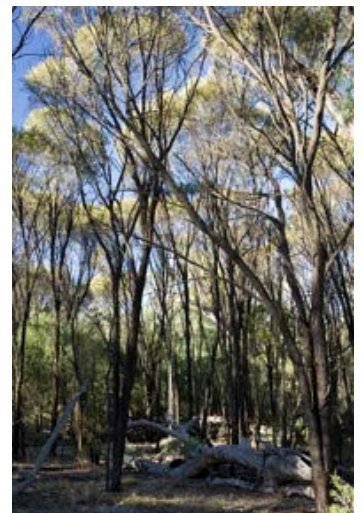
**Photo 1:** ID77a\_SWS0507315.jpg Yarran (*Acacia homalophylla*) shrubland with emergent trees of Belah (*Casuarina cristata*) and Western Grey Box (*Eucalyptus microcarpa*) along the Barmedman - Wyalong Road in the NSW southern wheatbelt, [AGD66 34°08.360'S 147°22.689'E], 30/5/2007, Jaime Plaza.



**Photo 2:** ID77b\_dsc\_1767.jpg Yarran (*Acacia homalophylla*) - Western Rosewood (*Alectryon oleifolius*) woodland, west of Gulargambone, [AGD66 31°18'47"S 148°22'22"E], 17/8/03, Jaime Plaza.



**Photo 3:** ID77c\_BBS MAY 2008 0764.jpg Yarran (*Acacia homalophylla*) very tall shrubland among Poplar Box woodland in Pilliga West NP CCAZ1, [AGD66 30°35'37.3"S 148°44'6.8"E], 03/05/08, Jaime Plaza.



**Characteristic Vegetation:** (Qualitative Estimate)

**Trees:** *Acacia homalophylla*; *Casuarina cristata*; *Acacia pendula*; *Eucalyptus microcarpa*; *Eucalyptus populnea* subsp. *bimbil*; *Callitris glaucophylla*.

**Shrubs/Vines/Epiphytes:** *Rhagodia spinescens*; *Enchylaena tomentosa*; *Senna form taxon 'zygophylla'*; *Eremophila deserti*; *Apophyllum anomalum*; *Acacia deanei* subsp. *deanei*; *Eremophila longifolia*; *Dodonaea viscosa* subsp. *angustissima*; *Alectryon oleifolius* subsp. *canescens*; *Hakea leucoptera* subsp. *leucoptera*; *Eremophila mitchellii*; *Geijera parviflora*; *Pimelea microcephala* subsp. *microcephala*; *Muehlenbeckia florulenta*; *Templetonia egena*; *Acacia oswaldii*; *Amyema quandang* var. *quandang*; *Maireana enchylaenoides*; *Rhagodia parabolica*; *Exocarpos aphyllus*.

**Ground Cover:** *Enteropogon acicularis*; *Atriplex spinibractea*; *Einadia nutans* subsp. *nutans*; *Austrostipa scabra* subsp. *scabra*; *Austrodanthonia setacea*; *Ptilotus semilanatus*; *Austrodanthonia duttoniana*; *Walwhalleya prolata*; *Sporobolus caroli*; *Calotis cuneifolia*; *Dianella porracea*; *Sclerolaena diacantha*; *Sclerolaena muricata* var. *semiglabra*; *Sclerolaena birchii*; *Sida trichopoda*; *Sida corrugata*; *Goodenia pinnatifida*; *Brachyscome ciliaris* var. *subintegrifolia*; *Minuria leptophylla*; *Leiocarpa leptolepis*; *Calotis cuneifolia*; *Calotis lappulacea*; *Calotis scabiosifolia* var. *scabiosifolia*; *Wahlenbergia stricta* subsp. *alternata*; *Eremophila debilis*; *Cheilanthes sieberi* subsp. *sieberi*; *Ancistrachne uncinulata*; *Cheilanthes distans*; *Aristida vagans*; *Austrodanthonia bipartita*; *Solanum esuriale*; *Oxalis perennans*; *Cyperus gracilis*; *Chamaesyce drummondii*; *Zygophyllum glaucum*; *Chenopodium desertorum* subsp. *microphyllum*.

**Weed Species:** *Echium plantagineum*; *Arctotheca calendula*; *Medicago polymorpha*; *Lycium ferocissimum*.

**Weediness:** Low (<5%) with <10% cover.

**Threatened Plants:** Not assessed.

**Threatened Fauna:** Not assessed.

**Mean Species Richness:** 42 (floristic group 37 in Lewer et al. 2002 in 20x20 m plots).

**Rainforest Structure (Webb):** Not applicable.

**Structure (WH):** Shrubland; Open Shrubland.

**Height Class (WH):** Tall; Very Tall.

**Vegetation Description:** Tall shrubland or low woodland to about 10 m high dominated by Yarran (*Acacia homalophylla*/A. *melvillei* complex) with a sparse small tree layer including Weeping Myall (*Acacia pendula*) and Belah (*Casuarina cristata*) and scattered emergent trees including Western Grey Box (*Eucalyptus microcarpa*) and Poplar Box (*Eucalyptus populnea* subsp. *bimbil*). A mid-dense to sparse shrub layer includes the low shrubs Ruby Saltbush (*Enchylaena tomentosa*) and Thorny Saltbush (*Rhagodia spinescens*), *Rhagodia parabolica* and taller shrubs such as Buddah (*Eremophila mitchellii*), Ellangowan Poison-bush (*Eremophila deserti*), *Senna form taxon 'zygophylla'*, Warrior Bush (*Apophyllum anomalum*), *Acacia oswaldii* and Sticky Hopbush (*Dodonaea viscosa*). Grey Mistletoe (*Amyema quandang* var. *quandang*) is a common parasite on Weeping Myall. The ground cover is mid-dense to sparse and contains small shrubs such as the saltbush *Atriplex spinibractea* and copperburrs (*Sclerolaena* spp.). Grass species include *Enteropogon acicularis*, *Austrostipa scabra* subsp. *scabra*, *Austrodanthonia setacea*, *Walwhalleya prolata* and *Sporobolus caroli*. Forb species include daisies such as *Brachyscome ciliaris* var. *subintegrifolia*, *Minuria leptophylla*, *Leiocarpa leptolepis* and *Calotis* spp. and other forbs such as *Einadia nutans*, *Dianella porracea*, *Solanum esuriale*, *Oxalis perennans*, *Zygophyllum glaucum*, *Chenopodium desertorum* subsp. *microphyllum*, *Ptilotus semilanatus* and *Goodenia pinnatifida*. Occurs on red to brown earths (loams) and red podzolic soils and sometimes gravel on level plains and gentle rises mainly in central NSW (wheatbelt). Small occurrences remain in the mainly cleared northern wheatbelt extending to the Liverpool Plains with larger stands remaining in the Western Division on the eastern edge of the Cobar Peneplain. Annual rainfall between 600 and 400 mm. Grades into the semi-arid (warm summers) Yarran community (ID23) west of Griffith in the Western Division of NSW. Very little of this shrubland remains in the wheatbelt with most remnants occurring on roadsides. Some of these are threatened by grazing, weeds and lack of seedling or sucker recruitment of key species including Yarran. This shrubland is highly threatened overall and western occurrences are under threat of continual clearing.

**Level of Classification:** Association.

**Classification Confidence Level:** Medium.

**Formation Group:** *Acacia* Woodlands and Shrublands of the Inland Slopes and Plains.

**State Veg Map (Keith 2004):** North-west Plain Shrublands.

**State Landscape (Mitchell 2002):** Not Assessed.

**NVIS Major Veg Sub-Groups:** Other *Acacia* tall open shrublands and shrublands.

**Forest Type (RN 17):** 224 - Scrub (P); 214 - Wattle (P).

**Authority(s):** (Combination of Expert Opinion and Quantitative Data). Listed by Mid-Lachlan Regional Vegetation Committee (1999). Possibly community 66 in Austin et al. (2000) for central Lachlan region. Map unit ALP4 and floristic group 37 in Lewer et al. (2003). Mapped for Cobar Shire by Dykes (2002). Part of comm 1 in Porteners (2007a). Field site 42, Trip 11 in Benson (1999-2009). Yarran also occurs in the northern wheatbelt as small stands and on the Liverpool Plains on the North Western Slopes. Includes BVT 66 in DEC (2006a). This community grades into the semi-arid Yarran community (ID23) west of Griffith. There is taxonomic confusion between the taxa *Acacia melvillei* and *Acacia homalophylla*. An assessment by Kodala (2001) shows that these closely related wattles overlap in their distribution but herbarium determination is difficult with out seedpods as these vary between the species while other characters tend to overlap. These two taxa are lumped here into a community in the semi-arid far inland plains southern wheatbelt of NSW and (ID77). Kodala (2001) considers that *Acacia homalophylla* may be more common than *Acacia melvillei* in central NSW, whereas this is reversed for semi-arid western NSW. Some sites field checked by Benson (1999-2009).

**Interstate Equivalent(s):** None.

**Mapped/Modelled:** Current extent and pre-European extent not mapped or modelled.

**Plot Sampling:** Inadequate.

**Mapping Info:** Mapped as a broader complex in Sivertsen & Metcalfe (1995). Mapped in Cobar Shire by Dykes (2002).

**Climate Zone:** Dry subtropical: moderately dry winter; Semi-arid: hot (persistently dry).

**IBRA Bioregion (v6):** Brigalow Belt South (1-30%); Cobar Peneplain (30-70%); Darling Riverine Plains (1-30%); NSW South-western Slopes (1-30%).

**IBRA Sub-Region:** Bogan-Macquarie (1-30%); Castlereagh-Barwon (1-30%); Liverpool Plains (1-30%); Lower Slopes (1-30%); Murray Fans (1-30%); Murrumbidgee (1-30%); Nymagee (1-30%).

**Botanical Division:** North Western Plains (NWP) (1-30%); North Western Slopes (NWS) (1-30%); South Western Plains (SWP) (30-70%); South Western Slopes (SWS) (1-30%).

**Local Govt. Areas:** Bland (1-30%); Bogan (1-30%); Cobar (1-30%); Coonamble (1-30%); Dubbo (1-30%); Forbes (1-30%); Gilgandra (1-30%); Gunnedah (1-30%); Lachlan (1-30%); Moree Plains (1-30%); Narromine (1-30%); Walgett (1-30%); Warren (1-30%); Warrumbungle (1-30%); Liverpool Plains (1-30%).

**CMAs:** Central West (1-30%); Lachlan (30-70%); Murray (1-30%); Murrumbidgee (1-30%); Western (1-30%); Namoi (1-30%).

**MD Basin:** Yes.

**Substrate Mass:** Eolian sediment; Partially weathered rock; Sedimentary rocks.

**Lithology:** Clay; Sand; Sedimentary rock (unidentified).

**Great Soil Group:** Earthy sand; Grey-brown podzolic soil; Red earth.

**Soil Texture:** Clay loam; Clay loam, sandy; Loamy sand.

**Landform Patterns:** Alluvial plain; Peneplain.

**Landform Elements:** Foothills; Plain.

**Land Use:** Cropping and Horticulture; Grazing.

**Impacts of European Settlement:** Major alteration of species composition; Major reduction (>70%) in extent and/or range; Older age class over most of distribution.

**Pre-European Extent:** 30000 ha ±50%. Estimated from extant vegetation maps: part range.

**Pre-European Extent Comments:** Estimated from distribution records - would always have occurred in small patches scattered over central NSW.

**Current Extent:** 7000 ha ±50% or 23% ± 80% of pre-European extent remaining.

**Current Extent Comments:** (Estimated from mapped extant vegetation: part range). Dykes (2002) maps 8200 ha in the Cobar Shire but this is the western most extent and most of the previous eastern areas in the wheatbelt have been cleared. Lewer et al. (2003) map only 200 ha south west of Condobolin.

**Conservation Reserves:** Cocoparra NP 1 (M); Cocoparra NR 42 (M); Yathong NR 500 (E2); Pilliga West CCAZ3 20 (E3); Pilliga West CCAZ1 30 (E3); Trinkey CCAZ3 1 (E3); Dowe CCAZ1 1 (E2).

**Reserves Total Area:** 595 ha.

**No. Representatives in Reserves:** 7

**Protected Area Explanation:** Yathong Nature Reserve estimate from mapping by Dykes (2002). Cocoparra NP and NR from community 2a in Whiting (1997). Pilliga West CCAZ1 & 3 estimated as small part of community 1 in Porteners (2007a) and pers. obs. J. Benson. Trinkey SCA pers. obs. J. Benson (small areas on edge of reserve). Small patch in Dowe NP (community 3 in Hunter 2009k).

**Secure Property Agreements:** None.

**Secure PAs Total Area:** 0 ha.

**No. Representatives in Secure Property Agreements:** 0

**Protected Current Extent:** 8.5% 595 ha ± 30%.

**No. Representatives in Protected Areas:** 7

**Protected Pre-European Extent:** 1.98% which is inadequately protected across distribution.

**Common in 1750:** Code 4a:1-5% of pre-European extent in protected areas (>10,000 ha).

**Key Sites for Protection:** Stands in the eastern Cobar Peneplain. Very small remnants survive in the wheatbelt such as in Tailby State Forest and along the Barmedman - Wyalong Road. Also near Pilliga.

**Degree of Fragmentation:** Human induced highly fragmented small stands with <30% extent remaining and high edge to area ratio.

**Recoverability:** Poor health as structure and/or composition significantly altered. But sufficient biota remain for natural regeneration if causal factors and their secondary impacts removed and dynamic processes reinstated.

**Variation & Disturbance:** Little known. Yarran resprouts after disturbance and may be clonal. Tends to occur in discrete clumps.

**Fire Regime:** Unknown. Seed of Yarran may be long lived and it suckers after fire or clearing.

**Adjoining Communities:** Grades into Belah-Western Rosewood (ID57), Weeping Myall woodland (ID26). Western Grey Box woodlands (IDs 76, 80) or Poplar Box woodland such as ID82). Contains a different species composition to the Yarran community on the more arid sandplains in far south-western NSW (ID23).

**Threatening Processes:** Mostly cleared in the NSW wheatbelt and stands east of Cobar are under threat in places. Intensive grazing by stock and rabbits has led to a lack of regeneration of Yarran and associate species in many locations.

**Threatening Process List:** Age class of woody vegetation; Clearing for agriculture; Dryland cropping; Soil erosion, water: sheet erosion; Soil erosion, wind; Unsustainable grazing and trampling by stock; Unsustainable grazing by introduced animals; Woody shrub (native) invasion.

**Threat Category:** Endangered.

**Threat/Protected Area Code:** E/4a

**Threat Criteria:** 3; 4; 5.

**Planning Controls:**

**Planning and Management:** Requires protection under catchment plans and more samples incorporated into reserves or protected under property agreements over private land.

**Listed Under Legislation:** Nominated NSW TSC Act.

**Recovery Plan:** Doesn't exist, but required.

**Reference List:** (308; 282; 293; 67; 34; 143; 373; 452; 565). Benson, J.S. (1999-2009) Unpublished field note books recording species at various locations in western NSW. (Royal Botanic Gardens and Domain Trust: Sydney); Dykes, P. (2002) Vegetation communities of the Cobar Shire. Unpublished report. (Department of Land and Water Conservation, Far West Region: Dubbo); Lewer, S., Ismay, K., Grounds, S., Gibson, R., Harris, M., Armstrong, R., Deluca, S. & Ryan, C. (2003) Native vegetation map report Bogan Gate, Boona Mount, Condobolin, Dandaloo, Tottenham and Tullamore 1:100 000 map sheets. (NSW Department of Infrastructure, Planning and Natural Resources). Submitted to Cunninghamia; Mid-Lachlan Regional Vegetation Committee (1999) Plan Draft Mid-Lachlan Regional Vegetation Management Plan for Public Exhibition. (Mid-Lachlan RVC: Forbes); Sivertsen, D. & Metcalfe, L. (1995) Natural vegetation of the southern wheat-belt (Forbes and Cargelligo 1:250 000 map sheets). Cunninghamia 4(1): 103-128; Whiting, E. (1997) Vegetation survey of Cocoparra National Park and Cocoparra Nature Reserve. Unpublished report (NSW National Parks and Wildlife Service: Griffith District); DEC (2006a) Reconstructed and extant distribution of native vegetation in the Lachlan Catchment. Unpublished report (NSW Department of Environment and Conservation: Dubbo); Porteners, M.F. (2007a) Aerial photo interpretation of the vegetation communities for the Pilliga community conservation areas zones 1-3 Stage 1 West Pilliga CCA Zones 1 & 3, Merriwindi CCA Zone 3. Report to NSW DECC (Marianne Porteners Environment Consul; Hunter, J.T. (2009k) Vegetation and floristics of Dowe National Park. Report to NSW National Parks and Wildlife Service.



# NSW Vegetation Classification - Vegetation ID

## Vegetation Community ID 229

**Common Name:** Derived mixed shrubland on loamy-clay soils in the Cobar Peneplain Bioregion

**Scientific Name:** *Eucalyptus intertexta* - *Callitris glaucophylla* / *Senna form taxon 'filifolia'* - *Senna form taxon 'artemisioides'* - *Eremophila mitchellii* - *Dodonaea viscosa subsp. angustissima* / *Sclerolaena birchii* - *Aristida jerichoensis var. subspinulifera* - *Rhodanthe floribunda* - *Thyridolepis mitchelliana*

**Veg. Comm. ID.:** 229 **Original Entry:** John Benson 31/12/2005

**Photo 1:** ID229a\_dsc\_1845.jpg Disturbed mixed shrubland, on Mt Grenfell Rd, [AGD66 31°30'10"S 145°25'23"E; 18/8/03, Jaime Plaza.



**Photo 2:** ID229b\_dsc\_1849.jpg Turpentine dominated mixed shrubland, on Mt Grenfell Rd, [AGD66 31°30'10"S 145°25'23"E; 18/8/03, Jaime Plaza.



**Characteristic Vegetation:** (Qualitative Estimate)

**Trees:** *Casuarina cristata*; *Callitris glaucophylla*; *Eucalyptus intertexta*; *Eucalyptus populnea subsp. bimbil*.

**Shrubs/Vines/Epiphytes:** *Senna form taxon 'filifolia'*; *Eremophila mitchellii*; *Senna form taxon 'artemisioides'*; *Eremophila sturtii*; *Eremophila glabra*; *Eremophila longifolia*; *Geijera parviflora*; *Acacia oswaldii*; *Dodonaea viscosa subsp. angustissima*; *Acacia homalophylla*; *Acacia aneura*.

**Ground Cover:** *Sclerolaena birchii*; *Aristida jerichoensis var. subspinulifera*; *Rhodanthe floribunda*; *Thyridolepis mitchelliana*; *Calandrinia eremaea*; *Themeda australis*; *Austrostipa scabra subsp. scabra*; *Cheilanthes sieberi subsp. sieberi*; *Calotis cuneata var. cuneata*; *Sida corrugata*; *Erodium crinitum*; *Crassula sieberiana subsp. sieberiana*; *Cuphonotus humistratus*.

**Weed Species:** *Carthamus lanatus*; *Cenchrus ciliaris*.

**Weediness:** Medium (5-15%) with <10% cover.

**Threatened Plants:** *Acacia curranii*; *Atriplex infrequens*.

**Threatened Fauna:** Kultarr; Australian Bustard; Bush Stone-curler; Major Mitchell's Cockatoo; Red-tailed Black-Cockatoo; Pied Honeyeater; Little Pied Bat; Leopard Ctenotus; Grey Falcon; Painted Honeyeater; Square-tailed Kite; Hooded Robin (south-eastern form); Black-chinned Honeyeater (eastern subspecies); Scarlet-chested Parrot; Grey-crowned Babbler (eastern subspecies); Grey-crowned Babbler (eastern subspecies); Yellow-bellied Sheath-tail-bat; Stripe-faced Dunnart; Western Blue-tongued Lizard.

**Mean Species Richness:** Not assessed.

**Rainforest Structure (Webb):** Not applicable.

**Structure (WH):** Shrubland; Open Shrubland.

**Height Class (WH):** Very Tall.

**Vegetation Description:** Very tall shrubland up to 6 m high dominated by Punty Bush (*Senna form taxon 'filifolia'*), Budda (*Eremophila mitchellii*), Silver Senna (*Senna form taxon 'artemisioides'*), Turpentine Bush (*Eremophila sturtii*), Tar Bush (*Eremophila glabra*), Emu bush (*Eremophila longifolia*), Wilga (*Geijera parviflora*) and Narrow-leaved Hopbush (*Dodonaea viscosa subsp. angustissima*). Some wattle (*Acacia*) species may also be present along with scattered trees such as Gum Coolabah (*Eucalyptus intertexta*) and White Cypress

Pine (*Callitris glaucophylla*). The ground cover is sparse and may comprise the grass species such as *Aristida jerichoensis* var. *subspinulifera* and *Thyridolepis mitchelliana*. Forbs include *Rhodanthe floribunda*, *Calandrinia eremaea*, *Calotis cuneata* var. *cuneata*, *Sida corrugata* and *Erodium cernitum*. The rockfern *Cheilanthes sieberi* subsp. *sieberi* is often present. Occurs on gravel red earth or clay soils sometimes derived from quartzite and sandstone on plains and rises on a peneplain landform. Distributed on the Cobar Peneplain mainly around the town of Cobar in the semi-arid climate zone. Probably a derived community from previous *Callitris glaucophylla*, Mulga (*Acacia aneura*) or Belah (*Casuarina cristata*) communities. This community is dominated by woody native shrubs commonly known as "woody weeds" in western NSW.

**Level of Classification:** Association.

**Classification Confidence Level:** High.

**Formation Group:** Eremophila, Melaleuca and Dodonaea shrublands of the inland.

**State Veg Map (Keith 2004):** North-west Plain Shrublands.

**State Landscape (Mitchell 2002):** Not Assessed.

**NVIS Major Veg Sub-Groups:** Other shrublands.

**Forest Type (RN 17):** 224 - Scrub (P).

**Authority(s):** (Expert Opinion). Equivalent to the "Cobar Modified Shrubland and Low Woodland" sub-unit of the "Mixed Shrublands (MSL)" map unit in Dykes (2002) covering the Cobar Shire. Probably community D3 in Cohn(1995) for Nombinnie NR where Emubush (*Eremophila longifolia*) dominates after fire. Field checked by J Benson August 2003. Similar to the disturbed shrubland ID143 that occurs to the south and west of the Cobar Peneplain Bioregion.

**Interstate Equivalent(s):** None.

**Mapped/Modelled:** Current extent partly mapped or modelled.

**Plot Sampling:** Inadequate.

**Mapping Info:** Dykes (2002) maps most of the distribution of this community as map unit Mixed Shrubland (MSL) but in a larger complex of shrublands so the exact boundaries are not mapped. some sampling in Gundabooka NP by Westbrooke et al. (2004).

**Climate Zone:** Semi-arid: hot (persistently dry).

**IBRA Bioregion (v6):** Cobar Peneplain (>70%).

**IBRA Sub-Region:** Barnato Downs (1-30%); Canbelego Downs (1-30%); Nymagee (1-30%).

**Botanical Division:** North Western Plains (NWP) (>70%).

**Local Govt. Areas:** Bourke (1-30%); Cobar (>70%).

**CMA:** Western (>70%).

**MD Basin:** Yes.

**Substrate Mass:** Metamorphic rocks; Sedimentary rocks.

**Lithology:** Clay; Gravel; Metamorphic rock (unidentified); Quartz sandstone; Quartzite; Sandstone.

**Great Soil Group:** Red clay; Red earth.

**Soil Texture:** Clay loam; Light clay; Loam; Loamy sand.

**Landform Patterns:** Peneplain.

**Landform Elements:** Plain.

**Land Use:** Grazing.

**Impacts of European Settlement:** Increased extent/range.

**Pre-European Extent:** 1000 ha  $\pm$ 30%. Expert estimate not based on any mapped vegetation.

**Pre-European Extent Comments:** It is assumed this is a derived community and small or no areas similar to this occurred prior to European settlement and instead this area would have been a Pine or Mulga woodland.

**Current Extent:** 200000 ha  $\pm$ 30% or 20000%  $\pm$  60% of pre-European extent remaining.

**Current Extent Comments:** (Estimated from mapped extant vegetation: full range). Dykes (2002) maps 250000 ha of Mixed shrubland but this is composed of three plant communities. It is estimated that about two thirds of this map unit is this plant community based on his mapping around Cobar. Other areas also occur to the north of Dykes mapping.

**Conservation Reserves:** Gundabooka NP 9000 (E2); Mount Grenfell HS 35 (E1); Nombinnie SCA 300 (E2); Yathong NR 600 (E2).

**Reserves Total Area:** 9935 ha.

**No. Representatives in Reserves:** 4

**Protected Area Explanation:** Mt Grenfell HS area mapped by Dykes (2002). Gundabooka NP estimate from Westbrooke et al. (2004). Probably similar to map unit D3 in Cohn (1995) covering Nombinnie SCA. Mixed Shrubland map unit in Dykes (2002) in Yathong NR.

**Secure Property Agreements:** None.

**Secure PAs Total Area:** 0 ha.

**No. Representatives in Secure Property Agreements:** 0

**Protected Current Extent:** 4.96% 9935 ha  $\pm$  30%.

**No. Representatives in Protected Areas:** 4

**Protected Pre-European Extent:** 993.5% which is inadequately protected across distribution.

**Restricted in 1750:** Code 1b: >50% of pre-European extent in protected areas (1,000<area<10,000 ha).

**Key Sites for Protection:** Not a priority for conservation due to it probably being a derived or successional community. Any conservation action should be directed towards species of importance.

**Degree of Fragmentation:** Contiguous stands with high connectivity with >60% extent remaining and low edge to area ratio.

**Recoverability:** Very poor health as structure and/or composition severely altered. Insufficient biota remain for natural regeneration except some ruderal species

**Variation & Disturbance:** Probably a derived community from an original Mulga (*Acacia aneura*) or Cypress Pine (*Callitris glaucophylla*) woodland.

**Fire Regime:** Fires are rare in this shrubland and some people consider this may explain the woody shrub regrowth. It is difficult for fire to carry with low fuel loads on the ground due to grazing by stock and goats. Fire may favour re-spouter species in some locations - an example is post-fire dominance of Emubush (*Eremophila longifolia*).

**Adjoining Communities:** Grades into Poplar Box and Eucalyptus intertexta communities (ID103 and ID104), Poplar Box - Mulga (ID109) of Mulga shrubland (ID125).

**Threatening Processes:** Woody native shrub regrowth has replaced previously cut or cleared Mulga or Pine. Soil erosion is a significant problem due to lack of ground cover. It is possible increased carbon dioxide has led to this shrub growth. Goats are abundant in this community.

**Threatening Process List:** Climate change; Inappropriate fire regimes; Overharvesting or collecting of key species; Soil erosion, water: sheet erosion; Unsustainable grazing and trampling by stock; Unsustainable grazing by introduced animals; Woody shrub (native) invasion.

Friday, 27 January 2012

Page 2 of 3

**Threat Category:** Least Concern.

**Threat/Protected Area Code:** LC/1b

**Threat Criteria:** 1.

**Planning Controls:**

**Planning and Management:** Manage grazing regimes and goats. Control of woody shrubs is a difficult management task.

**Listed Under Legislation:** None.

**Recovery Plan:** Doesn't exist and not required.

**Reference List:** (308; 39; 282). Benson, J.S. (1999-2009) Unpublished field note books recording species at various locations in western NSW. (Royal Botanic Gardens and Domain Trust: Sydney); Conn, J.S. (1995) The vegetation of Nombinnie and Round Hill Nature Reserves, central-western New South Wales. *Cunninghamia* 4(1): 81-101; Dykes, P. (2002) Vegetation communities of the Cobar Shire. Unpublished report. (Department of Land and Water Conservation, Far West Region: Dubbo).



# NSW Vegetation Classification - Vegetation ID

## Vegetation Community ID 164

**Common Name:** Cotton Bush open shrubland of the semi-arid (warm) zone

**Scientific Name:** *Maireana aphylla* / *Sclerolaena tricuspis* - *Calocephalus sonderi* - *Rhodanthe corymbiflora* - *Austrodanthonia caespitosa*

**Veg. Comm. ID.:** 164 **Original Entry:** John Benson 31/12/2005

**Photo 1:** ID164a\_img394pc.jpg Cotton Bush (*Maireana aphylla*) and *Bromus diandra* shrubland, NSW; September 1990; M.F. Porteners.



**Photo 2:** ID164b\_img395pc.jpg Cotton Bush (*Maireana aphylla*) and *Danthonia caespitosa*, Hay Plain, NSW; 1990; M.F. Porteners.



**Characteristic Vegetation:** (Combination of Quantitative Data and Qualitative Estimate)

**Trees:** Generally absent.

**Shrubs/Vines/Epiphytes:** *Maireana aphylla*; *Nitraria billardierei*; *Sclerolaena muricata*; *Atriplex vesicaria*; *Muehlenbeckia florulenta*; *Rhagodia spinescens*; *Eragrostis australasica*; *Maireana turbinata*; *Maireana pentagona*; *Lycium australe*; *Chenopodium nitrariaceum*.

**Ground Cover:** *Sclerolaena tricuspis*; *Rhodanthe corymbiflora*; *Austrodanthonia caespitosa*; *Austrodanthonia setacea*; *Sporobolus caroli*; *Goodenia fascicularis*; *Calocephalus sonderi*; *Rhodanthe stuartiana*; *Rhodanthe pygmaea*; *Sclerolaena brachyptera*; *Atriplex pseudocampanulata*; *Atriplex leptocarpa*; *Atriplex lindleyi*; *Leiocarpa panaetioides*; *Leiocarpa tomentosa*; *Osteocarpum acropterum* var. *deminuta*; *Minuria cunninghamii*; *Malacocera tricornis*; *Sclerolaena bicornis* var. *bicornis*; *Daucus glochidiatus*; *Plantago cunninghamii*; *Podolepis muelleri*; *Calotis scabiosifolia* var. *scabiosifolia*; *Brachyscome lineariloba*.

**Weed Species:** *Avena fatua*; *Hordeum leporinum*; *Lolium perenne*; *Bromus diandrus*; *Bromus madritensis*; *Cotula bipinnata*; *Medicago minima*; *Medicago polymorpha*; *Phalaris paradoxa*; *Vulpia myuros*; *Vulpia muralis*; *Schismus barbatus*; *Hedypnois rhagadioloides* subsp. *cretica*.

**Weediness:** Very high (>30%) with 10-30% cover.

**Threatened Plants:** *Swainsona murrayana* (V); *Maireana cheelii*.

**Threatened Fauna:** Not assessed.

**Mean Species Richness:** 29±14 (Forward & Robinson 1996) in 100x100 m plots); 24±1 (Horner et al. 2003 in 20x20 m plots).

**Rainforest Structure (Webb):** Not applicable.

**Structure (WH):** Open Chenopod Shrubland; Sparse Chenopod Shrubland.

**Height Class (WH):** Low; Mid-High.

**Vegetation Description:** Low to mid-high sparse to mid-dense shrubland usually about 0.8 m high dominated by Cotton Bush (*Maireana aphylla*) with occasional remnant shrubs of Bladder Saltbush (*Atriplex vesicaria*). Smaller shrubs include copperburrs (*Sclerolaena muricata*, *Sclerolaena tricuspis* and *Sclerolaena bicornis*) and annual saltbushes (*Atriplex lindleyi*, *Atriplex leptocarpa*). The sparse ground cover contains native forbs such as paper daisies (*Rhodanthe* spp.), *Minuria cunninghamii*, and *Calotis scabiosifolia* var. *scabiosifolia* and grasses such as *Austrodanthonia caespitosa*. Often contains a very high cover of weed species including *Hordeum* spp., *Bromus* spp.,

Vulpia spp., Medicago spp., Avena fatua and Lolium perenne. Occurs on grey to grey-brown clays or clay-loam soils on depressed alluvial plains mainly in the Riverina Bioregion of the semi-arid (warm) climatic zone. This is derived community occurring in highly disturbed areas. Areas in which it occupies were probably dominated by Bladder Saltbush and other species prior to European settlement but heavy grazing and other processes have led to the decline of perennial saltbush species leaving this Cotton Bush-dominated community. The severe droughts of the 1990s and 2000s have led to dieback of areas of Cotton Bush.

**Level of Classification:** Association.

**Classification Confidence Level:** High.

**Formation Group:** Chenopod (Halophytic) Shrublands of the Inland.

**State Veg Map (Keith 2004):** Riverine Chenopod Shrublands.

**State Landscape (Mitchell 2002):** Not Assessed.

**NVIS Major Veg Sub-Groups:** Chenopod shrublands.

**Forest Type (RN 17):** 226 - Saltbush (P).

**Authority(s):** (Combination of Expert Opinion and Quantitative Data). Community 21 in Scott (1992) and Porteners (1993). Extends into South Australia and Victoria. similar to but contains different associate species to Cotton Bush community to the north (ID224). Part of BVT 36 in DEC (2006a). Probably a derived community from previous Bladder Saltbush shrubland.

**Interstate Equivalent(s):** Part of Victorian Alluvial Plains Shrubland EVC; South Australia: Most of floristic group 20 in Forward and Robinson (1996).

**Mapped/Modelled:** Current extent mapped.

**Plot Sampling:** Inadequate.

**Mapping Info:** Mapped at 1:250000 scale by Scott (1992) and Porteners (1993). Poorly sampled although DLWC is remapping and ground sampling some regions in 2001/2.

**Climate Zone:** Semi-arid: warm (winter rain); Semi-arid: hot (persistently dry).

**IBRA Bioregion (v6):** Murray-Darling Depression (1-30%); Riverina (>70%).

**IBRA Sub-Region:** Lachlan (30-70%); Murray Fans (1-30%); Murrumbidgee (30-70%).

**Botanical Division:** South Far Western Plains (SFWP) (1-30%); South Western Plains (SWP) (>70%).

**Local Govt. Areas:** Balranald (1-30%); Carrathool (1-30%); Conargo (1-30%); Deniliquin (1-30%); Hay (30-70%); Murrumbidgee (1-30%); Wakool (1-30%); Urana (1-30%).

**CMAs:** Lachlan (30-70%); Lower Murray-Darling (1-30%); Murray (1-30%); Murrumbidgee (30-70%).

**MD Basin:** Yes.

**Substrate Mass:** Alluvium.

**Lithology:** Clay.

**Great Soil Group:** Brown clay; Brown earth; Grey clay.

**Soil Texture:** Clay loam; Light medium clay; Medium clay.

**Landform Patterns:** Alluvial plain.

**Landform Elements:** Plain; Scald; Scroll plain.

**Land Use:** Cropping and Horticulture; Grazing.

**Impacts of European Settlement:** Increased extent/range.

**Pre-European Extent:** 50000 ha  $\pm$ 30%. Expert estimate not based on any mapped vegetation.

**Pre-European Extent Comments:** Probably a derived community from an original Bladder Saltbush shrubland. There may have been some natural areas of this community prior to European settlement.

**Current Extent:** 460000 ha  $\pm$ 60% or 920%  $\pm$  80% of pre-European extent remaining.

**Current Extent Comments:** (Estimated from mapped extant vegetation: full range). About 440000 ha is mapped on Booligal-Hay-Deniliquin map sheets (Porteners 1993). Horner et al. (2002) map 170000 ha on part of the Hay Plain (part of the Porteners 1993 area). About 18500 ha is mapped on Balranald-Swan Hill map sheet by Scott (1992). Some of this area has been effected by drought dieback since the 1990s.

**Conservation Reserves:** Kalyarr NP 150 (E2); Oolambeyan NP 1000 (E2); Willandra NP 6000 (E4); Yanga NP 400 (E3); Murrumbidgee Valley NR 60 (E3); Yanga SCA 10000 (E3).

**Reserves Total Area:** 17610 ha.

**No. Representatives in Reserves:** 6

**Protected Area Explanation:** Mungo NP from Westbrooke & Miller (1995). Neary Lake NR from Westbrooke et al. (1997). Murrumbidgee Valley NR, Yanga NP & SCA estimates from map unit 21 in Scott (1992) and Kerr et al. (2000). Willandra NP, half of area mapped by Porteners (1993) - other half is estimated to be grassland. Oolambeyan NP estimate from map in Webster (1998). Kalyarr NP estimate as being a minor part of map unit 17 in Horner et al. (2002).

**Secure Property Agreements:** None.

**Secure PAs Total Area:** 0 ha.

**No. Representatives in Secure Property Agreements:** 0

**Protected Current Extent:** 3.82% 17610 ha  $\pm$  30%.

**No. Representatives in Protected Areas:** 6

**Protected Pre-European Extent:** 35.22% which is inadequately protected across distribution.

**Common in 1750:** Code 1a: >25% of pre-European extent in protected areas (>10,000 ha).

**Key Sites for Protection:** Covers large areas but only a small proportion is in reserves. However, due to the disturbed nature of this plant community it is not a priority for conservation.

**Degree of Fragmentation:** Contiguous stands with high connectivity with >60% extent remaining and low edge to area ratio.

**Recoverability:** Very poor health as structure and/or composition severely altered. Insufficient biota remain for natural regeneration except some ruderal species

**Variation & Disturbance:** Probably mostly derived from Bladder Saltbush shrubland (ID157) and Old Man Saltbush tall shrubland (ID159) but some areas may have existed in 1788.

**Fire Regime:** Rarely burns - occasional summer wildfires occur after plant growth in spring.

**Adjoining Communities:** Grades into Bladder Saltbush community (ID157) on the Hay Plain, Black Bluebush (ID153) and Dillon Bush (ID163) and grasslands.

**Threatening Processes:** The original saltbush component of this community has been lost through grazing. There may be some species in this community that are threatened and dieback during severe droughts has affected the extent of Cotton Bush.

**Threatening Process List:** Disease and/or dieback (abnormal); Dryland cropping; Irrigated cropping (incl. horticulture); Soil erosion, water: sheet erosion; Soil erosion, wind; Unsustainable grazing and trampling by stock.



**Threat Category:** Least Concern.

**Threat/Protected Area Code:** LC/1a

**Threat Criteria:** 1.

**Planning Controls:**

**Planning and Management:** Control soil erosion and grazing levels to maintain species composition and encourage recolonisation of perennial shrubs including Cotton Bush.

**Listed Under Legislation:** None.

**Recovery Plan:** Doesn't exist and not required.

**Reference List:** (272; 289; 14; 13; 325; 373). Forward, L.R. & Robinson, A.C. (1996) (eds.) A biological survey of the South Olary Plains South Australia. (Department of Environment and Natural Resources: South Australia); Horner, G., McNellie, M., Nott, T.A., Vanzella, B., Schliebs, M., Kordas, G.S., Turner, B. & Hudspith, T.J. (2002) Native vegetation map report series: No. 2 Dry Lake, Oxley, Hay, One Tree, Moggumbill & Gunbar 1:100 000 map sheets. (NSW Department of Infrastructure Planning and Natural Resources: Sydney); Porteners, M.F. (1993) The natural vegetation of the Hay Plain: Booligal-Hay and Deniliquin-Bendigo 1:250 000 maps. *Cunninghamia* 3(1) 1-122; Scott, J.A. (1992) The natural vegetation of the Balranald - Swan Hill area. *Cunninghamia* 2(4): 597-652; Webster, R. (1998) Vegetation management plan for "Oolambeyan". Prepared for Commonwealth Funds Management. (Ecosurveys Pty. Ltd. PO Box 13 Deniliquin NSW 2710); DEC (2006a) Reconstructed and extant distribution of native vegetation in the Lachlan Catchment. Unpublished report (NSW Department of Environment and Conservation: Dubbo).

# NSW Vegetation Classification - Vegetation ID

## Vegetation Community ID 216

**Common Name:** Black Roly Poly low open shrubland of the Riverina and Murray-Darling Depression Bioregions

**Scientific Name:** *Sclerolaena muricata* var. *semiglabra* - *Sclerolaena diacantha* - *Atriplex semibaccata* / *Vittadinia cuneata* - *Austrostipa scabra* subsp. *falcata* - *Austrodanthonia caespitosa*

**Veg. Comm. ID.:** 216 **Original Entry:** John Benson 31/12/2005

**Photo 1:** ID216a\_img038pc.jpg *Sclerolaena muricata*-Maireana shrubland, near Wakool, [AGD66 35°38'57.9"S 144°25'17.1"E], 11/4/02, Jaime Plaza.



**Photo 2:** ID216b\_img309pc.jpg Black Roly Poly (*Sclerolaena muricata*) shrubland, SW Plains; April 2002, J.S. Benson.



**Photo 3:** ID216c\_DIPNR.jpg *Sclerolaena muricata* var. *semiglabra* with *Vittadinia cuneata*, *Sclerolaena diacantha* & *Austrostipa* sp. approx 10 km E of Oxley township; 21/05/2001, Megan McNellie DIPNR.



**Characteristic Vegetation:** (Combination of Quantitative Data and Qualitative Estimate)

**Trees:** *Eucalyptus largiflorens*.

**Shrubs/Vines/Epiphytes:** *Sclerolaena muricata* var. *semiglabra*; *Sclerolaena diacantha*; *Maireana microphylla*; *Leiocarpa panaetioides*; *Teucrium racemosum*.

**Ground Cover:** *Atriplex semibaccata*; *Vittadinia cuneata*; *Austrostipa scabra* subsp. *scabra*; *Austrodanthonia caespitosa*; *Vittadinia pterochaeta*; *Rhodanthe corymbiflora*; *Sida trichopoda*; *Geranium solanderi* var. *solanderi*; *Walwhalleya prolata*; *Einadia nutans* subsp. *nutans*; *Chloris truncata*.

**Weed Species:** *Hordeum leporinum*; *Lolium perenne*; *Medicago polymorpha*; *Erodium cicutarium*.

**Weediness:** High (15-30%) with 10-30% cover.

**Threatened Plants:** *Lepidium monoplacoides* (E); *Atriplex infrequens*.

**Threatened Fauna:** Kultarr; Australian Bustard; Major Mitchell's Cockatoo; Red-tailed Black-Cockatoo; Pied Honeyeater; Little Pied Bat; Marble-faced Delma; Grey Falcon; Square-tailed Kite; Redthroat; Yellow-bellied Shearwater; Narrow-banded Snake; Stripe-faced Dunnart; Western Blue-tongued Lizard.

**Mean Species Richness:** 7±1.2 (Horner et al. 2003 in 20x20 m plots during drought).

**Rainforest Structure (Webb):** Not applicable.

**Structure (WH):** Open Chenopod Shrubland; Sparse Chenopod Shrubland.

**Height Class (WH):** Low; Mid-High.

**Vegetation Description:** Low or mid-high open chenopod shrubland dominated by Black Roly Poly (*Sclerolaena muricata* var. *semiglabra*), with other low shrubs such as *Sclerolaena diacantha*, *Maireana microphylla*, *Leiocarpa panaetioides* and *Teucrium racemosum*. Scattered Black Box trees (*Eucalyptus largiflorens*) may be present. The ground cover is sparse and includes forbs such as *Atriplex semibaccata*, *Vittadinia cuneata*, *Vittadinia pterochaeta*, *Rhodanthe corymbiflora*, *Sida trichopoda*, *Geranium solanderi* var. *solanderi* and grass species such as *Austrostipa scabra* subsp. *scabra*, *Austrodanthonia caespitosa*, *Walwhalleya prolata* and *Chloris truncata*. Occurs on grey and brown clays on alluvial plains primarily in the Riverina and Murray-Darling Depression Bioregions of south-western NSW. Probably a derived community from a previous Bladder Saltbush-dominated community. Grades into Bladder Saltbush, Cotton Bush and Dillon Bush communities.

**Level of Classification:** Association.

**Classification Confidence Level:** Medium.

**Formation Group:** Chenopod (Halophytic) Shrublands of the Inland.

**State Veg Map (Keith 2004):** Riverine Chenopod Shrublands.

**State Landscape (Mitchell 2002):** Not Assessed.

**NVIS Major Veg Sub-Groups:** Chenopod shrublands.

**Forest Type (RN 17):** 226 - Saltbush (P).

**Authority(s):** (Combination of Expert Opinion and Quantitative Data). Equivalent to floristic group 6 being part of map unit 19 in Horner et al. (2002) covering part of the Hay Plain. Includes community F1 in Cohn(1995). Probably included in Cotton Bush community ID164 and Dillon Bush (ID163) shrublands mapped by Porteners (1993) and others. Species recorded and checked by Benson (1999-2009). Part of BVT 34 in DEC (2006a). Similar to the Roly Poly shrubland ID168 in the north of NSW but contains some different species.

**Interstate Equivalent(s):** None.

**Mapped/Modelled:** Current extent and pre-European extent mapped or modelled as part of a broader community.

**Sampling:** Inadequate.

**Mapping Info:** Mappable - but only with low level aerial photographs and ground checking. Mapped as broader community on Hay Plain in Porteners (1993) and Horner et al. (2002). Cohn(1995) maps this community in Nombinnie region.

**Climate Zone:** Semi-arid: warm (winter rain).

**IBRA Bioregion (v6):** Murray-Darling Depression (1-30%); Riverina (30-70%).

**IBRA Sub-Region:** Darling Depression (1-30%); Lachlan (1-30%); Lachlan Plains (1-30%); Lower Slopes (1-30%); Murray Fans (1-30%); Murrumbidgee (1-30%); South Olary Plain, Murray Basin Sands (1-30%).

**Botanical Division:** South Far Western Plains (SFWP) (1-30%); South Western Plains (SWP) (30-70%).

**Local Govt. Areas:** Carrathool (1-30%); Conargo (1-30%); Greater Hume (1-30%); Deniliquin (1-30%); Griffith (1-30%); Hay (1-30%); Jerilderie (1-30%); Lachlan (1-30%); Leeton (1-30%); Lockhart (1-30%); Murray (1-30%); Murrumbidgee (1-30%); Urana (1-30%); Wakool (1-30%); Wentworth (1-30%).

**CMAs:** Lachlan (1-30%); Lower Murray-Darling (1-30%); Murray (1-30%); Murrumbidgee (1-30%).

**MD Basin:** Yes.

**Substrate Mass:** Alluvium.

**Lithology:** Clay.

**Great Soil Group:** Brown clay; Grey clay.

**Soil Texture:** Heavy clay; Medium clay.

**Landform Patterns:** Alluvial plain.

**Landform Elements:** Plain; Scald.

**Land Use:** Cropping and Horticulture; Grazing.

**Impacts of European Settlement:** Increased extent/range.

**Pre-European Extent:** 5000 ha ±50%. Expert estimate not based on any mapped vegetation.

**Pre-European Extent Comments:** Estimate. Possible did not exist before intensive stock grazing eliminated saltbushes from large areas.

**Current Extent:** 100000 ha ±50% or 2000% ± 80% of pre-European extent remaining.

**Current Extent Comments:** (Expert estimate). Horner et al. map about 200000 ha of map unit 19 in 6 map sheets on the Hay Plain but only half of this is estimated to be this Black Roly Poly community. Observed on the eastern edge of the Riverina in patches.

**Conservation Reserves:** Kalyarr NP 1300 (E3); Morrisons Lake NR 30 (E2); Nombinnie NR 240 (E1); Nombinnie SCA 10 (E1).

**Reserves Total Area:** 1580 ha.

**No. Representatives in Reserves:** 4

**Protected Area Explanation:** Mapped in Nombinnie NR and Nombinnie SCA as map unit F1 by Cohn(1995). Morrisons Lake NR from Kerr et al. (2000) but this may be inaccurate. Areas in Kalyarr NP estimated by splitting map unit 19 in Horner et al. (2002) between this community and ID236 but this needs field checking.



**Secure Property Agreements:** None.

**Secure PAs Total Area:** 0 ha.

**No. Representatives in Secure Property Agreements:** 0

**Protected Current Extent:** 1.58% 1580 ha ± 50%.

**No. Representatives in Protected Areas:** 4

**Protected Pre-European Extent:** 31.6% which is inadequately protected across distribution.

**Restricted in 1750:** Code 2b: 31-50% of pre-European extent in protected areas (1,000<area<10,000 ha).

**Key Sites for Protection:** Not a priority for protection unless a threatened species is present.

**Degree of Fragmentation:** Contiguous stands with high connectivity with >60% extent remaining and low edge to area ratio.

**Recoverability:** Very poor health as structure and/or composition severely altered. Insufficient biota remain for natural regeneration except some ruderal species

**Variation & Disturbance:** Probably a derived community that was originally dominated by saltbush or bluebush species.

**Fire Regime:** Unknown, would rarely burn.

**Adjoining Communities:** Grades into Bladder Saltbush on less grazed areas and into cotton Bush and Dillon Bush shrubland on the Hay Plain. May grade into Black Box woodland near watercourses or flood depressions. Some similarities with ID168 in the Darling Riverine Plain Bioregion to the north.

**Threatening Processes:** Overgrazing and ploughing for crops may threaten some species but overall this is not a threatened community.

**Threatening Process List:** Clearing for agriculture; Dryland cropping; Unsustainable grazing and trampling by stock.

**Threat Category:** Least Concern.

**Threat/Protected Area Code:** LC/2b

**Threat Criteria:** 1.

**Planning Controls:**

**Planning and Management:** Allow perennial plant species to recover from over-grazing. Some sites may warrant being protected if they contain species of concern.

**Listed Under Legislation:** None.

**Recovery Plan:** Doesn't exist and not required.

**Reference List:** (308; 39; 289; 14; 373). Benson, J.S. (1999-2009) Unpublished field note books recording species at various locations in western NSW. (Royal Botanic Gardens and Domain Trust: Sydney); Conn, J.S. (1995) The vegetation of Nombinnie and Round Hill Nature Reserves, central-western New South Wales. *Cunninghamia* 4(1): 81-101; Horner, G., McNellie, M., Nott, T.A., Vanzella, B., Schliebs, M., Kordas, G.S., Turner, B. & Hudspith, T.J. (2002) Native vegetation map report series: No. 2 Dry Lake, Oxley, Hay, One Tree, Moggumbill & Gunbar 1:100 000 map sheets. (NSW Department of Infrastructure Planning and Natural Resources: Sydney); Porteners, M.F. (1993) The natural vegetation of the Hay Plain: Booligal-Hay and Deniliquin-Bendigo 1:250 000 maps. *Cunninghamia* 3(1) 1-122; DEC (2006a) Reconstructed and extant distribution of native vegetation in the Lachlan Catchment. Unpublished report (NSW Department of Environment and Conservation: Dubbo).