

NSW Vegetation Classification - Vegetation ID

Vegetation Community ID 13

Common Name: Black Box - Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina and Murray Darling Depression Bioregions)

Scientific Name: *Eucalyptus largiflorens* / *Muehlenbeckia florulenta* - *Chenopodium nitrariaceum* / *Einadia nutans subsp. nutans* - *Paspalidium jubiflorum* - *Sclerolaena muricata* var. *muricata* - *Austrodanthonia caespitosa*

Veg. Comm. ID.: 13 **Original Entry:** John Benson 31/12/2005

Photo 1: ID13a_img066pc.jpg *Eucalyptus largiflorens*-*Chenopodium nitrariaceum* woodland, Kemendok Nature Reserve, [AGD66 34°32'11.3"S 142°24'15.0"E], 13/4/02, Jaime Plaza.



Photo 2: ID13b_img035pc.jpg *Eucalyptus largiflorens* - *Chenopodium nitrariaceum*. woodland, Echuca-Barham Rd, [AGD66 35°44'04.2"S 144°29'14.4"E], 11/4/02, Jaime Plaza.



Photo 3: ID13c_img033pc.jpg Wetland salinity, dead *Eucalyptus largiflorens*, Echuca-Barham Rd, [AGD66 35°48'67.9"S 144°31'35.4"E], 11/4/02, Jaime Plaza.



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

Trees: *Eucalyptus largiflorens*; *Eucalyptus camaldulensis* subsp. *camaldulensis*.

Shrubs/Vines/Epiphytes: *Muehlenbeckia florulenta*; *Chenopodium nitrariaceum*; *Acacia stenophylla*; *Rhagodia spinescens*; *Atriplex nummularia*; *Nitraria billardierei*; *Acacia salicina*; *Myoporum montanum*; *Amyema miquelii*.

Ground Cover: *Sclerolaena muricata* var. *muricata*; *Einadia nutans* subsp. *nutans*; *Paspalidium jubiflorum*; *Solanum esuriale*; *Austrodanthonia caespitosa*; *Atriplex leptocarpa*; *Atriplex eardleyae*; *Atriplex lindleyi*; *Atriplex pseudocampanulata*; *Atriplex semibaccata*; *Enchylaena tomentosa*; *Dissocarpus paradoxus*; *Sclerolaena tricuspis*; *Sclerolaena diacantha*; *Sclerolaena obliquicuspis*; *Cotula australis*; *Oxalis perennans*; *Pratia concolor*; *Enteropogon acicularis*; *Austrostipa aristiglumis*; *Austrodanthonia setacea*; *Rhodanthe corymbiflora*; *Marsilea drummondii*; *Wahlenbergia fluminalis*; *Juncus subsecundus*; *Juncus filicaulis*; *Carex inversa*; *Panicum simile*; *Eragrostis parviflora*; *Haloragis aspera*; *Teucrium racemosum*; *Alternanthera denticulata*; *Mimulus prostratus*; *Eclipta platyglossa*; *Walwhalleya prolata*; *Austrostipa scabra* subsp. *scabra*; *Sida corrugata*.

Weed Species: *Cotula bipinnata*; *Erodium cicutarium*; *Hordeum leporinum*; *Lolium perenne*; *Vulpia myuros*; *Lycium ferocissimum*; *Sisymbrium irio*; *Phalaris paradoxa*; *Spergularia rubra*; *Xanthium occidentale*.

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

Threatened Plants: Not assessed.

Threatened Fauna: Not assessed.

Mean Species Richness: 26±15 spp. with an average of 8 exotic spp. (community 23 in Smith & Smith 1990 in 20x20 m plots).

Rainforest Structure (Webb): Not applicable.

Structure (WH): Woodland; Open Woodland.

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

Vegetation Description: Woodland, open forest or open woodland averaging about 15 m high dominated by a sparse to dense stands of Lignum (*Muehlenbeckia florulenta*), Nitre Goosefoot (*Chenopodium nitrariaceum*) and River Cooba (*Acacia stenophylla*). The ground cover includes low shrubs such as *Sclerolaena muricata* var. *muricata*, *Enchylaena tomentosa*, *Einadia nutans* subsp. *nutans* and various saltbush species (*Atriplex* spp.). Forb species include *Solanum esuriale*, *Cotula australis*, *Oxalis perennans*, *Alternanthera denticulata* and *Pratia concolor*. Grass species include Warrego Summer Grass (*Paspalidium jubiflorum*), Curly Windmill Grass (*Enteropogon acicularis*) and *Walwhalleya prolata* and wallaby grasses (*Austrodanthonia* spp.). Weed species include the shrub African Boxthorn (*Lycium ferocissimum*), the forbs *Cotula bipinnata*, *Erodium cicutarium* and *Sisymbrium irio* and the grasses *Hordeum leporinum* and *Lolium perenne*. Occurs on clay or clay-loam, often gilgaied, soils on inner floodplains and on alluvial plains mostly in depressions that are frequently flooded. A widespread community along rivers in south-western NSW including the Murray, Wakool, lower Darling, Lachlan, Murrumbidgee Rivers and Willandra Creek. Mainly located in the semi-arid (warm) climate zone in the Riverina and Murray Darling Depression and southern Cobar Penneplain Bioregions. This community extends up the Darling River to above Kinchega National Park where it intergrades with floodplain communities dominated by Coolabah (*Eucalyptus coolabah* subsp. *coolabah*). In more arid areas of the Murray-Darling Depression Bioregion this community grades into the Black Box - chenopod community (ID15) that occurs on higher ground and contains less or no lignum and more chenopod shrubs. This community has been extensively cleared in eastern areas such as near Lake Cargelligo on the Lachlan River and east of Deniliquin on the Murray River. Threatened by further clearing for agricultural development, weed invasion, altered flooding regimes and in some places rising saline water tables. Tree dieback from drought has increased since 2000.

Level of Classification: Association.

Classification Confidence Level: Medium.

Formation Group: *Eucalyptus* Communities of Inland Watercourses and Inner Floodplains.

State Veg Map (Keith 2004): Inland Floodplain Woodlands.

State Landscape (Mitchell 2002): Not Assessed.

NVIS Major Veg Sub-Groups: *Eucalyptus* woodlands with a shrubby understorey.

Forest Type (RN 17): 202 - Black Box/Coolabah (P).

Authority(s): (Quantitative Data). Includes community 23 in the floristic plot survey of the Murray River by Smith & Smith (1990). Part of community 1a in Westbrooke et al. (2001) (Kinchega National Park) and part of map unit 2 in Pressey et al. (1984) covering the Great Cumbung Swamp. The Black Box community for the southern part of Cobar Shire on the lower Lachlan River mapped by Dykes (2002). Black Box community of the southern wheatbelt described in Sivertsen & Metcalfe (1995). Part of the broader Black Box community mapped and described by Fox (1991), Scott (1992), Porteners (1993) and Eardley (1999). Probably most of map unit 4 (including much of floristic group 14) in Horner et al. (2002). Floristic groups 13 and 15 being most of map unit FLP3 in Lewer et al. (2003) covering a section of central NSW. Most of Biolandscapes SouA80 in Priday (2006). Part of BVT 31 in DEC (2006a). Checked by Benson (1999-2009). A very widespread community that varies in its composition over its large range but consistently contains a suite of dominant species. Grades into ID15 in more arid areas and on higher ground. Limited site data exists as of 2005 to compare the Black Box communities in western NSW.

Interstate Equivalent(s): South Australia: part of *Eucalyptus largiflorens* community in Davies (1982 p23); Victoria: similar to EVC 663 Black Box Lignum Woodland or EVC823 Lignum Swampy Woodland.

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

Mapping Info: Mapped as part of the Black Box community in RBG 1:250 000 mapping for the region. Mapped for the southern the Lachlan River by Dykes (2002) and Sivertsen & Metcalfe (1995). Mapped along part of the lower Darling River by Pickard & Norris (1991) and in Kinchega NP by Westbrooke et al. (2001). Mapped for a part of the Hay Plain in Horner et al. (2002). Part of map unit ALP3 in Lewer et al. in central NSW. Mapped in a number of reserves.

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

IBRA Bioregion (v6): Cobar Penneplain (1-30%); Darling Riverine Plains (1-30%); Riverina (>70%).

IBRA Sub-Region: Menindee (1-30%); Murray Fans (>70%); Murray Scroll Belt (1-30%); Nymagee (1-30%); Robinvale Plains (1-30%).

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

Local Govt. Areas: Balranald (1-30%); Carrathool (1-30%); Central Darling (1-30%); Cobar (1-30%); Conargo (1-30%); Griffith (1-30%); Hay (1-30%); Jerilderie (1-30%); Lachlan (1-30%); Murray (30-70%); Wakool (30-70%); Wentworth (1-30%); Urana (1-30%).

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

MD Basin: Yes.

Substrate Mass: Alluvium.

Lithology: Alluvial loams and clays.

Great Soil Group: Grey clay.

Soil Texture: Clay loam; Heavy clay; Medium clay.

Landform Patterns: Flood plain.

Landform Elements: Backplain; Drainage depression; Levee; Ox-bow; Stream bed; Stream channel.

Land Use: Cropping and Horticulture; Grazing.

Impacts of European Settlement: Major alteration of species composition; Major reduction (>70%) in extent and/or range.

Pre-European Extent: 350000 ha \pm 50%. Estimated based on maps of current vegetation.

Pre-European Extent Comments: Part of the pre-European mapping of 776000 ha of broad Black Box in the Riverina as documented in WRRVC (2001). Part of Miles (2001) pre-European broad 334000 ha Floodplain Woodland map unit for the Murray Catchment area. Also part of the Black Box community in the MD Depression Bioregion mapped by Scott (1992) and Fox (1991).

Current Extent: 150000 ha \pm 30% or 43% \pm 70% of pre-European extent remaining.

Current Extent Comments: (Estimated from a more broadly classified vegetation map). Based on current extent to pre-European extent in WRRVC (2001). For the Murray Catchment, Miles (2001) estimates only 18% (71000) remains. Sivertsen & Metcalfe (1995) map 22500 ha in the mid-Lachlan region but Dykes (2002) maps only 576 ha remaining of an estimated original extent of 27000 ha on the Lachlan floodplain near Lake Cargelligo. Horner et al. (2002) map about 60000 ha as map unit 4 on the Hay Plain.

Conservation Reserves: Kalyarr NP 830 (E1); Kemendok NR 330 (E2); Kinchega NP 8600 (M); Morrisons Lake NR 40 (E2); Oolambeyan NP 297 (M); Peacock Creek FR 5 (E4); Willandra NP 3560 (E3); Yanga NP 3000 (E3); Murrumbidgee Valley NR 1633 (E2); Yanga SCA 7000 (E3).

Reserves Total Area: 25295 ha.

No. Representatives in Reserves: 10

Protected Area Explanation: Areas in reserves along the Murray River derived by examining descriptions of the vegetation for those reserves and their position along the river in relation to this Black Box community and Margules & Partners (1990) mapping. Morrisons Lake NR estimate is based on Kerr et al. (2000) and Brickhill (1977). Kinchega NP from Westbrooke et al. (2001) map unit part 1a (Black Box with lignum understorey). Kalyarr NP (Norwood and Darcoola properties) from map unit 4 in Horner et al. (2002). Oolambeyan NP from Roberts & Roberts (2001) with description in Webster (1998). Willandra NP from BB WL map unit in Porteners (1993). NSW NPWS (undated b) covering Murrumbidgee NR. NSW DEC (2005) and community 2 /18 in Scott for Yanga NP & SCA. The 2009/2010 NSW Government decision to protect areas of River Red Gum and associated vegetation types in reserves has not been taken into account in these protected area estimates.

Secure Property Agreements: None.

Secure PAs Total Area: 0 ha.

No. Representatives in Secure Property Agreements: 0

Protected Current Extent: 16.86% 25295 ha \pm 30%.

No. Representatives in Protected Areas: 10

Protected Pre-European Extent: 7.22% which is inadequately protected across distribution.

Common in 1750: Code 3a: 5-15% of pre-European extent in protected areas (>10,000 ha).

Key Sites for Protection: Sampled in reserves in the far west but inadequately sampled along the Murray River. Murray River State Forests and the Great Cumbung Swamp contain areas that could be protected. Protected areas should be concentrated at sites where the understorey is in good condition -i.e. where there has been a history of lighter grazing and where flooding regimes are likely to be adequate.

Degree of Fragmentation: Human induced fragmented stands with <60% >30% extent remaining and moderate 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: Requires intermittent flooding for seed germination. Successional stages influenced by intensity of grazing.

Fire Regime: Fire is rare in this community although Black Box can probably recover from intense fire better than River Red Gums.

Adjoining Communities: Grades into ID15 (Black Box - bluebush - saltbush woodland) in more arid areas and on higher ground and grades into various River Red Gum communities in more frequently flooded zones of the floodplain.

Threatening Processes: Reduced flooding along Murray, Murrumbidgee, Lachlan and Darling Rivers are threatening stands of this community. Hundreds of hectares were impounded at Menindee. Most of the wheatbelt regions of this community have been cleared and localised clearing is continuing. Stock grazing has affected the understorey composition. Salinity is killing some stands of Black Box on the Murray Floodplain. The restricted orchid *Pterostylis biseta* occurs on the Hay Plain in this community.

Threatening Process List: Age class of woody vegetation; Clearing for agriculture; Dryland cropping; Irrigated cropping (incl. horticulture); Hydrology (drainage); Salinity; Unsustainable grazing and trampling by stock; Weed (exotic) invasion.

Threat Category: Vulnerable.

Threat/Protected Area Code: V/3a

Threat Criteria: 1; 4; 5.

Planning Controls:

Planning and Management: Prevent further clearing in the wheatbelt and enhance flooding regimes through the allocation of environmental flows in major rivers.

Listed Under Legislation: None.

Recovery Plan: Doesn't exist and not required.

Reference List: (308; 76; 309; 282; 12; 289; 293; 11; 246; 342; 306; 14; 18; 13; 34; 9; 325; 23; 356; 373; 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); Brickhill, J. (1977) Morrisons Lake Nature Reserve proposal. Investigation report. Unpublished. (NSW National Parks and Wildlife Service: Hurstville); Davies, R.J.P. (1982) The conservation of major plant associations in South Australia. (Conservation Council of South Australia Incorporated: Adelaide); Dykes, P. (2002) Vegetation communities of the Cobar Shire. Unpublished report. (Department of Land and Water Conservation, Far West Region: Dubbo); Fox, M.D. (1991) The natural vegetation of the Ana Branch - Mildura 1:250 000 map sheet (New South Wales). *Cunninghamia* 2(3): 443-494; 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); 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*; Margules & Partners (1990) River Murray Riparian Vegetation Study. (Murray-Darling Basin Commission: Canberra); Miles, C. (2001) NSW Murray Catchment: biodiversity action plan. (Nature Conservation Working Group Inc.: Albury); NSW Department of Environment and Conservation (2005) New Area Investigation Report: Yanga. Unpublished Report (DEC: Dubbo); NSW National Parks and Wildlife Service (undated b) Yanga Nature Reserve vegetation map from interim management guidelines. File records. (NSW National Parks and Wildlife Service: Lower Darling); 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; Pressey, R.L., Bell,

F.C., Barker, J., Rundle, A.S. & Belcher, C.A. (1984) Bio-physical features of the Lachlan-Murrumbidgee Confluence, south-western New South Wales. (NSW National Parks and Wildlife Service: Sydney); Scott, J.A. (1992) The natural vegetation of the Balranald - Swan Hill area. *Cunninghamia* 2(4): 597-652; 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; Smith, P. & Smith J. Ecological Consultants (1990) Floristic Communities. In River Murray Riparian Vegetation Study. (Murray-Darling Basin Commission: Canberra); Webster, R. (1998) Vegetation management plan for "Oolambeyan". Prepared for Commonwealth Funds Management. (Ecosurveys Pty. Ltd. PO Box 13 Deniliquin NSW 2710); Westbrooke, M.E., Kerr, M.K.C. & Leversha, J. (2001) The vegetation of Kinchega National Park, western New South Wales. *Cunninghamia* 7(1): 1-25; Priday, S. (in prep. 2006) The native vegetation of the New South Wales South Western Slopes Bioregion (Lachlan, Murrumbidgee and Murray Catchments). Unpublished report to DEC Southern Office Queanbeyan; DEC (2006a) Reconstructed and extant distribution of native vegetation in the Lachlan Catchment. Unpublished report (NSW Department of Environment and Conservation: Dubbo); 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 15

Common Name: Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina and Murray Darling Depression Bioregions)

Scientific Name: *Eucalyptus largiflorens* / *Chenopodium nitrariaceum* - *Maireana pyramidata* / *Einadia nutans* subsp. *nutans* - *Sclerolaena divaricata* - *Atriplex semibaccata*

Veg. Comm. ID.: 15 **Original Entry:** John Benson 31/12/2005

Photo 1: ID15a_img059pc.jpg *Eucalyptus largiflorens* - *Maireana pyramidata* woodland, west of Oxley, [AGD66 34°12'16.6"S 143°51'28.9"E], 12/4/02, Jaime Plaza.



Photo 2: ID15b_img073pc.jpg *Eucalyptus largiflorens* - *Maireana pyramidata* woodland, Darling Anabranche, Nearie Lake turnoff, [AGD66 33°34'0.2"S 141°45'36.8"E], 13/4/02, Jaime Plaza.



Characteristic Vegetation: (Quantitative Data)

Trees: *Eucalyptus largiflorens*.

Shrubs/Vines/Epiphytes: *Maireana pyramidata*; *Chenopodium nitrariaceum*; *Atriplex vesicaria*; *Atriplex nummularia*; *Maireana decalvans*; *Maireana enchylaenoides*; *Maireana brevifolia*; *Rhagodia spinescens*; *Sclerolaena muricata* var. *muricata*; *Maireana brevifolia*; *Acacia oswaldii*; *Amyema miquelii*.

Ground Cover: *Einadia nutans* subsp. *nutans*; *Sclerolaena divaricata*; *Atriplex semibaccata*; *Atriplex lindleyi*; *Atriplex leptocarpa*; *Atriplex eardleyae*; *Sclerolaena tricuspis*; *Osteocarpum acropterum* var. *deminutum*; *Enchylaena tomentosa*; *Plantago drummondii*; *Dissocarpus paradoxus*; *Zygophyllum aurantiacum*; *Chenopodium desertorum* subsp. *microphyllum*; *Halgania cyanea*; *Mentha pulegium*; *Chenopodium pumilio*; *Sclerolaena obliquicuspis*; *Sclerolaena stelligera*; *Sclerolaena brachyptera*; *Ajuga australis*; *Chamaesyce drummondii*; *Scleroblitum atriplicinum*; *Boerhavia dominii*; *Enteropogon acicularis*; *Austrostipa nitida*; *Walwhalleya proluta*; *Sida corrugata*; *Teucrium racemosum*.

Weed Species: *Nicotiana glauca*; *Solanum nigrum*; *Cucumis myriocarpus* subsp. *leptodermis*.

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

Threatened Plants: *Pterostylis biseta* (rare in region).

Threatened Fauna: Not assessed.

Mean Species Richness: 23±1 (Horner et al. 2003 in 20x20 m plots); 32±3 (Smith & Smith 1990 in 20x20 m plots).

Rainforest Structure (Webb): Not applicable.

Structure (WH): Open Woodland; Woodland.

Height Class (WH): Mid-High.

Vegetation Description: Woodland or open woodland dominated by Black Box (*Eucalyptus largiflorens*) with an understorey of chenopod

shrubs such as Black Bluebush (*Maireana pyramidata*), *Maireana decalvans*, Nitre Goosefoot (*Chenopodium nitriaceum*) and Old Man Saltbush (*Atriplex nummularia*) but the latter has mostly disappeared due to grazing. Small shrubs include Bladder Saltbush (*Atriplex vesicaria*) and Cotton Bush (*Maireana aphylla*) with a ground cover of annual or perennial saltbushes, copperburrs, grasses and forbs. Common copperburrs include *Sclerolaena obliquispis*, *Sclerolaena stelligera*, *Sclerolaena divaricata*, *Sclerolaena brachyptera*. Lignum (*Muehlenbeckia florulenta*) may be absent or very sparse. Weed species include Black Nightshade (*Solanum nigrum*) and Paddy Melon (*Cucumis myriocarpus* subsp. *leptodermis*). Occurs on alkaline brown or grey clay soil on alluvial plains or sandy-loam soils on the flood plain of river systems. Also observed on sandy lunettes of some dry lakes in the semi-arid (warm) and arid climate zones of far south western NSW. In many places the understorey may have once been dominated by Old Man Saltbush (*Atriplex nummularia*) but this has been reduced due to grazing leaving bluebush, Nitre Goosefoot and copperburrs to dominate today. Grades into bluebush shrubland on higher ground. Mostly cleared in some regions such as the Murray CMA but significant stands remain in far western regions. The understorey is degraded throughout. Some areas are sampled in protected areas but as of 2009 this community is poorly represented in protected areas. Tree dieback from drought has increased since 2000.

Level of Classification: Association.

Classification Confidence Level: Medium.

Formation Group: Eucalyptus Communities of Inland Watercourses and Inner Floodplains.

State Veg Map (Keith 2004): Inland Floodplain Woodlands.

State Landscape (Mitchell 2002): Not Assessed.

NVIS Major Veg Sub-Groups: Eucalyptus woodlands with a shrubby understorey.

Forest Type (RN 17): 202 - Black Box/Coolabah (P).

Authority(s): (Combination of Expert Opinion and Quantitative Data). Includes community 27 in the floristic plot survey of the Murray River by Smith & Smith (1990). A major proportion of the Black Box community in Fox (1991), Scott (1992) and Porteners et al. (1997). Includes floristic group 14 which is part of map units 4 and 5 in Horner et al. (2002) covering part of the Hay Plain. Some of the Black Box map unit in Porteners (1993), WRRVC (2001), Pressey et al. (1984) and Westbrooke (1997). The open plains form of Black Box woodland mapped as part of community 1b in Westbrooke et al. (2001) in Kinchega National Park. Part of BVT 31 in DEC (2006a). This community is generally found on higher ground in more arid areas and contains less Lignum and sedges than the closely allied ID13. Little site data exists as of 2005 to compare the Black Box communities in western NSW.

Interstate Equivalent(s): South Australia: part of *Eucalyptus largiflorens* community in Davies (1982 p23); Victoria: part of EVC103 Riverine Grassy Chenopod Woodland or EVC823 Lignum Swampy Woodland.

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

Mapping Info: Mapable using aerial photographs. Mapped as mallee Black Box woodland in Margules & Partners (1990). Part of broad Black Box types mapped by RBG in south western NSW. Mapped for part of Hay Plain by Horner et al. (2002).

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

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

IBRA Sub-Region: Lachlan (1-30%); Menindee (1-30%); Murray Fans (30-70%); Murray Scroll Belt (1-30%); Murrumbidgee (1-30%); Pooncarie-Darling (1-30%); Great Darling Anabranch (1-30%).

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

Local Govt. Areas: Balranald (1-30%); Carrathool (1-30%); Central Darling (1-30%); Conargo (1-30%); Wakool (1-30%); Wentworth (1-30%).

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

MD Basin: Yes.

Substrate Mass: Alluvium.

Lithology: Alluvial loams and clays; Clay.

Great Soil Group: Brown clay; Grey clay.

Soil Texture: Heavy clay; Loam; Medium clay.

Landform Patterns: Flood plain; Lacustrine plain.

Landform Elements: Bank (streambank); Drainage depression; Dune; Ox-bow.

Land Use: Cropping and Horticulture; Grazing; Nature Conservation.

Impacts of European Settlement: Major alteration of species composition; Medium reduction (30-70%) in extent and/or range.

Pre-European Extent: 500000 ha \pm 30%. Estimated from pre-European map.

Pre-European Extent Comments: Most of the Black Box community in Fox (1991). Part of the pre-European mapping of 776000 ha of broad Black Box in the Riverina as documented in WRRVC (2001). Also occurs outside this area.

Current Extent: 250000 ha \pm 30% or 50% \pm 50% of pre-European extent remaining.

Current Extent Comments: (Estimated from broadly classified current extant vegetation map). Part of the Black Box communities in Fox (1991) and Scott (1992). Probably most of map unit 4 in Horner et al. (2002) covering 62000 ha on the Hay Plain. Mostly cleared in the Murray CMA.

Conservation Reserves: Kinchega NP 7875 (M); Nearie Lake NR 250 (E1); Willandra NP 90 (E3); Yanga NP 2000 (E3); Yanga SCA 230 (E3).

Reserves Total Area: 10445 ha.

No. Representatives in Reserves: 5

Protected Area Explanation: Kinchega NP from Westbrooke et al. (2001), Nearie Lake NR most of Black Box map unit in Westbrooke et al. (1997). Willandra NP from Porteners (1993). Yanga NP and SCA estimates from Black Box / blue bush mapped in Scott (1992) and notes in NSWDEC.

Secure Property Agreements: VCA105 VCA 20 (E1).

Secure PAs Total Area: 20 ha.

No. Representatives in Secure Property Agreements: 1

Protected Current Extent: 4.18% 10465 ha \pm 30%.

No. Representatives in Protected Areas: 6

Protected Pre-European Extent: 2.09% 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: Good occurrences occur on the outer floodplains of the Darling River Ana Branch. Also along the lower Murray River. An area on the floodplain of the lower Murrumbidgee River is sampled in Yanga National Park.

Degree of Fragmentation: Contiguous stands with high connectivity with >60% extent remaining and low 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: Ground cover floristics varies depending on flooding regimes but most of the original saltbush has been grazed

out. Sometimes occurs on slight sandy rises that rarely flood.

Fire Regime: Infrequently burnt. Due to the presence of fire-sensitive chenopod shrubs in the understorey it is likely fire does not play a major role in the dynamics of this community.

Adjoining Communities: Grades into saltbush and bluebush shrublands (e.g. ID155) on higher ground or Black Box with Lignum on lower levels of the floodplain (ID13). Differs from ID16 (Black Box in ephemeral depressions) in having a much denser shrub layer but species compositions overlaps between all Black Box communities. A more restrictive and similar community ID630 is restricted to the Darling River Ana-Branch region - ID630 contains Silver-Saltbush (*Atriplex rhagodioides*) as a dominant understorey shrub.

Threatening Processes: This Black Box community has been extensively cleared in some regions because it occurs on higher ground on the floodplain. However, clearing controls in the Western Division of NSW have resulted in some large areas remaining. The original *Atriplex nummularia* understorey has largely been grazed out.

Threatening Process List: Age class of woody vegetation; Clearing for agriculture; Climate change; Dryland cropping; Irrigated cropping (incl. horticulture); Hydrology (drainage); Salinity; Unsustainable grazing and trampling by stock; Weed (exotic) invasion.

Threat Category: Near Threatened.

Threat/Protected Area Code: NT/4a

Threat Criteria: 1; 4.

Planning Controls:

Planning and Management: The 2002 draft Western Riverina Vegetation Management Plan recognised Black Box community as being depleted and suggested targets for conservation management to be met by 2012. Requires protection from further clearing in Lachlan, Murrumbidgee, Murray and Lower Murray-Darling Catchment Management Plans.

Listed Under Legislation: None.

Recovery Plan: Doesn't exist and not required.

Reference List: (309; 16; 12; 289; 11; 246; 342; 14; 25; 18; 13; 9; 23; 19; 146; 373). Davies, R.J.P. (1982) The conservation of major plant associations in South Australia. (Conservation Council of South Australia Incorporated: Adelaide); Eardley, K.A. (1999) A foundation for conservation in the Riverina Bioregion. Unpublished Report. (NSW National Parks and Wildlife Service); Fox, M.D. (1991) The natural vegetation of the Ana Branch - Mildura 1:250 000 map sheet (New South Wales). *Cunninghamia* 2(3): 443-494; 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); Margules & Partners (1990) River Murray Riparian Vegetation Study. (Murray-Darling Basin Commission: Canberra); Miles, C. (2001) NSW Murray Catchment: biodiversity action plan. (Nature Conservation Working Group Inc.: Albury); NSW Department of Environment and Conservation (2005) New Area Investigation Report: Yanga. Unpublished Report (DEC: Dubbo); 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; Porteners, M.F., Ashby, E.M. & Benson, J.S. (1997) The natural vegetation of the Pooncarie 1:250 000 map. *Cunninghamia* 5(1): 139-232; Pressey, R.L., Bell, F.C., Barker, J., Rundle, A.S. & Belcher, C.A. (1984) Bio-physical features of the Lachlan-Murrumbidgee Confluence, south-western New South Wales. (NSW National Parks and Wildlife Service: Sydney); Scott, J.A. (1992) The natural vegetation of the Balranald - Swan Hill area. *Cunninghamia* 2(4): 597-652; Smith, P. & Smith J. Ecological Consultants (1990) Floristic Communities. In River Murray Riparian Vegetation Study. (Murray-Darling Basin Commission: Canberra); Westbrooke, M.E., Kerr, M.K.C. & Leversha, J. (2001) The vegetation of Kincheha National Park, western New South Wales. *Cunninghamia* 7(1): 1-25; Westbrooke, M.E., Miller, J.D. & Kerr, M.K. (1997) Vegetation and flora of Nearie Lake Nature Reserve, far western New South Wales. *Cunninghamia* 5(1) 129-137; Western Riverina Regional Vegetation Committee (2001) Draft Western Riverina Regional Vegetation Management Plan. (Western Riverina RVC: Deniliquin); 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 16

Common Name: Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina and Murray Darling Depression Bioregions)

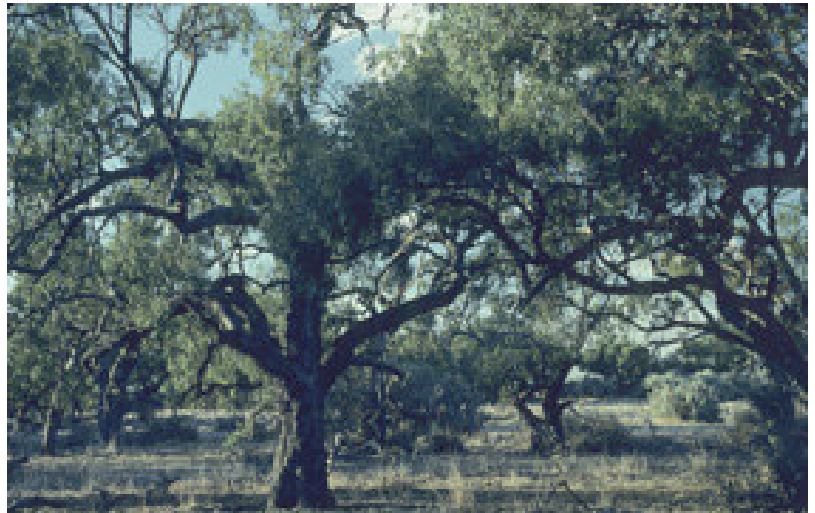
Scientific Name: *Eucalyptus largiflorens* / *Enchylaena tomentosa* - *Atriplex semibaccata* - *Hordeum leporinum* - *Schismus barbatus*

Veg. Comm. ID.: 16 **Original Entry:** John Benson 31/12/2005

Photo 1: ID16a_img386mp.jpg Black Box (*Eucalyptus largiflorens*) open woodland with annual grass ground cover (*Hordeum leporinum* and *Lolium perenne*), 2003, M.F. Porteners.



Photo 2: ID16b_img385mp.jpg Black Box (*Eucalyptus largiflorens*) open woodland with understorey of scattered Old Man Saltbush (*Atriplex nummularia*), 2003, M.F. Porteners.



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

Trees: *Eucalyptus largiflorens*; *Callitris glaucophylla*.

Shrubs/Vines/Epiphytes: *Rhagodia spinescens*; *Amyema miquelii*.

Ground Cover: *Enchylaena tomentosa*; *Atriplex semibaccata*; *Oxalis perennans*; *Salsola tragus* subsp. *tragus*; *Atriplex eardleyae*; *Atriplex leptocarpa*; *Sclerolaena muricata* var. *muricata*; *Dissocarpus paradoxus*; *Solanum esuriale*; *Marrubium vulgare*; *Chenopodium murale*.

Weed Species: *Hordeum leporinum*; *Schismus barbatus*; *Carrichtera annua*; *Sonchus oleraceus*.

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

Threatened Plants: Not assessed.

Threatened Fauna: Not assessed.

Mean Species Richness: Not assessed.

Rainforest Structure (Webb): Not applicable.

Structure (WH): Open Woodland.

Height Class (WH): Mid-High.

Vegetation Description: Open woodland dominated by Black Box (*Eucalyptus largiflorens*) generally with an open understorey dominated by forbs, grasses and low growing chenopods. With the exception of Thorny Saltbush (*Rhagodia spinescens*), this community lacks shrubs including tall saltbushes or bluebushes. Weeds are usually common. The understorey contains the low shrubs *Enchylaena tomentosa*, *Atriplex semibaccata*, *Salsola tragus* subsp. *tragus*, *Atriplex eardleyae*, *Sclerolaena muricata* var. *muricata*, and *Dissocarpus paradoxus*; forb species such as *Oxalis perennans* and *Solanum esuriale*; grass species such as *Austrodanthonia* spp. and exotic grasses such as *Hordeum leporinum* and *Schismus barbatus*. Occurs on heavy clay soils in ephemeral discharge areas including claypans and depressions distant from the major river floodplains. These areas are rarely flooded compared to fringing lake Black Box. This community contains a more sparse understorey than Black Box communities on the floodplains near major rivers (ID13 and ID15).

The original understorey may have contained perennial saltbushes that have been grazed out. While reasonably large areas remain, some may be threatened by local clearing and heavy grazing. Altered rainfall regimes may be preventing regeneration of the Black Box trees. Tree dieback from drought has increased since 2000.

Level of Classification: Association.

Classification Confidence Level: Low.

Formation Group: Eucalyptus Communities of Inland Watercourses and Inner Floodplains.

State Veg Map (Keith 2004): Inland Floodplain Woodlands.

State Landscape (Mitchell 2002): Not Assessed.

NVIS Major Veg Sub-Groups: Eucalyptus open woodlands with a grassy understorey.

Forest Type (RN 17): 202 - Black Box/Coolabah (P).

Authority(s): (Combination of Expert Opinion and Quantitative Data). Part of the southern Eucalyptus bicolor woodland in Beadle 1948. Part of map unit 2 in Fox (1991) and Porteners et al. (1997), community 5 in Morcom & Westbrooke (1990), community F2 in Cohn (1995). This Black Box community lacks shrubs and is dominated by grasses and forbs. It tends to be distant from major rivers and is rarely flooded. Little site data exists as of 2005 to compare the Black Box communities in western NSW.

Interstate Equivalent(s): South Australia: part of Eucalyptus largiflorens community in Davies (1982 p23).

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

Mapping Info: Requires field checking of understorey to map this community. Much of the Black Box mapped in south western NSW that is distant from major rivers or in ephemeral depressions is probably equivalent to this association.

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

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

IBRA Sub-Region: Darling Depression (1-30%); Great Darling Anabranch (1-30%); Lachlan (1-30%); Menindee (1-30%); Murrumbidgee (1-30%); Pooncarie-Darling (1-30%).

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

Local Govt. Areas: Balranald (1-30%); Carrathool (1-30%); Central Darling (1-30%); Wentworth (30-70%).

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

MD Basin: Yes.

Substrate Mass: Alluvium.

Lithology: Alluvial loams and clays; Clay.

Great Soil Group: Brown clay; Red clay.

Soil Texture: Medium clay; Medium heavy clay; Silty clay loam.

Landform Patterns: Alluvial plain.

Landform Elements: Drainage depression; Flood-out; Lake; Playa.

Land Use: Cropping and Horticulture; Grazing; Nature Conservation; Timber Production.

Impacts of European Settlement: Major alteration of species composition; Medium reduction (30-70%) in extent and/or range; Older age class over most of distribution.

Pre-European Extent: 200000 ha \pm 50%. Estimated based on maps of current vegetation.

Pre-European Extent Comments: Estimated to be about one quarter of the 776000 ha broad Black Box pre-European map unit in the Riverina as documented in WRRVC (2001). It also occurs outside this area.

Current Extent: 100000 ha \pm 50% or 50% \pm 80% of pre-European extent remaining.

Current Extent Comments: (Expert estimate). Estimate based on clearing rates in WRRVC (2001) and expert opinion.

Conservation Reserves: Kajuligah NR 100 (E3); Mallee Cliffs NP 10 (E2); Nombinnie NR 163 (M); Yanga SCA 3500 (E3).

Reserves Total Area: 3773 ha.

No. Representatives in Reserves: 4

Protected Area Explanation: Mallee Cliffs NP estimated from Morcom & Westbrooke (1990). Nombinnie NR from Cohn (1995). Also a small stand is recorded outside Mungo NP on Jounli Station by Westbrooke & Miller (1995). Kajuligah NR estimate from Brickhill (1976). PA LE9801 from overlaying Roberts & Roberts (2001) - appears to be this grassy Black Box community. Scotia VCA estimate from notes in Scotia Sanctuary summary sheet. Yanga SCA estimate from scattered Black Box WL map unit in Scott (1992).

Secure Property Agreements: LE9801 PA 11 (M); Scotia AWC VCA 50 (E3).

Secure PAs Total Area: 61 ha.

No. Representatives in Secure Property Agreements: 2

Protected Current Extent: 3.83% 3834 ha \pm 30%.

No. Representatives in Protected Areas: 6

Protected Pre-European Extent: 1.91% which is inadequately protected across distribution.

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

Key Sites for Protection: Requires investigation. Some sampling in reserves but more samples are required over the range of this community.

Degree of Fragmentation: Naturally fragmented stands of variable patch sizes with >50% extent remaining.

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: Requires occasional flooding. Prior to European settlement and stock and rabbit grazing it is likely that there was a denser understorey of chenopod shrubs and native grasses more similar to ID15.

Fire Regime: Rarely burns.

Adjoining Communities: Grades into box woodlands on higher ground, chenopod shrubland or mallee.

Threatening Processes: Few stands remain with an intact understorey due to grazing and subsequent weed invasion. Large areas have been cleared, natural and human-induced isolated stands occur in low lying areas. Regeneration of Black Box is threatened if rainfall regimes alter.

Threatening Process List: Age class of woody vegetation; Clearing for agriculture; Climate Change; Hydrology (drainage); Unsustainable grazing and trampling by stock; Unsustainable grazing by introduced animals; Weed (exotic) invasion.

Threat Category: Near Threatened.

Threat/Protected Area Code: NT/5a

Threat Criteria: 1; 4; 5.

Planning Controls: Other

Planning and Management: Prevent further clearing and protect some remnants from over-grazing to allow for regeneration. Control feral animals.

Listed Under Legislation: None.

Recovery Plan: Doesn't exist and not required.

Reference List: (73; 77; 39; 309; 12; 17; 14; 33; 13). Beadle, N.C.W. (1948) The vegetation and pastures of western New South Wales. (NSW Department of Conservation: Sydney); Brickhill, J. (1976c) Kajuligah Nature Reserve proposal including sketch map of vegetation. Unpublished HO file M350. (NSW National Parks and Wildlife Service: Hurstville); Conn, J.S. (1995) The vegetation of Nombinnie and Round Hill Nature Reserves, central-western New South Wales. *Cunninghamia* 4(1): 81-101; Davies, R.J.P. (1982) The conservation of major plant associations in South Australia. (Conservation Council of South Australia Incorporated: Adelaide); Fox, M.D. (1991) The natural vegetation of the Ana Branch - Mildura 1:250 000 map sheet (New South Wales). *Cunninghamia* 2(3): 443-494; Morcom, L. & Westbrooke, M. (1990) The vegetation of Mallee Cliffs National Park. *Cunninghamia* 2(2): 147-166; 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; Westbrooke, M.E. & Miller, J.D. (1995) The vegetation of Mungo National Park, western New South Wales. *Cunninghamia* 4(1): 63-80; Scott, J.A. (1992) The natural vegetation of the Balranald - Swan Hill area. *Cunninghamia* 2(4): 597-652.

NSW Vegetation Classification - Vegetation ID

Vegetation Community ID 176

Common Name: Green Mallee - White Cypress Pine very tall mallee woodland on gravel rises mainly in the Cobar Penneplain Bioregion

Scientific Name: *Eucalyptus viridis* - *Callitris glaucophylla* - *Acacia doratoxylon* / *Acacia deanei* subsp. *deanei* - *Cassinia laevis* - *Dodonaea viscosa* subsp. *cuneata* - *Myoporum montanum* / *Austrodanthonia setacea* - *Aristida jerichoensis* var. *subspinulifera* - *Austrostipa scabra* subsp. *scabra* - *Calotis cuneifolia*

Veg. Comm. ID.: 176 **Original Entry:** John Benson 31/12/2005

Last Modified: J.S. Benson 30/12/2008

Photo 1: ID176a_img193pc.jpg *Eucalyptus viridis* Woodland, Tottenham-Albert Rd [AGD66 32°22'22.2"S 147°25'21.6"E], 27/10/01, Jaime Plaza.



Photo 2: ID176b_img232pc.jpg *Eucalyptus viridis* Woodland (degraded), Sth of Canbelego, [AGD66 31°38'05.0"S 146°20'07.0"E], 26/10/01, Jaime Plaza.



Photo 3: ID176c_dsc_2662.jpg Green Mallee (*Eucalyptus viridis*) mallee woodland, approx. 10km E of Coolabah, NSW-NWP, Cobar Penneplain, [AGD66 31°1'29"S 146°52'55"E], 27/8/03, Jaime Plaza.



Characteristic Vegetation: (Quantitative Data)

Trees: *Eucalyptus viridis*; *Callitris glaucophylla*; *Acacia doratoxylon*; *Eucalyptus intertexta*; *Eucalyptus sideroxylon*; *Brachychiton populneus* subsp. *populneus*; *Eucalyptus populnea* subsp. *bimbi*.

Shrubs/Vines/Epiphytes: *Acacia deanei* subsp. *deanei*; *Cassinia laevis*; *Eremophila mitchellii*; *Acacia decora*; *Dodonaea viscosa* subsp. *cuneata*; *Myoporum montanum*; *Acacia hakeoides*; *Geijera parviflora*; *Acacia amblygona*; *Acacia aneura*; *Calytrix tetragona*; *Dodonaea lobulata*; *Eremophila serrulata*; *Senna form taxon 'filifolia'*; *Eremophila longifolia*; *Ozothamnus obcordatus* subsp. *obcordatus*; *Cassinia arcuata*; *Maireana microphylla*; *Eremophila sturtii*; *Apophyllum anomalum*.

Ground Cover: *Austrodanthonia setacea*; *Aristida jerichoensis* var. *subspinulifera*; *Sclerolaena convexula*; *Austrostipa scabra* subsp. *scabra*; *Einadia nutans* subsp. *nutans*; *Enteropogon acicularis*; *Cheilanthes austrotenuifolia*; *Melichrus erubescens*; *Platysace lanceolata*; *Walwhalleya subxerophilum*; *Maireana humillima*; *Atriplex stipitata*; *Dianella revoluta* var. *revoluta*; *Austrodanthonia setacea*; *Xerochrysum bracteatum*; *Austrodanthonia tenuior*; *Walwhalleya subxerophilum*; *Platysace lanceolata*.

Weed Species: Not assessed.

Weediness: Low (<5%) with 10-30% cover.

Threatened Plants: *Prostanthera howelliae* (locally rare); *Acacia curranii*; *Pterostylis cobarensis*.

Threatened Fauna: Striated Grasswren; Kultarr; Australian Bustard; Major Mitchell's Cockatoo; Shy Heathwren; Pied Honeyeater; Little Pied Bat; Grey Falcon; Painted Honeyeater; Malleefowl; Square-tailed Kite; Hooded Robin (south-eastern form); Black-chinned Honeyeater (eastern subspecies); Scarlet-chested Parrot; Barking Owl; Eastern Long-eared Bat (south eastern form); Gilbert's Whistler; Redthroat; Speckled Warbler; Yellow-bellied Shearwater; Stripe-faced Dunnart; Diamond Firetail; Inland Forest Bat.

Mean Species Richness: 34±3 (Lewer et al. 2003 in 20x20 m plots).

Rainforest Structure (Webb): Not applicable.

Structure (WH): Open Mallee Woodland; Mallee Woodland.

Height Class (WH): Extremely Tall (>35m for trees and vines, 6-12m for mallee).

Vegetation Description: Very tall or extremely tall mallee woodland to 10 m high dominated by Green Mallee (*Eucalyptus viridis*) often with White Cypress Pine (*Callitris glaucophylla*) with Currawang (*Acacia doratoxylon*) and occasionally Gum Coolabah (*Eucalyptus intertexta*). Shrubs include wattles such as *Acacia decora*, *Acacia hakeoides*, *Acacia deanei* and *Acacia amblygona*, Wilga (*Geijera parviflora*), hopbush (*Dodonaea lobulata* and *Dodonaea viscosa* subsp. *cuneata*), *Myoporum montanum*, *Cassinia laevis*, *Cassinia ancata* and *Calytrix tetragona*. The ground cover includes the grasses *Austrostipa scabra*, *Austrodanthonia* spp., *Enteropogon acicularis* and *Aristida jerichoensis*. Small shrubs are present such *Sclerolaena* spp. along with forbs such as *Calotis cuneifolia* and *Xerochrysum bracteatum*. The rock fern *Cheilanthes austrotenuifolia* is common. Occurs on gravel red and yellow sandy loam or sandy clay loam soils derived from mainly sedimentary substrates including sandstone and conglomerate. Restricted to gravel, upper slopes and rises on rolling downs mainly in the eastern section of the Cobar Peneplain Bioregion but extending into the NSW SWS and Murray-Darling Depression bioregions. Not threatened by clearing due to position on gravel ridges that are unsuitable for intensive agriculture but some areas are threatened by over-grazing by stock and goats. As of 2007 this community was inadequately represented in protected areas.

Level of Classification: Association.

Classification Confidence Level: High.

Formation Group: Mallee Woodlands and Shrublands on Stony Ridges of the Inland Slopes and Plains.

State Veg Map (Keith 2004): Inland Rocky Hill Woodlands.

State Landscape (Mitchell 2002): Not Assessed.

NVIS Major Veg Sub-Groups: Mallee *Eucalyptus* low open woodlands.

Forest Type (RN 17): 225 - Mallee (P).

Authority(s): (Quantitative Data). Includes parts of map units H2, H7 and U1 in Sivertsen & Metcalfe (1995 and 2001) and Metcalfe et al. (2003). Part of map unit 22 in Pickard & Norris (1994) (however this also includes *Eucalyptus morrisii* mallee ID180). Includes map unit HIL4 being floristic group 29 in Lewers et al. (2003) for central NSW on eastern edge of its range. Equivalent to 1c in Parker et al. (1979) for the Yathong NR. Includes community D4 in Cohn (1995) for Nombinnie NR region. Probably includes communities 55, 56 and 58 in Austin et al. (2000) for the Mid-Lachlan region. Includes map unit GMS in Dykes (2002) covering Cobar Shire. Part of the broad Green Mallee community in Mid-Lachlan RV MC (1999). Probably some of Biolandscape LacM53b in Priday (2006). Estimated to be half of the 7000 ha mapped as map units HIL3 and HIL5 in Lewer et al. (2003). Part of BVT 55 in DEC (2006, 2006a).

Interstate Equivalent(s): None.

Mapped/Modelled: Current extent partly mapped or modelled.

Plot Sampling: Inadequate.

Mapping Info: Mapped for wheatbelt by Sivertsen & Metcalfe (1995, 2001) but part of map unit H7 in Metcalfe et al. (2003) east of Coolabah. Mapped in Yathong NR by Parker et al. (1979) and part of broader map unit 22 in Pickard & Norris (1994) for north-western NSW. Plot sampled and mapped in central NSW by Lewer et al. (2003). Not plot sampled in western most range as of 2008.

Climate Zone: Temperate: no dry season (hot summer).

IBRA Bioregion (v6): Cobar Peneplain (>70%); Murray-Darling Depression (1-30%); NSW South-western Slopes (1-30%).

IBRA Sub-Region: Barnato Downs (1-30%); Canbelego Downs (1-30%); Darling Depression (1-30%); Lower Slopes (1-30%); Nymagee (30-70%).

Botanical Division: Central Western Slopes (CWS) (1-30%); North Western Plains (NWP) (30-70%); South Western Plains (SWP) (1-30%).

Local Govt. Areas: Bogan (1-30%); Cobar (30-70%); Forbes (1-30%); Lachlan (1-30%).

CMAs: Central West (30-70%); Lachlan (1-30%); Western (30-70%).

MD Basin: Yes.

Substrate Mass: Sedimentary rocks.

Lithology: Conglomerate; Quartz porphyry; Rhyolite; Sandstone; Tuff.

Great Soil Group: Lithosol; Red earth; Yellow earth.

Soil Texture: Sandy clay loam; Sandy loam.

Landform Patterns: Low hills.

Landform Elements: Hillcrest; Hillslope.

Land Use: Grazing.

Impacts of European Settlement: Major alteration of species composition.

Pre-European Extent: 75000 ha ±30%. Estimated from pre-European map: part range.

Pre-European Extent Comments: Pickard & Norris (1994) mapped of 90000 ha of larger remnants of Green Mallee for north western distribution with about 11% having been cleared using M305 data. However, this mapping includes other types and is very broad.

Current Extent: 60000 ha \pm 30% or 80% \pm 50% of pre-European extent remaining.

Current Extent Comments: (Estimated from mapped extant vegetation: part range). Sivertsen & Metcalfe (1995) map 10776 ha in Forbes/Cargellico regions but much of this is Blue Mallee - Green Mallee - a separate community. Sivertsen & Metcalfe (2001) map 21333 ha in Series 5 covering Nymagee region. Dykes (2002) maps 18600 in Cobar Shire and predicts only about 5% has been cleared. Lewer et al. (2003) map 3100 ha in central NSW at its east range. Parker et al. (1979) estimate 9200 ha are in Yathong NR. Other areas occur north west and south. More cleared in its eastern range than in its western range.

Conservation Reserves: Nombinnie SCA 260 (M); Yathong NR 6800 (E2); Big Bush NR 15 (E2).

Reserves Total Area: 7075 ha.

No. Representatives in Reserves: 3

Protected Area Explanation: Pickard & Norris (1994) map 700 ha in Yathong NR but Parker et al. (1979) map 6800 ha in the reserve (this may include some other vegetation types and needs checking). Nombinnie SCA from unit D4 in Cohn (1995). Sivertsen & Metcalfe (1995) map an area in The Charcoal Tank NR on the NSW SW Slopes but this is considered to be the Blue Mallee-Green Mallee community (ID177). PA WE9902 estimate from notes in DIPNR PA database mixing with Western Grey Box presumably downslope. PAs CD9907 and CD9911 from Lewer et al. (2003). Big Bush NR estimate from Porteners (2001b) but she lumps Green Mallee with an Western Grey Box map unit, also based on notes in Brickhill (1976a).

Secure Property Agreements: CD9907 PA 2 (M); CD9911 PA 21 (M); WE9902 PA 40 (E1).

Secure PAs Total Area: 63 ha.

No. Representatives in Secure Property Agreements: 3

Protected Current Extent: 11.89% 7138 ha \pm 30%.

No. Representatives in Protected Areas: 6

Protected Pre-European Extent: 9.51% which is inadequately protected across distribution.

Common in 1750: Code 3a: 5-15% of pre-European extent in protected areas (>10,000 ha).

Key Sites for Protection: Require investigation of sites in good condition for sampling in protected areas.

Degree of Fragmentation: Naturally fragmented stands of variable patch sizes with >50% extent remaining.

Recoverability: Moderate health as structure and/or composition altered. Likely to recover considerably if causal factors and secondary impacts removed.

Variation & Disturbance: Green Mallee forms a mosaic pattern on rises and its occurrence is mainly dictated by soil type. Fire and grazing are the main disturbance factors.

Fire Regime: Unknown. Probably irregularly burnt by wildfire.

Adjoining Communities: Grades into Gum Coolabah (*Eucalyptus intertexta*)(ID104) and Poplar Box (*Eucalyptus populnea*) on slopes (ID103) and Western Grey Box (*Eucalyptus microcarpa*) on flats (ID82).

Threatening Processes: Large areas cleared at its eastern range in the wheatbelt. Overgrazing and soil erosion threaten some stands. Not as threatened as sandplain mallee in the wheatbelt due to its occurrence on stony ridges.

Threatening Process List: Inappropriate fire regimes; Soil erosion; Unsustainable grazing and trampling by stock; Unsustainable grazing by introduced animals.

Threat Category: Least Concern.

Threat/Protected Area Code: LC/3a

Threat Criteria: 1; 4.

Planning Controls:

Planning and Management: Protect Green Mallee ridges from overgrazing by goats and stock.

Listed Under Legislation: None.

Recovery Plan: Doesn't exist and not required.

Reference List: (183; 39; 282; 293; 307; 67; 43; 27; 34; 46; 356; 372; 373; 249; 292). Austin, M.P., Cawsey, E.M., Baker, B.L., Yialeoglou, M.M., Grice, D.J. & Briggs, S.V. (2000) Predicted vegetation cover in the central Lachlan region. National Heritage Trust Project AA 1368.97. (CSIRO Division of Wildlife and Ecology: Canberra); 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); 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; Metcalfe, L., Sivertsen, D.P., Tindall, D.R. & Ryan, K.M. (2003) Natural vegetation of the New South Wales wheatbelt (Cobar-Nyngan-Gilgandra-Nymagee-Narromine-Dubbo 1:250 000 vegetation sheets). *Cunninghamia* 8(2) 252-284; Mid-Lachlan Regional Vegetation Committee (1999) Plan Draft Mid-Lachlan Regional Vegetation Management Plan for Public Exhibition. (Mid-Lachlan RVC: Forbes); Parker, B.S., Thackway, R.M. & Menzies, W.J. (1979) An introduction to Yathong Nature Reserve. Unpublished report. (CSIRO Division of Wildlife and Research: Canberra); Pickard, J. & Norris, E.H. (1994) The natural vegetation of north-western New South Wales: notes to accompany the 1:1 000 000 vegetation map sheet. *Cunninghamia* 3(3): 423-464; Sivertsen, D. & Metcalfe, L. (1995) Natural vegetation of the southern wheat-belt (Forbes and Cargellico 1:250 000 map sheets). *Cunninghamia* 4(1): 103-128; Sivertsen, D. & Metcalfe, L. (2001) Northern wheatbelt vegetation mapping. Unpublished 1:250 000 scale vegetation maps and vegetation descriptions covering northern NSW wheatbelt. (NSW National Parks and Wildlife Service: Hurstville); Priday, S. (in prep. 2006) The native vegetation of the New South Wales South Western Slopes Bioregion (Lachlan, Murrumbidgee and Murray Catchments). Unpublished report to DEC Southern Office Queanbeyan; DEC (2006) Reconstructed and extant distribution of native vegetation in the Central West Catchment. Unpublished report (NSW Department of Environment and Conservation: Dubbo); DEC (2006a) Reconstructed and extant distribution of native vegetation in the Lachlan Catchment. Unpublished report (NSW Department of Environment and Conservation: Dubbo); Brickhill, J. (1976a) Draft management plan for Big Bush Nature Reserve. File note RN 20. (NSW National Parks and Wildlife Service: Griffith); Porteners, M.F. (2001b) Vegetation survey of Ingalba, Big Bush and Puawan Nature Reserves. Report for NSW National Parks and Wildlife Service: Riverina Region.

NSW Vegetation Classification - Vegetation ID

Vegetation Community ID 178

Common Name: Broombush - Green Mallee - Blue Mallee very tall shrubland on stony rises in the NSW South-western Slopes Bioregion

Scientific Name: *Melaleuca uncinata* - *Eucalyptus viridis* - *Eucalyptus polybractea* / *Calytrix tetragona* - *Kunzea parvifolia* - *Acacia rhigiophylla* - *Melichrus urceolatus* / *Dianella revoluta* var. *revoluta* - *Cheilanthes sieberi* subsp. *sieberi* - *Daucus glochidiatus*

Veg. Comm. ID.: 178 **Original Entry:** John Benson 31/12/2005

Photo 1: ID178a_img148pc.jpg *Melaleuca uncinata* - *Eucalyptus dwyeri* shrubland, The Charcoal Tank Nature Reserve, [AGD66 33°59'08.0"S 147°09'07.4"E], 19/4/02, Jaime Plaza.



Photo 2: ID178b_img149pc.jpg *Melaleuca uncinata* - *Eucalyptus viridis* shrubland, The Charcoal Tank Nature Reserve, [AGD66 33°59'08.0"S 147°09'07.4"E], 19/4/02, Jaime Plaza.



Characteristic Vegetation: (Qualitative Estimate)

Trees: *Eucalyptus viridis*; *Eucalyptus polybractea*; *Eucalyptus dwyeri*; *Callitris endlicheri*.

Shrubs/Vines/Epiphytes: *Melaleuca uncinata*; *Calytrix tetragona*; *Melichrus urceolatus*; *Philotheca ciliata*; *Kunzea parvifolia*; *Acacia rhigiophylla*; *Grevillea floribunda*; *Leptospermum divaricatum*.

Ground Cover: *Dianella revoluta* var. *revoluta*; *Cheilanthes sieberi* subsp. *sieberi*; *Daucus glochidiatus*; *Austrostipa densiflora*; *Crassula sieberiana* subsp. *sieberiana*; *Drosera peltata*; *Cymbonotus lawsonianus*; *Chrysocephalum semipapposum*; *Austrodanthonia* spp.; *Wahlenbergia gracilentia*; *Hypericum gramineum*; *Carex inversa*; *Gonocarpus elatus*; *Sida corrugata*; *Austrostipa scabra* subsp. *scabra*; *Stackhousia monogyna*; *Oxalis perennans*; *Eragrostis brownii*; *Goodenia hederacea* subsp. *hederacea*; *Lomandra glauca*; *Lomandra leucocephala* subsp. *leucocephala*; *Bulbine semibarbata*; *Thysanotus patersonii*.

Weed Species: Not assessed.

Weediness: Low (<5%) with 10-30% cover.

Threatened Plants: *Acacia rhigiophylla* (restricted).

Threatened Fauna: Not assessed.

Mean Species Richness: Not assessed.

Rainforest Structure (Webb): Not applicable.

Structure (WH): Closed Shrubland; Shrubland.

Height Class (WH): Very Tall.

Vegetation Description: Very tall dense shrubland composed of Broombush (*Melaleuca uncinata*) with Green Mallee (*Eucalyptus viridis*),

Blue Mallee (*Eucalyptus polybractea*) or Dwyer's Red Gum (*Eucalyptus dwyeri*) scattered throughout. The understorey contains few species due to the dominance of the Broombush but includes *Acacia rhigiophylla*, *Philotheca ciliata*, *Melichrus urceolatus*, *Calytrix tetragona*, *Kunzea parvifolia* and *Dianella revoluta*. The ground is largely composed of stones or rocky outcrops with a sparse plant cover. Ground cover species include *Dianella revoluta* var. *revoluta*, *Cheilanthes sieberi* subsp. *sieberi*, *Daucus glochidiatus*, *Austrostipa densiflora*, *Crassula sieberiana* subsp. *sieberiana*, *Drosera peltata*, *Chrysocephalum semipapposum*, *Austrodanthonia* spp., *Carex inversa*, *Gonocarpus elatus*, *Sida corrugata*, *Austrostipa scabra* subsp. *scabra*, *Stackhousia monogyna*, *Oxalis perennans*, *Eragrostis brownii*, *Goodenia hederacea* subsp. *hederacea*, *Lomandra glauca*, *Lomandra leucocephala* subsp. *leucocephala*, *Bulbine semibarbata*, *Thysanotus patersonii*. Occurs on skeletal sandy loam soil derived from siliceous metamorphic or sedimentary rocks on ridges of hills in the West Wyalong district of the NSW South-western Slopes Bioregion. Grades into Blue - Bull - Green Mallee low woodland (ID177) on adjoining hills and into Mugga Ironbark - Western Grey Box on footslopes. Threatened by fragmentation, its small overall extent and harvesting of key component species including Broombush and Blue Mallee.

Level of Classification: Association.

Classification Confidence Level: High.

Formation Group: Eremophila, Melaleuca and Dodonaea Shrublands of the Inland.

State Veg Map (Keith 2004): Inland Rocky Hill Woodlands.

State Landscape (Mitchell 2002): Not Assessed.

NVIS Major Veg Sub-Groups: Mallee heath and shrublands.

Forest Type (RN 17): 225 - Mallee (P).

Authority(s): (Expert Opinion). Community 5 in Lilley & Tideman (1994) for Buddigower Nature Reserve. Includes community 52 in Austin et al. (2000). Part of Biolandscape LacM86 in Priday (2006). Observed in The Charcoal Tank NR by J Benson, April 2002. Restricted to West Wyalong region. Part of BVT 53 in DEC (2006a). Part of EEC description in NSW Scientific Committee (2010a). Similar to ID142 that occurs to the west and tends to lack Blue Mallee.

Interstate Equivalent(s): Victoria: similar to EVC 93 Sandstone Ridge Woodland (syn. Broombush Mallee).

Mapped/Modelled: Current extent partly mapped or modelled.

Plot Sampling: None.

Mapping Info: Some mapping of nature reserves but not mapped for whole distribution. Not segregated from a broader unit by Sivertsen & Metcalfe (1985).

Climate Zone: Temperate: no dry season (hot summer).

IBRA Bioregion (v6): NSW South-western Slopes (>70%).

IBRA Sub-Region: Lower Slopes (>70%).

Botanical Division: Central Western Slopes (CWS) (>70%).

Local Govt. Areas: Bland (>70%).

CMAs: Lachlan (>70%); Murrumbidgee (1-30%).

MD Basin: Yes.

Substrate Mass: Metamorphic rocks; Sedimentary rocks.

Lithology: Sandstone; Sedimentary rock (unidentified); Shale.

Great Soil Group: Brown earth; Grey earth.

Soil Texture: Loamy sand.

Landform Patterns: Hills.

Landform Elements: Hillcrest; Hillslope.

Land Use: Grazing; Nature Conservation.

Impacts of European Settlement: Major reduction (>70%) in extent and/or range.

Pre-European Extent: 800 ha \pm 30%. Expert estimate not based on any mapped vegetation.

Pre-European Extent Comments: Given its habitat, this community is likely to have been rare prior to European settlement.

Current Extent: 200 ha \pm 30% or 25% \pm 50% of pre-European extent remaining.

Current Extent Comments: (Expert estimate). Small areas are recorded from two nature reserves and it is assumed other patches occur.

Conservation Reserves: Blue Mallee FR 5 (E3); Buddigower NR 50 (E1); The Charcoal Tank NR 40 (E1).

Reserves Total Area: 95 ha.

No. Representatives in Reserves: 3

Protected Area Explanation: Estimates for Buddigower and The Charcoal Tank Nature Reserves from NPWS (1987a, 1987b). Blue Mallee estimate from descriptions in Forestry Commission (1989a).

Secure Property Agreements: None.

Secure PAs Total Area: 0 ha.

No. Representatives in Secure Property Agreements: 0

Protected Current Extent: 47.5% 95 ha \pm 30%.

No. Representatives in Protected Areas: 3

Protected Pre-European Extent: 11.87% which is inadequately protected across distribution.

Rare in 1750: Code 5c: <15% of pre-European extent in protected areas (<1,000 ha).

Key Sites for Protection: Small patches occur in the West Wyalong district and probably elsewhere in the NSW SWS Bioregion.

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

Recoverability: Moderate health as structure and/or composition altered. Likely to recover considerably if causal factors and secondary impacts removed.

Variation & Disturbance: Time since fire would affect successional dominance of species.

Fire Regime: Unknown. Wildfire may burn stands every few decades (20-60 years).

Adjoining Communities: Mixes with ID177 Blue Mallee, ID186 Dwyer's Red Gum - Black Cypress Pine mallee on gravel ridges and grades Mugga Ironbark - Western Grey Box (ID217) on slopes and flats.

Threatening Processes: Fragmentation and loss of extent due to past clearing is the main threat. Current threats include harvesting of Blue Mallee for oil and Broombush for brush fences.

Threatening Process List: Clearing for agriculture; Firewood collection; Inappropriate fire regimes; Overharvesting or collecting of key species; Recreation over-use.

Threat Category: Endangered.

Threat/Protected Area Code: E/5c

Threat Criteria: 1; 3.

Planning Controls:

Planning and Management: Protect remaining stands under the Lachlan and Murrumbidgee CMA catchment plans. Could be lumped with a Blue - Bull - Green Mallee (ID177) as a threatened ecological community. Listed as critically endangered under TSC Act.

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Listed Under Legislation: Listed TSC Act, CE: Mallee and Mallee-Broombush dominated woodland and shrubland, lacking Triodia, in the
Recovery Plan: Doesn't exist and not required.

Reference List: (183; 150; 152; 24; 167; 34; 356; 373; 567). Austin, M.P., Cawsey, E.M., Baker, B.L., Yialeoglou, M.M., Grice, D.J. & Briggs, S.V. (2000) Predicted vegetation cover in the central Lachlan region. National Heritage Trust Project AA 1368.97. (CSIRO Division of Wildlife and Ecology: Canberra); Fleetwood, R. (1987a) Buddigower Nature Reserve Vegetation Map. Unpublished file note RN 34. (NSW National Parks and Wildlife Service: Griffith); Fleetwood, R. (1987b) The Charcoal Tank NR vegetation abundance and distribution ratings. File note RN 58. (NSW National Parks and Wildlife Service: Griffith); Forestry Commission of NSW (1989a) Forest preservation in state forests of New South Wales. Research Note No. 47. (Forestry Commission of NSW: Sydney); Lilley, D.M. & Tidemann, C.R. (1994) Flora and fauna of Buddigower Nature Reserve NSW. Report to NSW National Parks and Wildlife Service (School of Resources and Environmental Management Aust. National University: Canberra); 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; Priday, S. (in prep. 2006) The native vegetation of the New South Wales South Western Slopes Bioregion (Lachlan, Murrumbidgee and Murray Catchments). Unpublished report to DEC Southern Office Queanbeyan; DEC (2006a) Reconstructed and extant distribution of native vegetation in the Lachlan Catchment. Unpublished report (NSW Department of Environment and Conservation: Dubbo); NSW Scientific Committee (2010a) Final Determination to list the Mallee and Mallee-Broombush dominated woodland and shrubland, lacking Triodia, in the NSW South Western Slopes Bioregion, as a Critically Endangered Ecological Community under the NSW TSC Act 1995.

NSW Vegetation Classification - Vegetation ID

Vegetation Community ID 185

Common Name: Dwyers Red Gum - White Cypress Pine - Currawang shrubby woodland mainly in the NSW South-western Slopes Bioregion

Scientific Name: *Eucalyptus dwyeri* - *Callitris glaucophylla* - *Acacia doratoxylon* / *Cassinia laevis* - *Leptospermum divaricatum* - *Grevillea floribunda* / *Melichrus urceolatus* - *Cheilanthes austrotenuifolia* - *Gonocarpus elatus* - *Austrodanthonia setacea*

Veg. Comm. ID.: 185 **Original Entry:** John Benson 31/12/2005

Photo 1: ID185a_Porteners.jpg *Eucalyptus dwyeri* - *Callitris glaucophylla*-*Acacia doratoxylon* low woodland on granite ridge at Snake Rock east of Tullamore, 03/2005, M. Porteners.



Characteristic Vegetation: (Quantitative Data)

Trees: *Eucalyptus dwyeri*; *Callitris glaucophylla*; *Acacia doratoxylon*; *Allocasuarina verticillata*; *Brachychiton populneus* subsp. *populneus*; *Eucalyptus sideroxylon*; *Eucalyptus viridis*; *Eucalyptus populnea* subsp. *bimbil*; *Eucalyptus microcarpa*.

Shrubs/Vines/Epiphytes: *Cassinia laevis*; *Grevillea floribunda*; *Platysace lanceolata*; *Melichrus urceolatus*; *Geijera parviflora*; *Acacia deanei* subsp. *deanei*; *Acacia implexa*; *Acacia pycnantha*; *Acacia montana*; *Leptospermum divaricatum*; *Calytrix tetragona*; *Philotheca brevifolia*; *Prostanthera nivea* var. *nivea*; *Beyeria viscosa*; *Teucrium corymbosum*; *Hibbertia obtusifolia*; *Daviesia latifolia*; *Indigofera adesmiifolia*; *Psyrax oleifolia*; *Dodonaea viscosa* subsp. *spatulata*; *Einadia hastata*; *Phyllanthus occidentalis*.

Ground Cover: *Gonocarpus elatus*; *Austrostipa densiflora*; *Austrodanthonia setacea*; *Calotis cuneifolia*; *Goodenia glabra*; *Oxalis perennans*; *Hybanthus monopetalus*; *Stypantra glauca*; *Podolepis arachnoidea*; *Austrodanthonia eriantha*; *Thyridolepis mitchelliana*; *Amphipogon carcinus* var. *carcinus*; *Austrostipa scabra* subsp. *scabra*; *Wahlenbergia queenslandica*; *Wahlenbergia stricta* subsp. *stricta*; *Laxmannia gracilis*; *Cheilanthes austrotenuifolia*; *Cheilanthes sieberi* subsp. *sieberi*; *Eragrostis lacunaria*; *Panicum queenslandicum* var. *queenslandicum*; *Goodenia hederacea* subsp. *hederacea*; *Lepidosperma laterale*; *Lomandra multiflora* subsp. *multiflora*; *Isotoma axillaris*.

Weed Species: *Pentastichis airoides*; *Hypochaeris radicata*; *Lycium ferocissimum*.

Weediness: Low (<5%) with 10-30% cover.

Threatened Plants: *Acacia rhigiophylla* (near West Wyalong); *Phebalium obcordatum*.

Threatened Fauna: Glossy Black Cockatoo.

Mean Species Richness: 30±3 (average of floristic groups 20, 21 and 22 in Lewer et al. 2003 in 20x20 m plots).

Rainforest Structure (Webb): Not applicable.

Structure (WH): Open Mallee Woodland.

Height Class (WH): Tall.

Vegetation Description: Tall mallee open woodland dominated by Dwyer's Red Gum (*Eucalyptus dwyeri*), White Cypress Pine (*Callitris glaucophylla*) and/or Currawang (*Acacia doratoxylon*) occasionally with stands of Drooping She-oak (*Allocasuarina verticillata*), Poplar Box (*Eucalyptus populnea*) or Western Grey Box (*Eucalyptus microcarpa*). Grades into communities with Western Grey Box (*Eucalyptus microcarpa*) or Mugga Ironbark (*Eucalyptus sideroxylon*). Kurrajong (*Brachychiton populneus* subsp. *populneus*) occurs in some locations. The understorey contains a sparse shrub layer that may include *Cassinia laevis*, *Grevillea floribunda*, *Acacia deanei* and in some areas *Leptospermum divaricatum*. Low shrubs species include *Melichrus urceolatus*, *Hibbertia obtusifolia* and thickets of *Platysace lanceolata*. The ground cover is sparse and is often covered in rocks. Species include forbs such as *Gonocarpus elatus*, *Calotis cuneifolia*, *Goodenia glabra* and *Hybanthus monopetalus* and grasses such as *Austrodanthonia setacea*, *Austrostipa scabra*, *Austrostipa densiflora*, *Austrodanthonia eriantha*, *Thyridolepis mitchelliana* and *Amphipogon carcinus*. The rock ferns (*Cheilanthes* spp.) are common. Occurs on shallow gravel, sandy or loamy soils derived from sandstone, conglomerate, chert, granite and volcanics on rocky hills, hill slopes and footslopes on isolated rocky ridges in the NSW South-western Slopes Bioregion extending into the eastern edge of the Cobar Peneplain and Riverina Bioregions. Mainly occurs in the temperate (hot summers) climate zone receiving between 400 and 600 mm of annual rainfall. Not threatened due to position in landscape (rocky ridges) but grazing by domestic stock and goats is adversely affecting some sites. The rare Glossy Black Cockatoo feeds on the fruit of the Drooping She-oak. Frequent fire can eliminate this she-oak therefore inter-fire periods should be greater than 20 years to ensure the she-oak can survive.

Level of Classification: Association.

Classification Confidence Level: Medium.

Formation Group: Eucalyptus Woodlands on Rocky Hills of the Inland.

State Veg Map (Keith 2004): Inland Rocky Hill Woodlands.

State Landscape (Mitchell 2002): Not Assessed.

NVIS Major Veg Sub-Groups: Eucalyptus woodlands with a shrubby understorey.

Forest Type (RN 17): 195 - White Cypress Pine-Hillside Red Gum (P).

Authority(s): (Quantitative Data). Estimated to be half of the H1 and most of H3 and H4 map units in Sivertsen & Metcalfe (1995, 2001). South eastern stands of map unit H1 in Metcalfe et al. (2003) where *Callitris glaucophylla* rather than *Callitris endlicheri* is the main associate of *Eucalyptus dwyeri*. It also incorporates map units 4a, 4b, 6a and 6b mapped in by Whiting (1997) covering Cocoparra National Park and Cocoparra Nature Reserve. Includes communities 61 and 64 and possibly 21 in Austin et al. (2000). Probably present at Mt Narriah, Mt Bungabil, Mt Wammera, Bald Hill Tank, Mt Goombargana, Quarry and Grong Grong as documented in the rocky outcrops study by Norris & Thomas (1991). Probably includes floristic group 41 being most of map units HIL1 and HIL5 in Lewer et al. (2003). Noted as a community by Mid-Lachlan RVPC (1999). There are several *Eucalyptus dwyeri* communities in NSW from the western side of the tablelands to the inland plains. They change in their species composition from north to south and east to west but other factors such as substrate, aspect and fire history may explain some floristic changes over short distances.

Interstate Equivalent(s): None known.

Mapped/Modelled: Current extent partly mapped or modelled.

Plot Sampling: Inadequate.

Mapping Info: Central wheatbelt areas mapped as the south-eastern part of the broad floristic map unit H1 in Sivertsen & Metcalfe (1995, 2001) and Metcalfe et al. (2003) and map unit H3 in Sivertsen & Metcalfe (1995). Norris & Thomas (1991) document some point locations. Detailed mapping in several sub-associations by Whiting (1997) in Cocoparra NP and Cocoparra NR.

Climate Zone: Temperate: no dry season (hot summer); Semi-arid: warm (winter rain).

IBRA Bioregion (v6): Cobar Peneplain (1-30%); NSW South-western Slopes (>70%); Riverina (1-30%).

IBRA Sub-Region: Lachlan Plains (1-30%); Lower Slopes (30-70%); Nymagee (1-30%).

Botanical Division: Central Western Slopes (CWS) (30-70%); South Western Plains (SWP) (1-30%); South Western Slopes (SWS) (1-30%).

Local Govt. Areas: Bland (1-30%); Greater Hume (1-30%); Griffith (1-30%); Jerilderie (1-30%); Lachlan (1-30%); Lockhart (1-30%); Narrandera (1-30%); Urana (1-30%).

CMAs: Lachlan (1-30%); Murrumbidgee (1-30%).

MD Basin: Yes.

Substrate Mass: Sedimentary rocks; Volcanic ash; Volcanic rocks; Plutonic rocks; Igneous rocks; Pyroclastic rocks.

Lithology: Arkose; Chert; Conglomerate; Granite; Quartz porphyry; Rhyolite; Sandstone; Tuff.

Great Soil Group: Lithosol; Red podzolic soil; Yellow podzolic soil; Red-brown earth.

Soil Texture: Loam; Loamy sand.

Landform Patterns: Hills; Low hills.

Landform Elements: Footslope; Hillslope.

Land Use: Grazing; Nature Conservation.

Impacts of European Settlement: Major alteration of species composition; Minor reduction (<30%) in extent and/or range.

Pre-European Extent: 50000 ha \pm 30%. Estimated from extant vegetation maps: part range.

Pre-European Extent Comments: Estimated based on a range of vegetation maps and surveys.

Current Extent: 40000 ha \pm 30% or 80% \pm 50% of pre-European extent remaining.

Current Extent Comments: (Estimated from mapped extant vegetation: part range). Sivertsen & Metcalfe (1995) map 79000 ha of map unit H1, 653 ha of map unit H3 in the Forbes and Cargelligo regions. Sivertsen & Metcalfe (2001) map 84792 ha of H1 in the Nymagee, Narromine and Dubbo regions of the wheatbelt. However, their map unit H1 includes several plant communities. It is assumed that one third of the total area of map unit H1 i.e. about 80000 ha may be this community (the remainder being either Green Mallee or *Dwyeri* with Black Cypress Pine ID186) or Mugga Ironbark - Pine (ID243). It is estimated that an additional 10000 ha of this community occurs to the south of this wheatbelt mapping.

Conservation Reserves: Cocoparra NR 830 (E1); Cocoparra NP 460 (E1); Snake Rock AA 5 (E2).

Reserves Total Area: 1295 ha.

No. Representatives in Reserves: 3

Protected Area Explanation: Areas in Cocoparra NR and Cocoparra NP include map units 4b and 6a in Whiting (1997). Snake Rock AA estimate from community 1 in Porteners (2005).

Secure Property Agreements: None.

Secure PAs Total Area: 0 ha.

No. Representatives in Secure Property Agreements: 0

Protected Current Extent: 3.23% 1295 ha \pm 30%.

No. Representatives in Protected Areas: 3

Protected Pre-European Extent: 2.59% 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: As of 2007, this community is poorly protected considering its extent. Mount Ross and some rocky hills in south-western and central western NSW identified in Norris & Thomas (1991) may be worthy of protection.

Degree of Fragmentation: Naturally fragmented stands of variable patch sizes with >50% extent remaining.

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: The floristics of the understorey of this community vary with substrate, soil type and landform position e.g. on basalt soils it is likely that here would be less shrubs and a denser herbaceous ground cover. Some areas have been partly cleared and heavily grazed leading to a ground cover of exotic grasses. Fire history largely dictates understorey floristic composition.

Fire Regime: Infrequently burns but occasional fires (every 20 - 50 years or so) may occur if there is enough fuel build up after rainfall in Spring. Such fires may burn intensely on higher slopes. Inter-fire periods of greater than 20 years would assist with the survival of stands of Drooping She-oak (*Allocasuarina verticillata*), given the time it takes for this species to grow into maturity.

Adjoining Communities: Grades into Poplar Box or Western Grey Box communities downslope on flatter terrain. Grades into ID184 to the west or ID257 on better soils. May grade into *Eucalyptus dwyeri*-*Callitris endlicheri* community (ID186) on siliceous, steep, rocky slopes and shares some understorey species with that plant community. Grades into a grassy form of a similar community on deeper soils (ID257).

Threatening Processes: Most of the original extent remains, although some areas have been cleared and others thinned. Weeds have invaded some heavily disturbed locations and stock and goats threaten regeneration at many sites. Soil erosion may also be a problem on heavily grazed steep slopes.

Threatening Process List: Age class of woody vegetation; Soil erosion; Unsustainable grazing and trampling by stock; Unsustainable grazing by introduced animals.

Threat Category: Least Concern.

Threat/Protected Area Code: LC/4a

Threat Criteria: 1; 4; 5.

Planning Controls:

Planning and Management: Protect hills from clearing and overgrazing including by feral animals. Establish more reserves over the range of this community.

Listed Under Legislation: None.

Recovery Plan: Doesn't exist and not required.

Reference List: (183; 307; 67; 154; 34; 46; 143; 388). Austin, M.P., Cawsey, E.M., Baker, B.L., Yialeloglou, M.M., Grice, D.J. & Briggs, S.V. (2000) Predicted vegetation cover in the central Lachlan region. National Heritage Trust Project AA 1368.97. (CSIRO Division of Wildlife and Ecology: Canberra); Metcalfe, L., Sivertsen, D.P., Tindall, D.R. & Ryan, K.M. (2003) Natural vegetation of the New South Wales wheatbelt (Cobar-Nyngan-Gilgandra-Nymagee-Narromine-Dubbo 1:250 000 vegetation sheets). *Cunninghamia* 8(2) 252-284; Mid-Lachlan Regional Vegetation Committee (1999) Plan Draft Mid-Lachlan Regional Vegetation Management Plan for Public Exhibition. (Mid-Lachlan RVC: Forbes); Norris, E.H. & Thomas, J. (1991) Vegetation on rocky outcrops and ranges in central and south-western New South Wales. *Cunninghamia* 2(3): 411-442; 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; Sivertsen, D. & Metcalfe, L. (2001) Northern wheatbelt vegetation mapping. Unpublished 1:250 000 scale vegetation maps and vegetation descriptions covering northern NSW wheatbelt. (NSW National Parks and Wildlife Service: Hurstville); Whiting, E. (1997) Vegetation survey of Cocoparra National Park and Cocoparra Nature Reserve. Unpublished report (NSW National Parks and Wildlife Service: Griffith District); Porteners, M.F. (2005) Vegetation survey of Snake Rock Aboriginal Area. Report to Western Rivers Region of the NSW National Parks and Wildlife Service, DECC.

NSW Vegetation Classification - Vegetation ID

Vegetation Community ID 186

Common Name: Dwyers Red Gum - Black Cypress Pine - Currawang shrubby low woodland on rocky hills mainly in the NSW South-western Slopes Bioregion

Scientific Name: *Eucalyptus dwyeri* - *Callitris endlicheri* - *Acacia doratoxylon* / *Calytrix tetragona* - *Dodonaea viscosa* subsp. *spatulata* - *Grevillea floribunda* - *Brachyloma daphnoides* subsp. *daphnoides* / *Gonocarpus elatus* - *Lepidosperma laterale* - *Chrysocephalum semipapposum* - *Austrostipa densiflora*

Veg. Comm. ID.: 186 **Original Entry:** John Benson 31/12/2005

Photo 1: ID186a_PC185-20.jpg *Eucalyptus dwyeri* - *Acacia doratoxylon* - *Callitris endlicheri* low woodland, Ulandra Nature Reserve, [AGD66 34°46'30"S 147°53'54"E], 14/10/02, Jaime Plaza.



Photo 2: ID186b_PC252-23.jpg *Eucalyptus dwyeri* - *Acacia doratoxylon* low woodland on Burrabidine Peak in Goobang National Park, [AGD66 32°46'40.9"S 148°20'20.4"E], 05/05/2005, Jaime Plaza.



Photo 3: ID186c_DX28235.jpg Dwyer's Red Gum (*Eucalyptus dwyeri*) with *Callitris endlicheri* and the shrubs *Calytrix tetragona* and *Acacia verniciflua* on rocky outcrops in Woomargama National Park, [AGD66 35°51.792'S 147°23.501'E], 2/5/2006, Jaime Plaza.



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

Trees: *Eucalyptus dwyeri*; *Callitris endlicheri*; *Acacia doratoxylon*; *Eucalyptus dealbata*; *Eucalyptus sideroxylon*; *Allocasuarina verticillata*; *Eucalyptus goniocalyx*; *Eucalyptus macrorhyncha*.

Shrubs/Vines/Epiphytes: *Calytrix tetragona*; *Dodonaea viscosa* subsp. *spatulata*; *Grevillea floribunda*; *Brachyloma daphnoides* subsp. *daphnoides*; *Cassinia laevis*; *Acacia linearifolia*; *Acacia verniciflua*; *Platysace lanceolata*; *Dodonaea viscosa* subsp. *mucronata*; *Hibbertia obtusifolia*; *Acacia paradoxa*; *Acacia deanei* subsp. *deanei*; *Acacia buxifolia* subsp. *buxifolia*; *Exocarpos cupressiformis*; *Micromyrtus ciliata*; *Phebalium obcordatum*; *Melichrus urceolatus*; *Persoonia curvifolia*; *Kunzea ambigua*; *Senecio garlandii*; *Leptospermum divaricatum*; *Phyllothea difformis* subsp. *difformis*; *Phyllothea salsolifolia* subsp. *salsolifolia*; *Phyllanthus hirtellus*; *Allocasuarina diminuta* subsp. *diminuta*; *Acacia lineata*; *Santalum acuminatum*; *Leptospermum multicaule*; *Lissanthe strigosa* subsp. *strigosa*; *Acacia verniciflua*; *Correa reflexa* var. *reflexa*; *Pomaderris prunifolia* var. *prunifolia*; *Pultenaea procumbens*.

Ground Cover: *Gonocarpus elatus*; *Lepidosperma laterale*; *Chrysocephalum semipapposum*; *Austrostipa densiflora*; *Austrodanthonia eriantha*; *Austrodanthonia pilosa*; *Austrodanthonia caespitosa*; *Austrostipa scabra* subsp. *scabra*; *Aristida ramosa*, *Stypantra glauca*; *Cheilanthes distans*; *Cheilanthes sieberi* subsp. *sieberi*; *Cheilanthes austrotenuifolia*; *Austrostipa mollis*; *Goodenia ovata*; *Dampiera lanceolata* subsp. *lanceolata*; *Amphipogon caricinus* var. *caricinus*; *Calotis cuneifolia*; *Poa sieberiana* var. *sieberiana*; *Themeda australis*; *Thyridolepis mitchelliana*; *Hybanthus monopetalus*; *Astroloma humifusum*; *Stuartina muelleri*; *Aristida jerichoensis* var. *jerichoensis*; *Lomandra filiformis* subsp. *coriacea*; *Arthropodium minus*; *Einadia nutans* subsp. *nutans*; *Xerochrysum viscosum*; *Goodenia hederacea* subsp. *hederacea*; *Laxmannia gracilis*; *Wahlenbergia stricta* subsp. *stricta*; *Gonocarpus tetragynus*.

Weed Species: *Hypochaeris glabra*; *Petrorhagia nanteuilii*; *Anagallis arvensis*; *Echium plantagineum*; *Vulpia myuros*; *Sonchus asper* subsp. *glaucescens*.

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

Threatened Plants: *Senecio garlandii*; *Phebalium obcordatum*.

Threatened Fauna: Not assessed.

Mean Species Richness: Varies across range, e.g. 30 +/- 6 (C1 in Porteners 1997a in 20 x 20 m plots).

Rainforest Structure (Webb): Not applicable.

Structure (WH): Open Mallee Woodland; Open Mallee Shrubland; Woodland; Mallee Woodland.

Height Class (WH): Mid-High.

Vegetation Description: Woodland or mallee shrubland dominated by Dwyer's Red Gum (*Eucalyptus dwyeri*), Black Cypress Pine (*Callitris endlicheri*) with Currawang (*Acacia doratoxylon*) often present. Drooping She-oak (*Allocasuarina verticillata*) may be present in areas infrequently burnt. Mugga Ironbark (*Eucalyptus sideroxylon*) may be present on mid-lower slopes. Tumbledown Red Gum (*Eucalyptus dealbata*) may occur in eastern occurrences. The understorey contains a mid-dense to sparse shrub layer that includes *Calytrix tetragona*, *Cassinia laevis*, *Grevillea floribunda*, *Acacia linearifolia*, *Dodonaea viscosa* subsp. *spatulata*, *Dodonaea viscosa* subsp. *mucronata*, *Acacia paradoxa*, *Correa reflexa*, *Acacia lineata* and in some eastern locations patches of *Kunzea ambigua*. The ground cover is sparse and can be very sparse on rocky areas and rocks may compose 60% of a site. Small shrubs such as *Melichrus urceolatus*, *Astroloma humifusum*, *Platysace lanceolata*, *Brachyloma daphnoides* and *Hibbertia obtusifolia* may be present along with grasses such as *Austrodanthonia* spp., *Austrostipa densiflora*, *Austrostipa scabra*, *Austrostipa mollis*, *Aristida ramosa* and *Themeda australis*. The sedge *Lepidosperma laterale* is often abundant. Forbs include *Gonocarpus elatus*, *Calotis cuneifolia*, *Stuartina muelleri* and *Chrysocephalum semipapposum*. Rock Ferns (*Cheilanthes* spp.) are usually common. The rare plant *Senecio garlandii* occurs at several sites including The Rock Nature Reserve south of Wagga Wagga. The ground cover may form rock forblands in some areas and on a different scale this could be described as a community in itself. Occurs on skeletal or shallow lithosol soils derived from sandstones, granites or other siliceous substrates including quartzite and psammite. Generally present on steep upper slopes, ridgelines or steep gullies on rocky hills mainly in the NSW South-western Slopes Bioregion but extending into the south-eastern edge of the Cobar Peneplain Bioregion. Due to its location on rocky ridges most of this community remains uncleared but grazing by stock or feral animals may threaten some locations. A broadly classified and widely distributed community that could be divided with floristic analyses.

Level of Classification: Alliance / Sub-formation.

Classification Confidence Level: High.

Formation Group: *Eucalyptus* Woodlands on Rocky Hills of the Inland.

State Veg Map (Keith 2004): Inland Rocky Hill Woodlands.

State Landscape (Mitchell 2002): Not Assessed.

NVIS Major Veg Sub-Groups: *Eucalyptus* woodlands with a shrubby understorey.

Forest Type (RN 17): 183 - Black Cypress Pine-Red Gum (P).

Authority(s): (Combination of Expert Opinion and Quantitative Data). A broad classification distributed over a large area. Part of map unit H1 in Sivertsen & Metcalfe (1995). Communities 62 and 63 in Austin et al. (2000). Mt Bingar and Flagstaff Hill and Lachlan Range rocky outcrops in Norris & Thomas (1991). Communities 4c, 4d, 4e and 6c, in Whiting (1997). Includes communities C16 and C6.1 in Bos & Lockwood (1996). Vegetation groups 38, 39, 41 and 42 in Gellie & Fanning (2004) for mapping of some south western slopes reserves. Mapped in Wagga Wagga Shire by Priday (2004). Floristic group 23 in Lewer et al. (2003) for northern areas. Community 1 in Porteners (1997). Veg. Group 41 in Gellie & Fanning (2004). Most of the Dwyer's Red Gum open forest in Priday (2004). Most of community 2 in Porteners (2007). Part of BVT 49 in DEC (2006, 2006a). Note: *Eucalyptus dwyeri* and *Eucalyptus dealbata* intergrade over their range including on the south western slopes of NSW. Analysis of more data could divide this community into several associations.

Interstate Equivalent(s): None known.

Mapped/Modelled: Current extent partly mapped or modelled.

Plot Sampling: Inadequate.

Mapping Info: Part of map unit H1 in Sivertsen & Metcalfe (1995, 2001). Mapped in several reserves on the NSW south western slopes e.g. (veg groups 37 and 42 in Gellie & Fanning 2004) and in the Wagga Wagga Shire. Mappable due to landscape position.

Climate Zone: Temperate: no dry season (hot summer).

IBRA Bioregion (v6): Cobar Peneplain (1-30%); NSW South-western Slopes (>70%).

IBRA Sub-Region: Lachlan Plains (1-30%); Lower Slopes (30-70%); Nymagee (1-30%); Upper Slopes (30-70%).

Botanical Division: Central Western Slopes (CWS) (30-70%); South Western Plains (SWP) (1-30%); South Western Slopes (SWS) (1-30%).

Local Govt. Areas: Bland (1-30%); Coolamon (1-30%); Forbes (1-30%); Greater Hume (1-30%); Junee (1-30%); Lachlan (1-30%); Lockhart (1-30%); Parkes (1-30%); Temora (1-30%); Wagga Wagga (1-30%); Weddin (1-30%).

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

MD Basin: Yes.

Substrate Mass: Igneous rocks; Metamorphic rocks; Sedimentary rocks; Plutonic rocks; Volcanic rocks.

Lithology: Arkose; Conglomerate; Granite; Quartz; Quartz sandstone; Quartzite; Rhyolite; Sandstone.

Great Soil Group: Lithosol.

Soil Texture: Clayey sand; Loamy sand.

Landform Patterns: Hills.

Landform Elements: Cliff; Cliff-foot slope; Hillcrest; Rock flat.

Land Use: Grazing; Nature Conservation.

Impacts of European Settlement: Minor reduction (<30%) in extent and/or range.

Pre-European Extent: 60000 ha ±50%. Estimated from extant vegetation maps: part range.

Pre-European Extent Comments: Estimate based on limited existing mapping.

Current Extent: 50000 ha ±50% or 83% ± 80% of pre-European extent remaining.

Current Extent Comments: (Estimated from mapped extant vegetation: part range). Estimated to be about 35,000, i.e. one fifth of map unit H1 in Sivertsen & Metcalfe (1995, 2001). Widespread to the south of this mapping on the NSW South-western Slopes with western patches in the Cocoparra Ranges.

Conservation Reserves: Blue Mallee FR 10 (E3); Cocoparra NP 6030 (E1); Cocoparra NR 3200 (E1); Eugowra NR 100 (M); Goobang NP 500 (E1); Ingalba NR 400 (E2); The Charcoal Tank NR 2 (E1); The Rock NR 193 (E2); Weddin Mountains NP 5145 (E1); Livingstone NP 300 (E2); Livingstone SCA 17 (E1); Boginderra Hills NR 320 (E2); Benambra NP 30 (E2); Tabletop NR 23 (E3); Koorawatha NR 420 (E1); Dananbilla NR 1000 (E1); Woomargama NP 200 (E3); Ulandra NR 2400 (E2); Buddigower NR 40 (E2).

Reserves Total Area: 20330 ha.

No. Representatives in Reserves: 19

Protected Area Explanation: Cocoparra NR and NP from 4c, 4d, 4e and 6c in Whiting (1997). Boginderra Hills area from Lembit & Skelton (1998) including 2006 addition. Eugowra NR from Porteners 2000. Weddin Mountains NP includes the shrubland and woodland forms mapped by ERM Mitchell McCotter (1996). Buddigower NR estimated from Fleetwood (1987a). Estimate from Goobang NP from Porteners (1997) accounting for mosaic mapping of this community with other communities. The Rock NR estimated in NSW NPWS (undated) and community 4 in Whiting (2006). The Charcoal Tank NR (NSW NPWS 1987c). Small area recorded in Blue Mallee Flora Reserve from notes in Forestry Commission (1989a). Ingalba NR estimate from NSW NPWS Griffith District files. CO9801 from DIPNR PA database notes. Livingstone NP, Livingstone SCA and Tabletop NR from all or part of vegetation groups 38 & 41 in Gellie & Fanning (2004). Woomargama NP is part of VG 37 in Gellie & Fanning (2004 as noted by J. Benson (pers. obs.)). Ulandra NR from part of group 39 in Gellie & Fanning (2004). Dananbilla and Koorawatha NR estimates from community 2 in Porteners (2007). VCA044 estimate from NSW DECC file notes.

Secure Property Agreements: CO9801 PA 525 (M); VCA044 VCA 12 (E3); WE9904 PA 45 (E3).

Secure PAs Total Area: 582 ha.

No. Representatives in Secure Property Agreements: 3

Protected Current Extent: 41.82% 20912 ha ± 30%.

No. Representatives in Protected Areas: 22

Protected Pre-European Extent: 34.85% which is adequately protected across distribution.

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

Key Sites for Protection: Well represented in protected areas in the NSW South-western Slopes Bioregion due to its position on rocky ridges with poor soils - i.e. unproductive land.

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

Recoverability: Moderate health as structure and/or composition altered. Likely to recover considerably if causal factors and secondary impacts removed.

Variation & Disturbance: Species composition varies across distribution but a consistent group of dominant canopy species is present across the range. Generally, occurs east of ID185 (Dwyer's Red Gum - White Cypress Pine) and ID257 (grassy Dwyer's Gum - Currawang low woodland). Could be split into several communities based on understorey variation determined by differences in substrate, soils and fire history - although Black Cypress Pine low open forest ID309 and Currawang tall shrubland (ID317) have been split from it.

Fire Regime: Probably is burnt occasionally (20-50 years) in many locations due to lightning strikes or human ignitions. Some species would be threatened by too-frequent fire but some may also benefit from occasional fire and post-fire seed germination.

Adjoining Communities: Grades into box woodlands on lower slopes e.g. ID110 Western Grey Box woodland. Grades into Red Stringybark (ID239) and Mugga Ironbark forests. Grades into ID185 in Cocoparra National Park at its western limit. Grades into ID309 Black Cypress Pine open forest and ID317 Currawang tall shrubland on rocky ridges. Grades into ID292 where *Allocasuarina diminuta* and *Calytrix tetragona* shrubland dominates.

Threatening Processes: Overgrazing by goats and stock is the main threat. Soil erosion affects some sites.

Threatening Process List: Inappropriate fire regimes; Soil erosion; Unsustainable grazing and trampling by stock; Unsustainable grazing by introduced animals.

Threat Category: Least Concern.

Threat/Protected Area Code: LC/1a

Threat Criteria: 1; 4.

Planning Controls:

Planning and Management: Protect ridges and hills from overgrazing by stock and goats. Apply appropriate fire regimes. Too frequent burning may eliminate some shrub species but lack of fire may also impact on the germination of key species such as *Acacia dorotoxylon*.

Listed Under Legislation: None.

Recovery Plan: Doesn't exist and not required.

Reference List: (183; 177; 263; 152; 24; 154; 153; 69; 180; 34; 46; 143; 316; 340; 179; 372; 373; 150; 379; 522). Austin, M.P., Cawsey, E.M., Baker, B.L., Yialeloglou, M.M., Grice, D.J. & Briggs, S.V. (2000) Predicted vegetation cover in the central Lachlan region. National Heritage Trust Project AA 1368.97. (CSIRO Division of Wildlife and Ecology: Canberra); Bos, D. & Lockwood, M. (1996) Flora, fauna and other features of the south west slopes biogeographic region, NSW. Report No. 59, Johnson Centre of Parks, Recreation and Heritage. (Charles Sturt University: Albury); ERM Mitchell McCotter Pty. Ltd. (1996) Bathurst vegetation survey for NSW National Parks and Wildlife Service: Bathurst District covering Winburndale NR, Nangar NP, Conimbla NP and Weddin Mountains NP. (NSW National Parks and Wildlife Service: Bathurst); Fleetwood, R. (1987b) The Charcoal Tank NR vegetation abundance and distribution ratings. File note RN 58. (NSW National Parks and Wildlife Service: Griffith); Forestry Commission of NSW (1989a) Forest preservation in state forests of New South Wales. Research Note No. 47. (Forestry Commission of NSW: Sydney); Norris, E.H. & Thomas, J. (1991) Vegetation on rocky outcrops and ranges in central and south-western New South Wales. *Cunninghamia* 2(3): 411-442; NSW National Parks and Wildlife Service (undated a) The Rock Nature Reserve information leaflet. File note RN 38. (NSW National Parks and Wildlife Service: Griffith); Porteners, M. (1997) Vegetation communities of Goobang National Park and adjoining areas. Unpublished report and vegetation map to NSW National Parks and Wildlife Service: Bathurst; Porteners, M.F. (2000) Vegetation survey of Mullion Range SRA and Wambool, Freemantle, Girralang and Eugowra Nature Reserves. Report to NSW National Parks and Wildlife Service: Central West; 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; Sivertsen, D. & Metcalfe, L. (2001) Northern wheatbelt vegetation mapping. Unpublished 1:250 000 scale vegetation maps and

vegetation descriptions covering northern NSW wheatbelt. (NSW National Parks and Wildlife Service: Hurstville); Whiting, E. (1997) Vegetation survey of Cocoparra National Park and Cocoparra Nature Reserve. Unpublished report (NSW National Parks and Wildlife Service: Griffith District); Priday, S. (2004) The native vegetation and threatened species of the City of Wagga Wagga. Unpublished report. (NSW National Parks and Wildlife Service, Southern Region: Queanbeyan); Gellie, N. & Fanning, M. (2004) Final report of vegetation ecosystems in new and existing conservation reserves, south west slopes region 2002-2004, version 3. Report to NSW Department of Environment and Conservation: Queanbeyan; Lembit, R. & Skelton, N. (1998) Vegetation survey of Copperhanna, Barton, Dapper and Boginderra Hills Nature Reserves. Report to the NSW National Parks and Wildlife Service: Central West; DEC (2006) Reconstructed and extant distribution of native vegetation in the Central West Catchment. Unpublished report (NSW Department of Environment and Conservation: Dubbo); DEC (2006a) Reconstructed and extant distribution of native vegetation in the Lachlan Catchment. Unpublished report (NSW Department of Environment and Conservation: Dubbo); Fleetwood, R. (1987a) Buddigower Nature Reserve Vegetation Map. Unpublished file note RN 34. (NSW National Parks and Wildlife Service: Griffith); Porteners, M.F. (2007) Vegetation survey and mapping of Koorawatha, Dananbilla, Gungewalla and Illunie Nature Reserves. Report to Department of Environment and Climate Change NSW; Whiting, E. (2006) Vegetation survey of the Rock Nature Reserve.

NSW Vegetation Classification - Vegetation ID

Vegetation Community ID 239

Common Name: Red Stringybark - Dwyers Red Gum - Black Cypress Pine woodland on siliceous ranges in the Lockhart to Griffith regions SWS and Cobar Penepplain Bioregions

Scientific Name: *Eucalyptus macrorhyncha* - *Eucalyptus dwyeri* - *Callitris endlicheri* / *Acacia deanei* subsp. *deanei* - *Dodonaea viscosa* subsp. *mucronata* - *Grevillea floribunda* / *Chrysocephalum semipapposum* - *Cheilanthes sieberi* subsp. *sieberi* - *Gonocarpus elatus* - *Lepidosperma laterale*

Veg. Comm. ID.: 239 **Original Entry:** John Benson 31/12/2005

Last Modified: J Benson 23/04/2010

Photo 1: ID239a_Ballestrin.jpg Red Stringybark (*Eucalyptus macrorhyncha*) with *Callitris endlicheri* and *Eucalyptus dwyeri* in gully near The Pines, Cocoparra National Park; 21/10/2004, M. Ballestrin.



Photo 2: ID239b_Ballestrin.jpg Red Stringybark (*Eucalyptus macrorhyncha*) with *Eucalyptus dwyeri* in Duncans Creek, Cocoparra National Park; 01/08/2004, M. Ballestrin.



Characteristic Vegetation: (Quantitative Data)

Trees: *Eucalyptus macrorhyncha*; *Eucalyptus dwyeri*; *Callitris endlicheri*; *Acacia doratoxylon*.

Shrubs/Vines/Epiphytes: *Acacia deanei* subsp. *deanei*; *Dodonaea viscosa* subsp. *mucronata*; *Grevillea floribunda*; *Hibbertia obtusifolia*; *Pomaderris cocoparrana*; *Acacia paradoxa*; *Dodonaea viscosa* subsp. *spatulata*; *Dodonaea viscosa* subsp. *spatulata*; *Persoonia curvifolia*; *Prostanthera nivea* var. *nivea*; *Melichrus urceolatus*; *Daviesia ulicifolia* subsp. *aridicola*.

Ground Cover: *Chrysocephalum semipapposum*; *Cheilanthes sieberi* subsp. *sieberi*; *Gonocarpus elatus*; *Lepidosperma laterale*; *Cheilanthes austrotenuifolia*; *Juncus aridicola*; *Luzula meridionalis*; *Arthropodium minus*; *Hybanthus monopetalus*; *Galium gaudichaudii*; *Calandrinia eremaea*; *Oxalis radicata*; *Goodenia ovata*; *Goodenia cycloptera*; *Dampiera lanceolata* var. *lanceolata*; *Astroloma humifusum*.

Weed Species: *Anagallis arvensis*; *Aira cupaniana*; *Briza maxima*.

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

Threatened Plants: *Senecio garlandii*.

Threatened Fauna: Not assessed.

Mean Species Richness: Not assessed.

Rainforest Structure (Webb): Not applicable.

Structure (WH): Woodland.

Height Class (WH): Mid-High.

Vegetation Description: Mid-high woodland dominated by Red Stringybark (*Eucalyptus macrorhyncha*) with Dwyer's Red Gum (*Eucalyptus dwyeri*) and Black Cypress Pine (*Callitris endlicheri*). A sparse shrub layer is present including the *Acacia deanei* subsp. *deanei*,

Dodonaea viscosa subsp. mucronata, Dodonaea viscosa subsp. spatulata, Pomaderris cocoparrana, Acacia paradoxa, Prostanthera nivea var. nivea and Grevillea floribunda. Low shrubs include Hibbertia obtusifolia and Melichrus urceolatus. The ground cover is sparse and is dominated by forbs and sedges. Forb species include Chrysocephalum semipapposum, Gonocarpus elatus, Arthropodium minus, Hybanthus monopetalus, Galium gaudichaudii, Goodenia cycloptera and Dampiera lanceolata var. lanceolata. The rock ferns Cheilanthes sieberi subsp. sieberi and Cheilanthes austrotenuifolia are common. The sedge Lepidosperma laterale is often present along with the rush Luzula meridionalis. Occurs on shallow, loamy sand soils on upper sheltered slopes of sandstone or quartzite ranges including the Cocoparra Ranges in the south-eastern corner of the Cobar Penneplain Bioregion north of the town of Griffith and in the Lower Slopes sub-region of NSW South-western Slopes Bioregion. A rare outlier of more common and similar communities that occur to the east. Sampled in Cocoparra National Park.

Level of Classification: Sub-association.

Classification Confidence Level: High.

Formation Group: Eucalyptus Woodlands on Rocky Hills of the Inland.

State Veg Map (Keith 2004): Inland Rocky Hill Woodlands.

State Landscape (Mitchell 2002): Not Assessed.

NVIS Major Veg Sub-Groups: Eucalyptus woodlands with a shrubby understorey.

Forest Type (RN 17): 210 - Red Ironbark-Stringybark (P).

Authority(s): (Quantitative Data). Community 6d in the vegetation map and report on Cocoparra National Park and Cocoparra Nature Reserve by Whiting (1997). Listed in Brickhill (1976b). Community 3 in Whiting (2006) in The Rock NR. A western disjunct occurrence of a community dominated by Red Stringybark (Eucalyptus macrorhyncha). A sub-association of the more common Dwyer's Red Gum - Black Pine association (ID186). Red Stringybark dominated communities are very common in more eastern areas of NSW in the western slopes and tablelands regions where it forms a number of associations with a range of other species.

Interstate Equivalent(s): None.

Mapped/Modelled: Current extent mapped.

Plot Sampling: Adequate.

Mapping Info: Whiting (1997) maps most of this community but patches may occur on other ranges outside his mapping.

Climate Zone: Temperate: no dry season (hot summer).

IBRA Bioregion (v6): Cobar Penneplain (>70%); NSW South-western Slopes (1-30%).

IBRA Sub-Region: Lachlan Plains (>70%); Lower Slopes (1-30%).

Botanical Division: South Western Slopes (SWS) (30-70%); South Western Plains (SWP) (30-70%).

Local Govt. Areas: Griffith (30-70%); Bland (1-30%); Lockhart (1-30%).

CMAs: Lachlan (30-70%); Murrumbidgee (30-70%).

MD Basin: Yes.

Substrate Mass: Metamorphic rocks; Sedimentary rocks.

Lithology: Quartz sandstone; Quartzite; Sandstone.

Great Soil Group: Brown earth.

Soil Texture: Loamy sand.

Landform Patterns: Hills; Low hills.

Landform Elements: Gully; Hillslope.

Land Use: Grazing; Nature Conservation.

Impacts of European Settlement: No significant impacts known.

Pre-European Extent: 500 ha \pm 50%. Estimated from extant vegetation maps: part range.

Pre-European Extent Comments: Mostly intact as clearing is rare in sandstone ranges.

Current Extent: 400 ha \pm 50% or 80% \pm 80% of pre-European extent remaining.

Current Extent Comments: (Estimated from mapped extant vegetation: part range). Small areas mapped by Whiting (1997) in the Cocoparra Ranges but this community also occurs elsewhere in the Lower Slopes sub-region. Similar communities are more widespread on the upper western slopes to the east.

Conservation Reserves: Cocoparra NP 60 (M); The Rock NR 20 (E2); Pucawan NR 20 (E2).

Reserves Total Area: 100 ha.

No. Representatives in Reserves: 3

Protected Area Explanation: Whiting (1997) maps 60 ha of Red Stringybark-dominated woodland in Cocoparra National Park but Brickhill (1976b) notes it as being more widespread there and in Cocoparra Nature Reserve. The Rock NR estimate from NPWS (undated a) and Whiting (2006). Pucawan NR from Brickhill (1976c).

Secure Property Agreements: None.

Secure PAs Total Area: 0 ha.

No. Representatives in Secure Property Agreements: 0

Protected Current Extent: 25% 100 ha \pm 30%.

No. Representatives in Protected Areas: 3

Protected Pre-European Extent: 20% which is adequately protected across distribution.

Rare in 1750: Code 4c: 15-30% of pre-European extent in protected areas (<1,000 ha).

Key Sites for Protection: Well protected in Cocoparra National Park.

Degree of Fragmentation: Naturally fragmented stands of variable patch sizes with >50% extent remaining.

Recoverability: Healthy, structure and composition intact. Insignificant indicators of degradation. Likely to continue in good health if maintained.

Variation & Disturbance: Confined to sheltered gullies in this western region with a similar species composition to more widespread communities on the ranges where it occurs.

Fire Regime: Rarely burns. Occasional wildfire every few decades or so is unlikely to damage this community.

Adjoining Communities: Similar to and grades into ID186 Dwyer's Red Gum - Black Cypress Pine on upper slopes of ranges.

Threatening Processes: Few threats to this community due to its occurrence on non-arable rocky ranges. Grazing by goats may affect the growth of associated species in the community.

Threatening Process List: Soil erosion, water: sheet erosion; Unsustainable grazing by introduced animals.

Threat Category: Least Concern.

Threat/Protected Area Code: LC/4c

Threat Criteria: 1; 4.

Planning Controls:

Planning and Management: The main factor in managing this community is controlling goats, including in conservation reserves.

Listed Under Legislation: None.

Recovery Plan: Doesn't exist and not required.

Reference List: (315; 153; 143; 151; 522). Brickhill, J. (1976b) Cocoparra National Park and Nature Reserve vegetation structural forms. Unpublished file note RN 32A. (NSW National Parks and Wildlife Service: Griffith); NSW National Parks and Wildlife Service (undated a) The Rock Nature Reserve information leaflet. File note RN 38. (NSW National Parks and Wildlife Service: Griffith); Whiting, E. (1997) Vegetation survey of Cocoparra National Park and Cocoparra Nature Reserve. Unpublished report (NSW National Parks and Wildlife Service: Griffith District); Brickhill, J. (1976c) Investigation report: Pucawan Nature Reserve proposal. File note RN 18. (NSW National Parks and Wildlife Service: Griffith); Whiting, E. (2006) Vegetation survey of the Rock Nature Reserve.

NSW Vegetation Classification - Vegetation ID

Vegetation Community ID 257

Common Name: Dwyers Red Gum - Currawang grassy low woodland of the central western plains of NSW

Scientific Name: *Eucalyptus dwyeri* - *Acacia doratoxylon* / *Acacia deanei* subsp. *deanei* - *Dodonaea boroniifolia* / *Amphipogon caricinus* var. *caricinus* - *Austrostipa scabra* subsp. *scabra* - *Austrodanthonia setacea* - *Goodenia cycloptera*

Veg. Comm. ID.: 257 **Original Entry:** John Benson 31/12/2005

Photo 1: ID257a_img138pc.jpg *Eucalyptus dwyeri*-*Acacia doratoxylon* mallee grassy woodland, Monia Gap near Hillston, [AGD66 33°35'17.2"S 145°53'30.0"E], 18/4/02, Jaime Plaza.



Photo 2: ID257b_SWS0507367.jpg Low open woodland dominated by Dwyer's Gum (*Eucalyptus dwyeri*), Currawang (*Acacia doratoxylon*) and White Cypress Pine (*Callitris glaucophylla*) with a grassy ground cover on a conglomerate ridge near Lake Cowal, [AGD66 33°41.879'S 147°22.995'E], 31/5/2007, Jaime Plaza.



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

Trees: *Eucalyptus dwyeri*; *Acacia doratoxylon*; *Eucalyptus vicina*; *Callitris glaucophylla*.

Shrubs/Vines/Epiphytes: *Solanum ferocissimum*; *Acacia deanei* subsp. *deanei*; *Dodonaea boroniifolia*; *Dodonaea lobulata*; *Leptospermum divaricatum*; *Geijera parviflora*; *Allocasuarina verticillata*; *Pandorea pandorana* subsp. *pandorana*.

Ground Cover: *Amphipogon caricinus* var. *caricinus*; *Austrostipa scabra* subsp. *scabra*; *Austrodanthonia setacea*; *Chrysocephalum apiculatum*; *Austrodanthonia eriantha*; *Thyridolepis mitchelliana*; *Aristida jerichoensis* var. *subspinulifera*; *Cheilanthes sieberi* subsp. *sieberi*; *Elymus scaber* var. *scaber*; *Eragrostis lacunaria*; *Austrostipa gibbosa*; *Goodenia cycloptera*; *Goodenia hederacea* subsp. *hederacea*; *Sida cunninghamii*; *Gonocarpus elatus*.

Weed Species: *Hypochaeris glabra*; *Hypochaeris radicata*; *Carthamus lanatus*; *Vulpia muralis*; *Sonchus oleraceus*; *Pentstemon airoides*; *Chondrilla juncea*; *Aira cupaniana*; *Spergularia rubra*.

Weediness: Medium (5-15%) with 10-30% cover.

Threatened Plants: *Lomandra patens* (rare); *Goodenia pusilliflora* (rare); *Pterostylis cobarensis*; *Swainsona sericea*.

Threatened Fauna: Kultarr; Australian Bustard; Major Mitchell's Cockatoo; Pied Honeyeater; Little Pied Bat; Collared Whip Snake; Grey Falcon; Painted Honeyeater; Square-tailed Kite; Hooded Robin (south-eastern form); Black-chinned Honeyeater (eastern subspecies); Scarlet-chested Parrot; Barking Owl; Eastern Long-eared Bat (south eastern form); Koala; Speckled Warbler; Yellow-bellied Sheath-tail-bat; Diamond Firetail; Masked Owl; Inland Forest Bat.

Mean Species Richness: 32±3 (average of floristic groups 21 and 22 in Lewer et al. 2003 in 20x20 m plots).

Rainforest Structure (Webb): Not applicable.

Structure (WH): Woodland.

Height Class (WH): Mid-High.

Vegetation Description: Mid-high woodland dominated by Dwyer's Red Gum with Currawang (*Acacia doratoxylon*) and occasional *Eucalyptus vicina* in western areas. White Cypress Pine (*Callitris glaucophylla*) is often absent but may be present. The shrub layer is absent or sparse and may include *Solanum ferocissimum*, *Acacia deanei* subsp. *deanei*, *Leptospermum divaricatum* and *Dodonaea lobulata* and *Dodonaea boroniifolia*. The vine *Pandorea pandorana* subsp. *pandorana* is often present. The ground cover may be dense or mid-dense and may be dominated by tussock grass species such as *Amphipogon caricinus* var. *caricinus*, *Austrostipa scabra* subsp. *scabra*, *Austrodanthonia eriantha*, *Austrodanthonia setacea*, *Thyridolepis mitchelliana*, *Aristida jerichoensis* var. *subspinulifera*, and *Elymus scaber* var. *scaber*. The fern *Cheilanthes sieberi* subsp. *sieberi* is often present. Forb species include *Chrysocephalum apiculatum*, *Goodenia cycloptera*, *Goodenia hederacea* subsp. *hederacea* and *Sida cunninghamii*. Occurs on brown sandy clay or sandy loam soils on flats or undulating country on rises and low hills in the semi arid and temperate (hot summer) climate zones of central NSW. The substrate varies but may include fine-grained sedimentary or volcanic rocks. Less common than the closely allied shrubby *Eucalyptus dwyeri* low woodlands ID184 and ID186 but because this community is grassy more of it has been cleared than other more shrubby *Eucalyptus dwyeri*-dominated communities.

Level of Classification: Association.

Classification Confidence Level: Medium.

Formation Group: Eucalyptus Woodlands on Rocky Hills of the Inland.

State Veg Map (Keith 2004): Inland Rocky Hill Woodlands.

State Landscape (Mitchell 2002): Not Assessed.

NVIS Major Veg Sub-Groups: Eucalyptus woodlands with a grassy understorey.

Forest Type (RN 17): 195 - White Cypress Pine-Hillside Red Gum (P).

Authority(s): (Combination of Expert Opinion and Quantitative Data). Floristic groups 21 and 22 in being part of map units HIL1 and HIL5 in Lewer et al. (2003). Possibly includes areas in map units H1, H3 and H4 in Sivertsen & Metcalfe (1995) and some southern sections of map unit H1 in Sivertsen & Metcalfe (2001). Part of BVT 49 in DEC (2006, 2006a). Observed in Nombinnie and Yathong regions on better soils. Generally lacks *Callitris* and a shrub layer but contains a dense ground cover of forbs and grasses.

Interstate Equivalent(s): None.

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

Mapping Info: Part of the map units HIL1 and HIL5 in Lewer et al. (2003) and part of broad map unit H1 in Sivertsen & Metcalfe (1995, 2001). Not mapped or sampled across whole range as of 2005.

Climate Zone: Temperate: no dry season (hot summer); Semi-arid: warm (winter rain); Semi-arid: hot (persistently dry).

IBRA Bioregion (v6): Cobar Penneplain (30-70%); NSW South-western Slopes (30-70%).

IBRA Sub-Region: Lachlan Plains (1-30%); Lower Slopes (1-30%); Nymagee (1-30%).

Botanical Division: Central Western Slopes (CWS) (30-70%); North Western Plains (NWP) (1-30%); South Western Plains (SWP) (1-30%).

Local Govt. Areas: Bogan (1-30%); Carrathool (1-30%); Cobar (1-30%); Lachlan (1-30%); Narromine (1-30%).

CMAs: Central West (30-70%); Lachlan (1-30%); Western (1-30%).

MD Basin: Yes.

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

Lithology: Basalt; Metamorphic rock (unidentified); Sedimentary rock (unidentified).

Great Soil Group: Brown earth; Yellow podzolic soil.

Soil Texture: Clay loam; Clay loam, sandy; Sandy clay loam; Sandy loam.

Landform Patterns: Low hills; Rises.

Landform Elements: Hillcrest; Hillslope; Plain.

Land Use: Grazing.

Impacts of European Settlement: Medium reduction (30-70%) in extent and/or range.

Pre-European Extent: 45000 ha \pm 30%. Expert estimate not based on any mapped vegetation.

Pre-European Extent Comments: A minor proportion of original extent cleared due to occurrence of grassy understorey.

Current Extent: 30000 ha \pm 30% or 67% \pm 50% of pre-European extent remaining.

Current Extent Comments: (Expert estimate). Possibly about one third of the approximately 60000 ha mapped as map units HIL1 and HIL5 in Lewer et al. Also occurs outside that mapping. Less common than the more shrubby ID184 and ID186 communities as it is restricted to richer soils.

Conservation Reserves: Cocoparra NP 330 (E2).

Reserves Total Area: 330 ha.

No. Representatives in Reserves: 1

Protected Area Explanation: Cocoparra NP estimate from map unit 4a in Whiting (1997). May be in Yathong Nature Reserve but finer scale mapping required.

Secure Property Agreements: None.

Secure PAs Total Area: 0 ha.

No. Representatives in Secure Property Agreements: 0

Protected Current Extent: 1.1% 330 ha \pm %.

No. Representatives in Protected Areas: 1

Protected Pre-European Extent: 0.73% which is inadequately protected across distribution.

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

Key Sites for Protection: Low rises in central NSW with loamy soils. Occurs on the eastern edge of the Cobar Penneplain and western edge of the lower slopes sub-region in the NSW SWS Bioregion including from the Yathong area to near Lake Cowal.

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

Recoverability: Moderate health as structure and/or composition altered. Likely to recover considerably if causal factors and secondary impacts removed.

Variation & Disturbance: *Callitris* normally absent but may be present. This community is distinguished by the dominance of a denser herbaceous ground cover and richer soils than other Dwyer Red Gum communities.

Fire Regime: Unknown. Occasional wildfire may be beneficial for some species.

Adjoining Communities: Grades into similar communities ID184 and ID186 which are shrubbier and contain more *Callitris*. Grades into Poplar Box or Western Grey Box communities down slope on lower slopes and flats.

Threatening Processes: Isolated clearing could affect some areas due to grassy ground cover and reasonable soils. Weeds more prevalent than ID184. Over-grazing by stock and feral animal remains the main long term threat.

Threatening Process List: Clearing for agriculture; Soil erosion, water: sheet erosion; Unsustainable grazing and trampling by stock; Unsustainable grazing by introduced animals.

Threat Category: Near Threatened.

Threat/Protected Area Code: NT/5a

Threat Criteria: 1; 4.

Planning Controls:

Planning and Management: Improve protection in protected areas. Grazing management.

Listed Under Legislation: None.

Recovery Plan: Doesn't exist and not required.

Reference List: (293; 34; 46; 372; 373). 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; 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; Sivertsen, D. & Metcalfe, L. (2001) Northern wheatbelt vegetation mapping. Unpublished 1:250 000 scale vegetation maps and vegetation descriptions covering northern NSW wheatbelt. (NSW National Parks and Wildlife Service: Hurstville); DEC (2006) Reconstructed and extant distribution of native vegetation in the Central West Catchment. Unpublished report (NSW Department of Environment and Conservation: Dubbo); 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 292

Common Name: She oak - Fringe Myrtle heathland on rocky ranges in the NSW South-western Slopes Bioregion

Scientific Name: *Eucalyptus dwyeri* - *Callitris endlicheri* - *Eucalyptus rossii* / *Allocasuarina diminuta* subsp. *diminuta* - *Calytrix tetragona* - *Leucopogon attenuatus* - *Grevillea floribunda* / *Gonocarpus elatus* - *Goodenia hederacea* subsp. *hederacea* - *Austrodanthonia eriantha* - *Pomax umbellata*

Veg. Comm. ID.: 292 **Original Entry:** J.S. Benson 16/02/2006

Photo 1: ID292a_PC248-5.jpg *Allocasuarina diminuta* - *Calytrix tetragona* shrubland on a rocky ridge in Goobang National Park, [AGD66 32°55'41.8"S 148°23'46"E], 04/05/2005, Jaime Plaza.



Photo 2: ID292b_PC183-14.jpg *Allocasuarina diminuta* - *Calytrix tetragona* shrubland, Ingalba Nature Reserve, [AGD66 34°26'56"S 147°25'58"E], 13/10/02, Jaime Plaza.



Photo 3: ID292c_PC171-6.jpg *Calytrix tetragona* - *Allocasuarina diminuta* heath, Nangar Mountain in Nangar National Park, [AGD66 33°25'50"S 148°31'37"E], 10/10/02, Jaime Plaza.



Characteristic Vegetation: (Quantitative Data)

Trees: *Eucalyptus dwyeri*; *Eucalyptus dealbata*; *Callitris endlicheri*; *Eucalyptus rossii*; *Eucalyptus sideroxylon*; *Eucalyptus macrorhyncha*; *Eucalyptus goniocalyx*.

Shrubs/Vines/Epiphytes: *Allocasuarina diminuta* subsp. *diminuta*; *Calytrix tetragona*; *Leucopogon attenuatus*; *Grevillea floribunda*; *Leucopogon virgatus*; *Olax stricta*; *Melaleuca diosmatifolia*; *Brachyloma daphnoides* subsp. *daphnoides*; *Melichrus urceolatus*; *Phyllanthus occidentalis*; *Phyllanthus hirtellus*; *Lissanthe strigosa* subsp. *strigosa*; *Platysace lanceolata*; *Hibbertia riparia*; *Grevillea wiradjuri*; *Xanthorrhoea glauca* subsp. *angustifolia*; *Prostanthera saxicola* var. *bracteolata*; *Leucopogon biflorus*; *Acacia ulicifolia*; *Acacia rubida*; *Styphelia triflora*; *Ozothamnus obcordatus* subsp. *obcordatus*; *Cassinia aculeata*; *Cassinia uncata*; *Philotheca salsolifolia* subsp. *salsolifolia*; *Styphelia triflora*; *Platysace lanceolata*; *Dillwynia sericea*; *Dillwynia acicularis*; *Acacia gladiiformis*; *Acacia lanigera*; *Hakea decurrens* subsp. *decurrens*; *Kunzea* sp. 'Mt Kaputar'.

Ground Cover: *Gonocarpus elatus*; *Goodenia hederacea* subsp. *hederacea*; *Austrodanthonia eriantha*; *Pomax umbellata*; *Stypantra glauca*; *Cheilanthes sieberi* subsp. *sieberi*; *Poa sieberiana* var. *hirtella*; *Drosera peltata*; *Cassytha pubescens*; *Rhytidosporum procumbens*; *Thelymitra ixioides* var. *ixioides*; *Lomandra filiformis* subsp. *coriacea*; *Lomandra filiformis* subsp. *filiformis*; *Laxmannia gracilis*; *Dianella revoluta* var. *revoluta*; *Veronica plebeia*; *Xerochrysum viscosum*; *Astroloma humifusum*; *Lepidosperma laterale*; *Pseudanthus divaricatissimus*; *Triodia scariosa* subsp. *scariosa*; *Bulbine bulbosa*; *Actinotus helianthi*; *Calotis cuneifolia*; *Hypericum gramineum*; *Burchardia umbellata*; *Wahlenbergia stricta* subsp. *stricta*; *Caustis flexuosa*; *Gahnia aspera*; *Hibbertia acicularis*; *Dampiera adpressa*; *Patersonia sericea*; *Diuris goonooensis*; *Microtis parviflora*; *Pterostylis plumosa*; *Dichelachne micrantha*.

Weed Species: *Aira cupaniana*; *Hypochaeris glabra*; *Hypochaeris radicata*; *Vulpia myuros*.

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

Threatened Plants: A number of restricted plant occur in this community..

Threatened Fauna: Not assessed..

Mean Species Richness: 29 +/- 2 (Porteners 2001b in 20 x 20 m plots), 35 +/-6 (Porteners 1997a in 20 x 20 m plots).

Rainforest Structure (Webb): Not applicable.

Structure (WH): Heathland; Open Heath; Woodland.

Height Class (WH): Very Tall; Tall.

Vegetation Description: Very tall dense to sparse dry heathland to 5 m high with emergent low woodland tree overstorey to 10 m high. The dominant tall heath-shrubs are *Allocasuarina diminuta* subsp. *diminuta* (She Oak) with *Calytrix tetragona* (Fringe Myrtle). Many other shrub species are present that vary across the range of the community. These include *Grevillea floribunda*, *Philotheca salsolifolia*, *Brachyloma daphnoides* subsp. *daphnoides*, *Melichrus urceolatus*, *Platysace lanceolata*, *Leucopogon attenuatus*, *Acacia* spp. *Cassinia* spp. and *Melaleuca diosmatifolia*. The main tree species are Dwyer's Red Gum (*Eucalyptus dwyeri*), Tumbledown Red Gum (*Eucalyptus dealbata*), Inland Scribbly Gum (*Eucalyptus rossii*), Mugga Ironbark (*Eucalyptus sideroxylon*) and Red Stringybark (*Eucalyptus macrorhyncha*). Black Cypress Pine (*Callitris endlicheri*) is often present. The ground cover is sparse to very sparse. It contains grasses such as *Austrodanthonia eriantha*, *Poa sieberiana* and *Dichelachne micrantha*. Forbs include *Goodenia hederacea* subsp. *hederacea*, *Pomax umbellata*, *Gonocarpus elatus*, *Laxmannia gracilis*, *Dianella revoluta* var. *revoluta*, *Actinotus helianthi*, *Xerochrysum viscosum* and a range of orchids. The gaminoid *Lomandra filiformis* is common along with the sedge *Lepidosperma laterale*. The vine *Cassytha pubescens* may be present. Occurs on shallow, stony, brown to red-brown sandy loam soils derived from quartzite, sandstone and acid volcanic lithologies on hillcrests of low hills and hills mainly between 300 and 450 m altitude mainly in the central western slopes part of the NSW South-western Slopes Bioregion from near Hervey Range in the north to Temora in the south. This community contains a number of plant species that are restricted in their distribution or at their western limit. Weeds are absent or low in number. Some areas have been cleared but large areas remain in good condition that are sampled in protected areas. Goat grazing may threaten some areas.

Level of Classification: Association.

Classification Confidence Level: High.

Formation Group: Heaths and Shrublands on the Tablelands and Western Slopes of South-eastern Australia.

State Veg Map (Keith 2004): Inland Rocky Hill Woodlands.

State Landscape (Mitchell 2002): Not Assessed.

NVIS Major Veg Sub-Groups: Heath (agreed taxa <2 metres tall).

Forest Type (RN 17): 223 - Heath (P); 183 - Black Cypress Pine-Red Gum (P).

Authority(s): (Quantitative Data). Community 2 in Porteners (2001b) mapped for several reserves in the Temora region. Includes Nangar Mountain Heath community mapped by ERM Mitchell McCotter (1996). Includes community 8 in Goobang National Park (Porteners 1997a). Includes Scrubby She-oak Heaths unit in Mid-Lachlan Regional Vegetation Management Plan (1999). Part of BVT 11 in DEC (2006, 2006a).

Interstate Equivalent(s): None.

Mapped/Modelled: Current extent partly mapped or modelled.

Plot Sampling: Inadequate.

Mapping Info: Porteners (2001b) maps areas in reserves near Temora and a small area is mapped on Mount Nangar by ERM Mitchell McCotter (1996).

Climate Zone: Temperate: no dry season (hot summer).

IBRA Bioregion (v6): NSW South-western Slopes (>70%).

IBRA Sub-Region: Lower Slopes (30-70%); Upper Slopes (30-70%).

Botanical Division: South Western Slopes (SWS) (1-30%); Central Western Slopes (CWS) (30-70%).

Local Govt. Areas: Bland (1-30%); Coolamon (1-30%); Temora (1-30%); Weddin (1-30%); Cabonne (1-30%); Forbes (1-30%); Parkes (1-30%).

CMAs: Lachlan (30-70%); Murrumbidgee (1-30%); Central West (1-30%).

MD Basin: Yes.

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

Lithology: Arkose; Phyllite; Quartz sandstone; Quartzite; Sandstone; Rhyolite.

Great Soil Group: Lithosol.

Soil Texture: Sandy loam.

Landform Patterns: Hills; Low hills.

Landform Elements: Hillcrest; Hillslope.

Land Use: Grazing; Nature Conservation.

Impacts of European Settlement: Medium reduction (30-70%) in extent and/or range.

Pre-European Extent: 8000 ha ±30%. Estimated from pre-European map: part range.

Pre-European Extent Comments: Restricted to rocky siliceous ridges - naturally restricted.

Current Extent: 6000 ha ±30% or 75% ± 50% of pre-European extent remaining.

Current Extent Comments: (Estimated from mapped extant vegetation: part range). Restricted in extent - some areas mapped in reserves.

Conservation Reserves: Big Bush NR 170 (E1); Pucawan NR 30 (E1); Ingalba NR 350 (E1); Nangar NP 36 (E1); Goobang NP 2000 (E2); Conimbla NP 360 (E1); Dananbilla NR 20 (E3); Koorawatha NR 5 (E3); Gungewalla NR 2 (E3).

Reserves Total Area: 2973 ha.

No. Representatives in Reserves: 9

Protected Area Explanation: Big Brush NR, Ingalba NR and Pucawan NR areas from Porteners (2001b) with some alterations to accommodate Green Mallee (ID177) in Big Bush NR and Red Stringybark (ID239) in Pucawan NR. Nangar NP and Conimbla NP areas from Nangar Mountain Heath community and Casuarina communities respectively mapped by ERM Mitchell McCotter (1996). Goobang National Park estimate from community 8 and part mosaics with community 8 mapped in in Porteners (1997a). Dananbilla NR from description in NSW NPWS (undated f). Koorawatha NR from comments in Doherty (2006). Gungewalla NR from S. Jackson (pers. comm.).

Secure Property Agreements: None.

Secure PAs Total Area: 0 ha.

No. Representatives in Secure Property Agreements: 0

Protected Current Extent: 49.55% 2973 ha ± 30%.

No. Representatives in Protected Areas: 9

Protected Pre-European Extent: 37.16% which is adequately 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: Well represented in reserves as of 2007 although drought may impact on its condition.

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

Recoverability: Healthy, structure and composition intact. Insignificant indicators of degradation. Likely to continue in good health if maintained.

Variation & Disturbance: Understorey species vary over range, such as from Temora to Nangar region, and also due to fire and other disturbances. Calytrix tetragona tends to proliferate after clearing while Allocasuarina may senesce over time and become less dominant.

Fire Regime: Unknown but many of the shrub species present would be eliminated with too-frequent fire. Inter-fire periods should be 10-30 years and variable.

Adjoining Communities: Grades into ID217 Mugga Ironbark - Western Grey Box shrubby woodland on lower slopes on clay loam soils and into ID186 Dwyer's Red Gum - Black Cypress Pine on ridges. Grades into various types of ironbark woodlands in the Goobang National Park

Threatening Processes: Frequent fire could eliminate Allocasuarina and other shrub species. Goat grazing could affect regeneration and ground cover. Extended droughts kill key shrub species (Doherty 2006).

Threatening Process List: Inappropriate fire regimes; Soil erosion, water: sheet erosion; Unsustainable grazing and trampling by stock; Unsustainable grazing by introduced animals.

Threat Category: Least Concern.

Threat/Protected Area Code: LC/2b

Threat Criteria: 1; 4; 5.

Planning Controls:

Planning and Management: Maintain appropriate fires regimes and control stock and feral animal grazing pressure.

Listed Under Legislation: None.

Recovery Plan: Doesn't exist and not required.

Reference List: (292; 263; 69; 67; 362; 363; 372; 373). Porteners, M.F. (2001b) Vegetation survey of Ingalba, Big Bush and Pucawan Nature Reserves. Report for NSW National Parks and Wildlife Service: Riverina Region; ERM Mitchell McCotter Pty. Ltd. (1996) Bathurst vegetation survey for NSW National Parks and Wildlife Service: Bathurst District covering Winburndale NR, Nangar NP, Conimbla NP and Weddin Mountains NP. (NSW National Parks and Wildlife Service: Bathurst); Porteners, M.F. (1997a) Vegetation communities of Goobang National Park and adjoining areas. Unpublished report and vegetation map to NSW National Parks and Wildlife Service: Bathurst; Mid-Lachlan Regional Vegetation Committee (1999) Plan Draft Mid-Lachlan Regional Vegetation Management Plan for Public Exhibition. (Mid-Lachlan RVC: Forbes); NSW National Parks and Wildlife Service (undated f) Sandy Creek (Wambanumba) Nature Reserve Proposal (Dananbilla NR). Investigation report (NSWNPWS file M2502); Doherty, M. (2006) Notes on the fire ecology of selected species in Koorawatha and Dananbilla Nature Reserves. Unpublished report to NSW Department of Environment and Conservation, Queanbeyan; DEC (2006) Reconstructed and extant distribution of native vegetation in the Central West Catchment. Unpublished report (NSW Department of Environment and Conservation: Dubbo); 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 317

Common Name: Currawang very tall shrubland on siliceous rocky ridges and cliffs mainly in the NSW South Western Slopes Bioregion

Scientific Name: *Acacia doratoxylon* / *Allocasuarina diminuta* subsp. *diminuta* - *Calytrix tetragona* / *Stuartina muelleri* - *Triptilodiscus pygmaeus* - *Austrodanthonia fulva* - *Cheilanthes sieberi* subsp. *sieberi*

Veg. Comm. ID.: 317 **Original Entry:** J.S. Benson 27/10/2006

Photo 1: ID317a_PC171-2.jpg *Acacia doratoxylon* very tall shrubland on sandstone ridge in Nangar National Park, [AGD66 33°25'30"S 148°31'47"E], 10/10/02, Jaime Plaza.



Photo 2: ID317b_PC178-2.jpg *Acacia doratoxylon* very tall shrubland, Weddin Mountains National Park, [AGD66 33°54'39"S 147°57'13"E], 12/10/02, Jaime Plaza.



Photo 3: ID317c_PC203-13.jpg *Acacia doratoxylon* very tall shrubland in Benambra National Park, [AGD66 35°48'13"S 147°04'28"E], 19/10/02, Jaime Plaza.



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

Trees: *Acacia doratoxylon*; *Eucalyptus dwyeri*; *Eucalyptus macrorhyncha*; *Eucalyptus sideroxylon*; *Eucalyptus fibrosa*.

Shrubs/Vines/Epiphytes: *Allocasuarina diminuta* subsp. *diminuta*; *Calytrix tetragona*.

Ground Cover: *Stuartina muelleri*; *Triptilodiscus pygmaeus*; *Austrodanthonia fulva*; *Cheilanthes sieberi* subsp. *sieberi*; *Gonocarpus elatus*; *Dichopogon strictus*; *Stypandra glauca*; *Geranium solanderi* var. *solanderi*; *Chrysocephalum semipapposum*; *Gonocarpus tetragynus*; *Drosera peltata*; *Oxalis perennans*; *Poranthra microphylla*; *Euchiton sphaericus*; *Daucus glochidiatus*; *Crassula sieberiana* subsp. *sieberiana*; *Microlaena stipoides* var. *stipoides*; *Poa sieberiana*; *Lepidosperma laterale*; *Dianella revoluta* var. *revoluta*; *Drosera peltata*; *Haloragis aspera*.

Weed Species: *Aira elegantissima*; *Anagallis arvensis*; *Briza minor*; *Briza maxima*; *Vulpia bromoides*; *Hypochaeris radicata*; *Petrorhagia nanteuillii*.

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

Threatened Plants: Not assessed.

Threatened Fauna: Painted Honeyeater; Barking Owl; Grey Falcon; Masked Owl; Yellow-bellied Shearwater.

Mean Species Richness: Not assessed.

Rainforest Structure (Webb): Not applicable.

Structure (WH): Shrubland; Open Shrubland.

Height Class (WH): Very Tall.

Vegetation Description: Tall shrubland dominated by Currawang (*Acacia doratoxylon*). Black Cypress Pine (*Callitris endlicheri*), Dwyer's Red Gum (*Eucalyptus dwyeri*) or other *Eucalyptus* species may be present as a sub-dominant canopy species. The shrub layer varies from absent to mid-dense depending on the site and disturbance history with the sheoak *Allocasuarina diminuta* common in some locations along with *Calytrix tetragona*. The ground cover is mainly rock with grasses and forbs or low shrubs growing on skeletal soils over rock flats or in in rock crevasses. Ground cover species include the forbs *Dichopogon strictus*, *Gonocarpus elatus*, *Sypandra glauca*, *Chrysocephalum semipapposum*, *Drosera peltata*, *Oxalis perennans*, *Stuartina muelleri*, *Triptilodiscus pygmaeus*, *Euchiton sphaericus*, *Daucus glochidiatus* and *Crassula sieberiana* subsp. *sieberiana*. Grasses include *Poa sieberiana* and *Austrodanthonia fulva*. The rock fern *Cheilanthes sieberi* subsp. *sieberi* is usually present. Occurs on skeletal, clay loam lithosol soil derived from granite, sandstone, conglomerate or other siliceous substrates on rock flats or steep escarpments often with exposed northern or western aspects in the NSW South-western Slopes Bioregion from the Hervey Range to near Victoria. Often near to or grades into the similar but broadly classified Dwyer's Red Gum - Black Pine - Currawang community (ID186). Not threatened due to landscape position although grazing by goats and frequent fire may damage *Acacia* re-generation.

Level of Classification: Sub-association.

Classification Confidence Level: Medium.

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

State Veg Map (Keith 2004): Inland Rocky Hill Woodlands.

State Landscape (Mitchell 2002): Not Assessed.

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

Forest Type (RN 17): 214 - Wattle (P).

Authority(s): (Combination of Expert Opinion and Quantitative Data). Includes vegetation group 42 in Gellie & Fanning (2004). Probably includes vegetation group 192 in Gellie (2005). Affinity to *Acacia doratoxylon* modelled floristic group 53 in Austin et al. covering mid-Lachlan region. Currawang Shrublands described in Mid-Lachlan Regional Vegetation Management Plan (1999). A sub-association of the widespread ID186 where *Eucalyptus dwyeri* and / or *Callitris endlicheri* dominate the canopy. Some areas listed in ID186 may contain areas of this Currawang community.

Interstate Equivalent(s): May be in Victoria..

Mapped/Modelled: Current extent partly mapped or modelled.

Plot Sampling: Inadequate.

Mapping Info: Mapped in southern range in some reserves but not on private land or over northern range as of 2006. It is possible to map areas dominated by *Acacia doratoxylon* by API but its associated species are similar to ID186.

Climate Zone: Temperate: no dry season (hot summer); Temperate: no dry season (warm summer).

IBRA Bioregion (v6): NSW South-western Slopes (>70%).

IBRA Sub-Region: Upper Slopes (30-70%); Lower Slopes (1-30%).

Botanical Division: South Western Slopes (SWS) (30-70%); Central Western Slopes (CWS) (30-70%).

Local Govt. Areas: Bland (1-30%); Cabonne (1-30%); Cootamundra (1-30%); Cowra (1-30%); Forbes (1-30%); Greater Hume (1-30%); Gundagai (1-30%); Harden (1-30%); Junee (1-30%); Lockhart (1-30%); Orange (1-30%); Parkes (1-30%); Wagga Wagga (1-30%); Weddin (1-30%).

CMAs: Central West (1-30%); Lachlan (1-30%); Murray (1-30%); Murrumbidgee (1-30%).

MD Basin: Yes.

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

Lithology: Conglomerate; Granite; Quartz sandstone; Quartzite; Sandstone.

Great Soil Group: Lithosol.

Soil Texture: Clay loam.

Landform Patterns: Hills; Low hills.

Landform Elements: Cliff; Cliff-foot slope; Hillcrest; Rock flat.

Land Use: Grazing; Nature Conservation.

Impacts of European Settlement: Minor reduction (<30%) in extent and/or range.

Pre-European Extent: 1500 ha \pm 10%. Expert estimate not based on any mapped vegetation.

Pre-European Extent Comments: Restricted to small patches on rocky ridges often among more widespread communities.

Current Extent: 1300 ha \pm 10% or 87% \pm 20% of pre-European extent remaining.

Current Extent Comments: (Expert estimate). Very little is cleared due to topographical position, however, condition has been degraded due to grazing in some locations.

Conservation Reserves: Tabletop NR 31 (M); Livingstone NP 25 (M); Ulandra NR 89 (M); Dananbilla NR 20 (E4); Nangar NP 30 (E3); Weddin Mountains NP 20 (E3); Benambra NP 42 (E2).

Reserves Total Area: 257 ha.

No. Representatives in Reserves: 7

Protected Area Explanation: Livingstone NP, Tabletop NR and Ulandra NR from vegetation group 42 in Gellie & Fanning (2004). Small patches probably occur in a number of other reserves. Dananbilla NR estimate from descriptions in NSW NPWS (undated f). Nangar and Weddin Mountains NPs noted in Benson (1999-2009). Benambra NP from part of group 41 in Gellie & Fanning (2004).

Secure Property Agreements: None.

Secure PAs Total Area: 0 ha.

No. Representatives in Secure Property Agreements: 0

Protected Current Extent: 19.76% 257 ha ± 30%.

No. Representatives in Protected Areas: 7

Protected Pre-European Extent: 17.13% which is adequately protected across distribution.

Restricted in 1750: Code 3b: 15-30% of pre-European extent in protected areas (1,000<area<10,000 ha).

Key Sites for Protection: Reasonably well sampled in reserves as of 2006.

Degree of Fragmentation: Naturally fragmented stands of variable patch sizes with >50% extent remaining.

Recoverability: Moderate health as structure and/or composition altered. Likely to recover considerably if causal factors and secondary impacts removed.

Variation & Disturbance: Some associated species vary across range but *Acacia doratoxylon* is consistently the dominant canopy species.

Fire Regime: Occasionally burnt by wildfire (20-50 years) and the key species *Acacia doratoxylon* may regenerate from such fires as a cohort.

Adjoining Communities: Grades into Black Cypress Pine low forest (ID309) or Dwyer's Gum woodland (ID186). Grades into various box woodlands on slopes below ridges and cliffs.

Threatening Processes: Goat grazing threatens the regeneration of *Acacia* on some ridges and ranges. Too-frequent fire may also impact on shrub species survival.

Threatening Process List: Inappropriate fire regimes; Unsustainable grazing and trampling by stock; Unsustainable grazing by introduced animals.

Threat Category: Least Concern.

Threat/Protected Area Code: LC/3b

Threat Criteria: 1; 4.

Planning Controls:

Planning and Management: Control goats and prevent too-frequent fire but occasional wildlife may be important for regeneration of *Acacia doratoxylon*.

Listed Under Legislation: None.

Recovery Plan: Doesn't exist and not required.

Reference List: (340; 183; 67; 353; 308). Gellie, N. & Fanning, M. (2004) Final report of vegetation ecosystems in new and existing conservation reserves, south west slopes region 2002-2004, version 3. Report to NSW Department of Environment and Conservation: Queanbeyan; Austin, M.P., Cawsey, E.M., Baker, B.L., Yialeoglou, M.M., Grice, D.J. & Briggs, S.V. (2000) Predicted vegetation cover in the central Lachlan region. National Heritage Trust Project AA 1368.97. (CSIRO Division of Wildlife and Ecology: Canberra); Mid-Lachlan Regional Vegetation Committee (1999) Plan Draft Mid-Lachlan Regional Vegetation Management Plan for Public Exhibition. (Mid-Lachlan RVC: Forbes); Gellie, N.J.H. (2005) Native vegetation of the Southern Forests: South-east Highlands, Australian Alps, South-west Slopes and SE Corner bioregions. *Cunninghamia* 9(2): 219-254; Benson, J.S. (1999-2009) Unpublished field note books recording species at various locations in western NSW. (Royal Botanic Gardens and Domain Trust: Sydney).

NSW Vegetation Classification - Vegetation ID

Vegetation Community ID 318

Common Name: Mugga Ironbark -Tumbledown Red Gum - Red Box - Black Cypress Pine open forest on shallow stony soils on hills in the NSW South-western Slopes Bioregion

Scientific Name: *Eucalyptus sideroxylon* - *Eucalyptus dealbata*- *Callitris endlicheri* - *Eucalyptus polyanthemos* subsp. *polyanthemos* - / *Acacia paradoxa* - *Acacia genistifolia* - *Grevillea floribunda* - *Brachyloma daphnoides* subsp. *daphnoides* / *Austrostipa densiflora* - *Stypandra glauca*; *Gonocarpus elatus* - *Chrysocephalum semipapposum*

Veg. Comm. ID.: 318 **Original Entry:** J.S. Benson 6/02/2007

Photo 1: ID318a_PC185-9.jpg *Eucalyptus sideroxylon* - *E.dealbata* woodland on clay soil on hills south of Cootamundra, [AGD66 34°43'20"S 147°54'13"E], 14/10/02, Jaime Plaza.



Photo 2: ID318b_PC196-8.jpg *Eucalyptus sideroxylon* - *E.macrorhyncha* shrubbt woodland on shallow clay soil on the Hume Highway south of Tarcutta, [AGD66 35°25'12"S 147°38'30"E], 17/10/02, Jaime Plaza.



Photo 3: ID318c_PC245-10.jpg *Eucalyptus sideroxylon* - *Eucalyptus dealbata* ridge woodland on ridge along the Manildra - Parkes Road, [AGD66 33°11'33"S 148°29'48.2"E], 03/05/2005, Jaime Plaza.



Characteristic Vegetation: (Qualitative Estimate)

Trees: *Eucalyptus sideroxylon*; *Eucalyptus dealbata*; *Callitris endlicheri*; *Eucalyptus polyanthemos* subsp. *polyanthemos*; *Eucalyptus macrorhyncha*; *Allocasuarina verticillata*; *Eucalyptus albens*.

Shrubs/Vines/Epiphytes: *Acacia genistifolia*; *Grevillea floribunda*; *Lissanthe strigosa* subsp. *strigosa*; *Acacia paradoxa*; *Brachyloma daphnoides* subsp. *daphnoides*; *Phyllanthus hirtellus*; *Daviesia leptophylla*; *Hibbertia riparia*; *Pultenaea foliolosa*; *Pultenaea subspicata*; *Kunzea parvifolia*; *Leucopogon virgatus*; *Grevillea ramosissima* subsp. *ramosissima*; *Xanthorrhoea glauca* subsp. *angustifolia*; *Acacia dealbata*; *Acacia implexa*; *Acacia verniciflua*; *Cassinia aculeata*; *Exocarpos cupressiformis*; *Cassytha pubescens*.

Ground Cover: *Austrostipa densiflora*; *Stypantra glauca*; *Gonocarpus elatus*; *Chrysocephalum semipapposum*; *Poa sieberiana* var. *sieberiana*; *Xerochrysum viscosum*; *Cheilanthes sieberi* subsp. *sieberi*; *Lomandra filiformis* subsp. *coriacea*; *Lomandra multiflora* subsp. *multiflora*; *Joycea pallida*; *Aristida ramosa*; *Austroanthonia fulva*; *Austroanthonia racemosa* var. *racemosa*; *Austrostipa scabra* subsp. *falcata*; *Echinopogon ovatus*; *Goodenia hederacea* subsp. *hederacea*; *Dichopogon strictus*; *Arthropodium minus*; *Senecio prenanthoides*; *Tricoryne elatior*; *Scutellaria humilis*; *Wahlenbergia stricta* subsp. *stricta*; *Senecio bathurstianus*; *Hydrocotyle laxiflora*; *Poranthera microphylla*; *Oxalis chnoodes*; *Lepidosperma laterale*; *Dampiera lanceolata* var. *lanceolata*; *Daucus glochidiatus*; *Geranium retrorsum*; *Euchiton gymnocephalus*; *Euchiton involucratus*; *Galium propinquum*; *Crassula sieberiana* subsp. *sieberiana*; *Juncus remotiflorus*; *Schoenus apogon*; *Cassytha pubescens*; *Hardenbergia violacea*.

Weed Species: *Aira cupaniana*; *Hypochaeris glabra*; *Hypochaeris radicata*; *Briza minor*; *Echium vulgare*; *Petrorhagia nanteuillii*; *Trifolium angustifolium*; *Trifolium campestre*; *Vulpia muralis*.

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

Threatened Plants: Not assessed.

Threatened Fauna: Regent Honeyeater.

Mean Species Richness: Not assessed.

Rainforest Structure (Webb): Not applicable.

Structure (WH): Open Forest.

Height Class (WH): Mid-High; tall.

Vegetation Description: Mid-high to tall open forest dominated by Mugga Ironbark (*Eucalyptus sideroxylon*) with Tumbledown Red Gum (*Eucalyptus dealbata*) with mixtures of Red Box (*Eucalyptus polyanthemos*). Black Cypress Pine (*Callitris endlicheri*) and Red Stringybark (*Eucalyptus macrorhyncha*) may occur along with *Allocasuarina verticillata*. White Box (*Eucalyptus albens*) is present as a sub-dominant at some sites. The shrub layer is mid-dense to sparse depending on fire frequency and grazing impacts. It includes *Acacia paradoxa*, *Lissanthe strigosa* subsp. *strigosa*, *Pultenaea foliolosa*, *Acacia genistifolia*, *Daviesia leptophylla*, *Hibbertia riparia*, *Brachyloma daphnoides* subsp. *daphnoides*, *Kunzea parvifolia*, *Leucopogon virgatus*, *Grevillea floribunda* and *Grevillea ramosissima* subsp. *ramosissima*. The vine *Cassytha pubescens* is often present growing over shrubs. The ground cover is sparse and gravel or rocks may occupy much of it. Grass species include *Austrostipa densiflora*, *Poa sieberiana*, *Joycea pallida*, *Aristida ramosa*, *Austrostipa scabra* subsp. *falcata*, *Austroanthonia pilosa* and *Echinopogon ovatus*. The mat-rushes *Lomandra filiformis* subsp. *coriacea* and *Lomandra multiflora* subsp. *multiflora*, may be present. Forb species include *Stypantra glauca*, *Xerochrysum viscosum*, *Chrysocephalum semipapposum*, *Goodenia hederacea* subsp. *hederacea*, *Dichopogon strictus*, *Gonocarpus elatus*, *Arthropodium minus* and the climber *Hardenbergia violacea*. The rock fern *Cheilanthes sieberi* subsp. *sieberi* may be abundant. Occurs on gravel, yellow to red clays and loams derived from metamorphic or sedimentary rocks on hillcrests and hillslopes in hill a landscape pattern in the Upper Slopes sub-region of the NSW South-western Slopes Bioregion from Tarcutta northwards. Mostly cleared with some patches remaining on hills and along roads.

Level of Classification: Association.

Classification Confidence Level: Medium.

Formation Group: *Eucalyptus* Ironbark Woodlands and Forests of the Inland Slopes, Plains and Penneplains.

State Veg Map (Keith 2004): Inland Rocky Hill Woodlands.

State Landscape (Mitchell 2002): Not Assessed.

NVIS Major Veg Sub-Groups: *Eucalyptus* forests with a shrubby understorey.

Forest Type (RN 17): 205 - Ironbark-Red Gum (P).

Authority(s): (Expert Opinion). Described by Moore (1953a). Includes community 2.2.9 In Wagga Wagga Shire Priday (2004) and Biolandscapes WagM53d in Priday (2006). Community 50 in Austin et al. (2001). Probably part of BVT 14 in DEC (2006, 2006a). Species noted in Benson (1999-2009).

Interstate Equivalent(s): Victoria: some similarities to Box-Ironbark Forest EVC 61.

Mapped/Modelled: Current extent partly mapped or modelled.

Plot Sampling: Inadequate.

Mapping Info: Priday (2004) maps part of this community as Yabtree open forest in the Wagga Wagga LGA and Wag M53d in Priday (2006). Poorly plot sampled as of 2006.

Climate Zone: Temperate: no dry season (hot summer); Temperate: no dry season (warm summer).

IBRA Bioregion (v6): NSW South-western Slopes (>70%).

IBRA Sub-Region: Upper Slopes (>70%); Lower Slopes (1-30%).

Botanical Division: Central Western Slopes (CWS) (30-70%); South Western Slopes (SWS) (30-70%).

Local Govt. Areas: Wagga Wagga (1-30%); Junee (1-30%); Gundagai (1-30%); Tumut (1-30%).

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

MD Basin: Yes.

Substrate Mass: Metamorphic rocks; Sedimentary rocks.

Lithology: Phyllite; Shale; Siltstone.

Great Soil Group: Red earth; Red podzolic soil.

Soil Texture: Clay loam; Light clay.

Landform Patterns: Hills.

Landform Elements: Hillcrest; Hillslope.

Land Use: Grazing.

Impacts of European Settlement: Medium reduction (30-70%) in extent and/or range.

Pre-European Extent: 30000 ha ±50%. Expert estimate not based on any mapped vegetation.

Pre-European Extent Comments: Restricted to stony rises and hills mainly in the upper slopes sub-region of the NSW South-western Slopes Bioregion.

Current Extent: 12000 ha ±50% or 40% ± 70% of pre-European extent remaining.

Current Extent Comments: (Expert estimate). Partly cleared for grazing. Some areas remain in good condition.

Conservation Reserves: None.

Reserves Total Area: 0 ha.

No. Representatives in Reserves: 0

Protected Area Explanation: TA9801 from notes in DNR database. May be wrong.

Secure Property Agreements: TA9801 PA 116 (E2).

Secure PAs Total Area: 116 ha.

No. Representatives in Secure Property Agreements: 1

Protected Current Extent: 0.96% 116 ha ± %.

No. Representatives in Protected Areas: 1

Protected Pre-European Extent: 0.38% 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: Requires investigation but remnants occur in the Tarcutta region and to the north including along the Hume highway and along Mundarlow Road.

Degree of Fragmentation: Human induced fragmented stands with <60% >30% extent remaining and moderate edge to area ratio.

Recoverability: Moderate health as structure and/or composition altered. Likely to recover considerably if causal factors and secondary impacts removed.

Variation & Disturbance: Understorey species composition varies from south the north with some species occurring throughout. Mugga Ironbark may occur without Tumbledown Red Gum in transitional zones on footslopes. Red Stringybark (*Eucalyptus macrorhyncha*) tends to occur on sheltered sites. The shrub layer varies in density and composition depending on grazing and burning history. Species such as *Acacia vestita* may dominate some sites but be absent from others.

Fire Regime: Unknown but many of the shrub species present would not survive too frequent burning.

Adjoining Communities: Grades into Red Stringybark and Blakely's Red Gum communities on ridges and into grassy Blakely's Red Gum and White Box or Western Grey Box woodlands on richer soils on gentle slopes on richer soils. Similar to ID332 on the central western slopes to the north that tends to be dominated by *Eucalyptus dealbata* and *Eucalyptus macrorhyncha* with less *Eucalyptus sideroxylon* and similar to ID289 that occurs on ridges in the southern-most part of the NSW SW Slopes Bioregion

Threatening Processes: Mostly cleared for grazing with some remnants on stony ridges and along roadsides. Other threats include firewood collecting and logging. It is poorly represented in reserves as of 2007.

Threatening Process List: Clearing for agriculture; Clearing on small lots (hobby farms); Firewood collection; Forestry activities including logging; Unsustainable grazing and trampling by stock.

Threat Category: Vulnerable.

Threat/Protected Area Code: V/4a

Threat Criteria: 1; 4.

Planning Controls:

Planning and Management: Sample areas in protected areas, prevent further clearing and over-collection of firewood. Avoid frequent burning.

Listed Under Legislation: None.

Recovery Plan: Doesn't exist and not required.

Reference List: (308; 166; 316; 183; 356; 372; 373). Benson, J.S. (1999-2006) Unpublished field note books recording species at various locations in western NSW. (Royal Botanic Gardens and Domain Trust: Sydney); Moore, C.W.E. (1953a) The vegetation of the south-eastern Riverina, New South Wales 1: the climax communities. *Aust. J. Botany* 1: 485-547; Priday, S. (2004) The native vegetation and threatened species of the City of Wagga Wagga. Unpublished report. (NSW National Parks and Wildlife Service, Southern Region: Queanbeyan); Austin, M.P., Cawsey, E.M., Baker, B.L., Yialeloglou, M.M., Grice, D.J. & Briggs, S.V. (2000) Predicted vegetation cover in the central Lachlan region. National Heritage Trust Project AA 1368.97. (CSIRO Division of Wildlife and Ecology: Canberra); Priday, S. (in prep. 2006) The native vegetation of the New South Wales South Western Slopes Bioregion (Lachlan, Murrumbidgee and Murray Catchments). Unpublished report to DEC Southern Office Queanbeyan; DEC (2006) Reconstructed and extant distribution of native vegetation in the Central West Catchment. Unpublished report (NSW Department of Environment and Conservation: Dubbo); 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 319

Common Name: Tumbledown Red Gum - White Cypress Pine hill woodland in the southern part of the NSW South-western Slopes Bioregion

Scientific Name: *Eucalyptus dealbata* - *Callitris glaucophylla* - *Eucalyptus macrorhyncha* / *Acacia buxifolia* subsp. *buxifolia* - *Melichrus urceolatus* - *Brachyloma daphnoides* subsp. *daphnoides* / *Aristida ramosa* - *Austrodanthonia eriantha* - *Dianella revoluta* var. *revoluta* - *Stypantra glauca*

Veg. Comm. ID.: 319 **Original Entry:** J.S. Benson 8/11/2006

No Photo Available

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

Trees: *Eucalyptus dealbata*; *Callitris glaucophylla*; *Eucalyptus macrorhyncha*; *Callitris endlicheri*; *Eucalyptus albens*; *Acacia doratoxylon*.

Shrubs/Vines/Epiphytes: *Acacia buxifolia* subsp. *buxifolia*; *Melichrus urceolatus*; *Brachyloma daphnoides* subsp. *daphnoides*; *Acacia dealbata*; *Daviesia leptophylla*; *Acacia pycnantha*; *Dillwynia sericea*.

Ground Cover: *Aristida ramosa*; *Dianella revoluta* var. *revoluta*; *Stypantra glauca*; *Gonocarpus elatus*; *Austrodanthonia eriantha*; *Austrodanthonia racemosa* var. *racemosa*; *Joycea pallida*; *Acrotriche serrulata*; *Pimelea curviflora* var. *curviflora*; *Asperula conferta*; *Chrysocephalum apiculatum*; *Goodenia hederacea* subsp. *hederacea*; *Gonocarpus tetragynus*; *Hardenbergia violacea*; *Hydrocotyle laxiflora*; *Hypericum gramineum*; *Lomandra filiformis* subsp. *coriacea*; *Lomandra multiflora* subsp. *multiflora*; *Microlaena stipoides* var. *stipoides*; *Microseris lanceolata*; *Poa sieberiana*; *Themeda australis*; *Cheilanthes sieberi* subsp. *sieberi*; *Xerochrysum viscosum*; *Aristida jerichoensis* var. *subspinulifera*; *Austrostipa scabra* subsp. *Falcata*.

Weed Species: Not data.

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

Threatened Plants: Not assessed.

Threatened Fauna: Not assessed.

Mean Species Richness: Not assessed.

Rainforest Structure (Webb): Not applicable.

Structure (WH): Open Forest; Woodland.

Height Class (WH): Mid-High; Tall.

Vegetation Description: Mid-high to tall open forest or woodland dominated by Tumbledown Red Gum (*Eucalyptus dealbata*) with White Cypress Pine (*Callitris glaucophylla*) with Red Stringybark (*Eucalyptus macrorhyncha*) common on sheltered slopes. Black Cypress Pine (*Callitris endlicheri*) and Currawang (*Acacia doratoxylon*) may occur on stony sites. The shrub layer is sparse and includes *Acacia buxifolia* subsp. *buxifolia*, *Acacia pycnantha*, *Melichrus urceolatus*, *Brachyloma daphnoides* subsp. *daphnoides* and *Daviesia leptophylla*. Low shrubs such as *Acrotriche serrulata* and *Pimelea curviflora* var. *curviflora* may be present. The ground cover is sparse and may contain some stony soils or rock outcrops. It includes grasses such as *Aristida ramosa*, *Austrodanthonia racemosa* var. *racemosa*, *Joycea pallida*, *Poa sieberiana* and *Themeda australis*. The graminoid *Lomandra filiformis* subsp. *coriacea* is common. Forbs include *Asperula conferta*, *Chrysocephalum apiculatum*, *Dianella revoluta* var. *revoluta*, *Goodenia hederacea* subsp. *hederacea*, *Gonocarpus tetragynus*, *Hydrocotyle laxiflora* and *Hypericum gramineum*. The climber *Hardenbergia violacea* is often present. Occurs on shallow loamy grey clay soils derived from granite or sedimentary rocks on slopes and low ridges in low hill or hill landscape patterns in the southern part of the NSW South-western Slopes Bioregion including on granite hills south of Wagga Wagga. Extensively cleared and some sites are threatened by over-grazing and weed invasion.

Level of Classification: Association.

Classification Confidence Level: Low.

Formation Group: *Eucalyptus* Woodlands on Rocky Hills of the Inland.

State Veg Map (Keith 2004): Inland Rocky Hill Woodlands.

State Landscape (Mitchell 2002): Not Assessed.

NVIS Major Veg Sub-Groups: *Eucalyptus* forests with a grassy understorey.

Forest Type (RN 17): 195 - White Cypress Pine-Hillside Red Gum (E).

Authority(s): (Combination of Expert Opinion and Quantitative Data). Described as the *Eucalyptus dealbata* - "*Callitris glauca*" association in Moore (1953a). Map unit 2.2.16 and perhaps most of map unit 2.2.17 for Wagga Wagga City mapped by Priday (2004). Includes Biolandscape SouV53 in Priday (in prep. 2006). May be similar to floristic group 25 in Austin et al.(2000).

Interstate Equivalent(s): None.

Mapped/Modelled: Current extent partly mapped or modelled.

Mapping Info: Mapped in Wagga Wagga City by Priday (2004) and Priday (2006) but not mapped elsewhere as of 2007.

Climate Zone: Temperate: no dry season (hot summer).

IBRA Bioregion (v6): NSW South-western Slopes (>70%).

IBRA Sub-Region: Lower Slopes (1-30%); Upper Slopes (>70%).

Botanical Division: South Western Slopes (SWS) (30-70%); Central Western Slopes (CWS) (30-70%).

Local Govt. Areas: Wagga Wagga (1-30%); Lockhart (1-30%); Greater Hume (1-30%).

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

MD Basin: Yes.

Substrate Mass: Plutonic rocks; Sedimentary rocks.

Lithology: Granite; Sandstone; Siltstone.

Great Soil Group: Grey-brown podzolic soil; Solodic soil.

Soil Texture: Clay loam.

Landform Patterns: Hills; Low hills.

Landform Elements: Hillcrest; Hillslope.

Land Use: Grazing.

Impacts of European Settlement: Medium reduction (30-70%) in extent and/or range.

Pre-European Extent: 20000 ha \pm 50%. Estimated from extant vegetation maps: part range.

Pre-European Extent Comments: Estimate only.

Current Extent: 8000 ha \pm 50% or 40% \pm 70% of pre-European extent remaining.

Current Extent Comments: (Estimated from mapped extant vegetation: part range). Mostly cleared.

Conservation Reserves: None.

Reserves Total Area: 0 ha.

No. Representatives in Reserves: 0

Protected Area Explanation:

Secure Property Agreements: None.

Secure PAs Total Area: 0 ha.

No. Representatives in Secure Property Agreements: 0

Protected Current Extent: Not known to be protected.

No. Representatives in Protected Areas: 0

Protected Pre-European Extent: 0% which is inadequately protected across distribution.

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

Key Sites for Protection: Mount Flackney Range, including Plum Pudding Hill, south of Wagga Wagga. Possibly on Mount Galore near Lockhart.

Degree of Fragmentation: Human induced fragmented stands with <60% >30% extent remaining and moderate 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: Red Stringybark occurs in protected sites. Shrubs are more common where fire is less frequent such as among rocky outcrops. Some areas contain a mainly herbaceous ground cover.

Fire Regime: Unknown. Now rare due to fragmented remnants.

Adjoining Communities: Grades downslope into a range of box woodlands including those dominated by Blakely's Red Gum and White Box. Grade into Mugga Ironbark - Tumbledown Red Gum forest (ID318) and into Dwyer's Red Gum - Black Cypress Pine (ID186) on rocky ridges. Has some affiliation to a northern Tumbledown - Black Cypress Pine community (ID332) on ranges in the Cowra region.

Threatening Processes: Although this community occurs on hills it has mainly been cleared over its range and weeds dominate some sites, it is therefore threatened.

Threatening Process List: Clearing for agriculture; Firewood collection; Soil erosion, water: sheet erosion; Unsustainable grazing and trampling by stock; Unsustainable grazing by introduced animals; Weed (exotic) invasion.

Threat Category: Vulnerable.

Threat/Protected Area Code: V/5a

Threat Criteria: 1; 4.

Planning Controls:

Planning and Management: Some areas should be protected in reserves or under secure property agreements. Re-vegetation schemes required to facilitate regrowth of stands on private land.

Listed Under Legislation: None.

Recovery Plan: Doesn't exist and not required.

Reference List: (166; 316; 356; 183). Moore, C.W.E. (1953a) The vegetation of the south-eastern Riverina, New South Wales 1: the climax communities. Aust. J. Botany 1: 485-547; Priday, S. (2004) The native vegetation and threatened species of the City of Wagga Wagga. Unpublished report. (NSW National Parks and Wildlife Service, Southern Region: Queanbeyan); Priday, S. (in prep. 2006) The native vegetation of the New South Wales South-western Slopes Bioregion (Lachlan, Murrumbidgee and Murray Catchments). Unpublished report to DEC Southern Office Queanbeyan; Austin, M.P., Cawsey, E.M., Baker, B.L., Yialeloglou, M.M., Grice, D.J. & Briggs, S.V. (2000) Predicted vegetation cover in the central Lachlan region. National Heritage Trust Project AA 1368.97. (CSIRO Division of Wildlife and Ecology: Canberra).

NSW Vegetation Classification - Vegetation ID

Vegetation Community ID 634

Common Name: White Cypress Pine low woodland on hills in the Griffith region of the eastern Riverina Bioregion

Scientific Name: *Callitris glaucophylla*

Veg. Comm. ID.: 634 **Original Entry:** J.S. Benson 26/11/2011

No Photo Available

Characteristic Vegetation: (Qualitative Estimate)

Trees: *Callitris glaucophylla*.

Shrubs/Vines/Epiphytes: .

Ground Cover: .

Weed Species: .

Weediness: .

Threatened Plants: .

Threatened Fauna: .

Mean Species Richness: Not assessed.

Rainforest Structure (Webb): Not applicable.

Structure (WH): Open Woodland; Woodland.

Height Class (WH): Mid-High.

Vegetation Description: Mid-high to low open woodland to woodland dominated by *Callitris glaucophylla* (White Cypress Pine) that often occur in monospecific stands. Shrubs are very sparse and include xxxx. The ground cover is sparse and includes xxxx. Occurs on shallow sandy loam soils derived from sedimentary substrates on hillcrests and upper hillslopes on hills in the Griffith-Leeton area in the eastern Riverina and western NSW South Western Slopes Bioregions. Probably a sub-type dominated by White Cypress Pine derived from original Dwyers Red gum - White Cypress Pine woodland (ID185). It is possible that frequent fire has eliminated *Eucalyptus* with regrowth of dense patches of White Cypress Pine on hills. Different from ID28 White Cypress Pine woodland that occurs on alluvial sandy rises in the Riverina.

Level of Classification: Sub-association.

Classification Confidence Level: Low.

Formation Group: Cypress Pine (*Callitris*) Woodlands Mainly of the Inland.

State Veg Map (Keith 2004): Inland Rocky Hill Woodlands.

State Landscape (Mitchell 2002): Not Assessed.

NVIS Major Veg Sub-Groups: *Callitris* forests and woodlands.

Forest Type (RN 17): 195 - White Cypress Pine-Hillside Red Gum (P).

Authority(s): (Expert Opinion). To be completed with more data. Needs sampling, species list and abiotic description. Based on feedback from DECCW South ADS-40 mapping team from the Griffith region.

Interstate Equivalent(s): None.

Mapped/Modelled: Current extent partly mapped or modelled.

Mapping Info: Mapped around Griffith as part of ADS-40 mapping program in Murrumbidgee CMA. Distinct photo pattern. Needs plot sampling and improved description.

Climate Zone: Temperate: no dry season (hot summer).

IBRA Bioregion (v6): NSW South-western Slopes (1-30%); Riverina (>70%).

IBRA Sub-Region: Murrumbidgee (>70%); Lower Slopes (1-30%).

Botanical Division: South Western Plains (SWP) (>70%).

Local Govt. Areas: Griffith (30-70%); Leeton (30-70%); Murrumbidgee (1-30%).

CMAs: Murrumbidgee (>70%).

MD Basin: Yes.

Substrate Mass: Sedimentary rocks.

Lithology: Sandstone.

Great Soil Group: Lithosol.

Soil Texture: Loamy sand.

Landform Patterns: Low hills.

Landform Elements: Hillcrest; Hillslope.

Land Use: Grazing.

Impacts of European Settlement: Increased extent/range; Major alteration of species composition.

Pre-European Extent: 50 ha \pm 90%. Expert estimate not based on any mapped vegetation.

Pre-European Extent Comments: Notional estimate only.

Current Extent: 500 ha \pm 30% or 1000% \pm \pm 90% of pre-European extent remaining.

Current Extent Comments: (Estimated from mapped extant vegetation: part range). Possibly a derived community from ID185 so may have increased extent.

Conservation Reserves: None.

Reserves Total Area: 0 ha.

No. Representatives in Reserves: 0

Protected Area Explanation:

Secure Property Agreements: None.

Secure PAs Total Area: 0 ha.

No. Representatives in Secure Property Agreements: 0

Protected Current Extent: Not known to be protected.

No. Representatives in Protected Areas: 0

Protected Pre-European Extent: 0% which is inadequately protected across distribution.

Rare in 1750: Code 5c: <15% of pre-European extent in protected areas (<1,000 ha).

Key Sites for Protection: Hills south east of the town of Griffith in the eastern Riverina Bioregion.

Degree of Fragmentation: Naturally fragmented stands of variable patch sizes with >50% extent remaining.

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: Lillie to be a derived community due to severe disturbance including frequent fire.

Fire Regime: Landholders apply low intensity burns to some hills and this may have eliminated *Eucalyptus dwyeri* over time leaving a regrowth *Callitris* plant community.

Adjoining Communities: Grades into ID185 where *Eucalyptus dwyeri* and *Acacia doratoxylon* are more abundant.

Threatening Processes: Mainly cleared on hills around Griffith and Leeton for stock grazing with frequent burning hills. Regrowth of White Cypress Pine may have occurred due to past land use practices. Some small scale mining on hills.

Threatening Process List: Age class of woody vegetation; Clearing for agriculture; Firewood collection; Forestry activities including logging; Inappropriate fire regimes; Mining or quarrying; Recreation over-use; Road construction; Soil erosion, water: sheet erosion; Soil erosion, wind; Unsustainable grazing and trampling by stock.

Threat Category: Near Threatened.

Threat/Protected Area Code: NT/5c

Threat Criteria: 1; 4; 2.

Planning Controls:

Planning and Management: Manage fire frequency to allow regrowth of a range of native species including species of *Eucalyptus*.

Listed Under Legislation: None.

Recovery Plan: Doesn't exist and not required.

Reference List: No references.

NSW Vegetation Classification - Vegetation ID

Vegetation Community ID 55

Common Name: Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions

Scientific Name: *Casuarina cristata* / *Geijera parviflora* - *Alectryon oleifolius* subsp. *canescens* - *Eremophila mitchellii* - *Capparis mitchellii* / *Einadia nutans* subsp. *nutans* - *Enchylaena tomentosa* - *Monachather paradoxus* - *Sclerolaena birchii*

Veg. Comm. ID.: 55 **Original Entry:** John Benson 31/12/2005

Photo 1: ID55a_SWS0507326.jpg Belah (*Casuarina cristata*) woodland between Wyalong and Barmedman in the NSW central-south wheatbelt, [AGD66 33°57.985"S 147°20.255"E], 31/5/2007, Jaime Plaza.



Photo 2: ID55b_BBSMAY09_0071.jpg Belah (*Casuarina cristata*) open forest remnant on basalt soils on the Liverpool Plains, [AGD66 31°0'47.8"S, 149°57'58.7"E], 6/5/09, Jaime Plaza.



Photo 3: ID55c_BBS MAY 2008 1092.jpg Belah - Wilga woodland on a brown clay loam flat, Squires Lane, Pilliga National Park [AGD66 30°30'51"S 148°59'49.3"E], 06/05/08, Jaime Plaza.



Characteristic Vegetation: (Quantitative Data)

Trees: *Casuarina cristata*; *Eucalyptus populnea* subsp. *bimbil*; *Eucalyptus largiflorens*; *Eucalyptus coolabah* subsp. *coolabah*; *Eucalyptus microcarpa*; *Acacia pendula*; *Atalaya hemiglauca*.

Shrubs/Vines/Epiphytes: *Geijera parviflora*; *Alectryon oleifolius* subsp. *canescens*; *Eremophila mitchellii*; *Capparis mitchellii*; *Apophyllum anomalum*; *Acacia oswaldii*; *Myoporum montanum*; *Senna form taxon 'filifolia'*; *Rhagodia spinescens*; *Maireana enchylaenoides*; *Alectryon oleifolius* subsp. *elongatus*; *Pimelea microcephala* subsp. *microcephala*; *Eremophila longifolia*; *Eremophila maculata*; *Eremophila deserti*; *Muehlenbeckia florulenta*; *Exocarpos aphyllus*; *Parsonsia eucalyptophylla*; *Amyema linophyllum* subsp. *orientale*; *Senna form taxon 'zygophylla'*; *Solanum parvifolium*; *Santalum acuminatum*.

Ground Cover: *Einadia nutans* subsp. *linifolia*; *Enchylaena tomentosa*; *Sclerolaena birchii*; *Sclerolaena muricata*; *Enteropogon acicularis*; *Chloris truncata*; *Atriplex leptocarpa*; *Oxalis chnoodes*; *Monachather paradoxus*; *Abutilon oxycarpum* var. *subsagittatum*; *Austrostipa scabra* subsp. *scabra*; *Austrostipa aristiglumis*; *Boerhavia dominii*; *Paspalidium constrictum*; *Leptochloa divaricatissima*; *Dichanthium sericeum* subsp. *sericeum*; *Vittadinia cuneata*; *Zygophyllum apiculatum*; *Sida trichopoda*; *Sclerolaena divaricata*; *Chenopodium desertorum* subsp. *desertorum*; *Atriplex semibaccata*; *Sporobolus caroli*; *Austrodanthonia fulva*; *Austrodanthonia setacea*; *Marsilea hirsuta*; *Marsilea drummondii*; *Sida corrugata*; *Sida trichopoda*; *Boerhavia dominii*; *Juncus radula*; *Walwhalleya prolata*; *Carex inversa*; *Convolvulus erubescens*; *Alternanthera denticulata*; *Glycine tabacina*; *Juncus radula*; *Panicum simile*; *Wahlenbergia fluminalis*; *Eleocharis pallens*; *Eleocharis pusilla*; *Dichondra repens*; *Sclerolaena calcarata*; *Plectranthus parviflorus*; *Paspalidium caespitosum*.

Weed Species: *Lycium ferocissimum*; *Rapistrum rugosum*; *Lolium rigidum*; *Medicago polymorpha*; *Medicago truncatula*; *Pavonia hastata*; *Sonchus oleraceus*; *Marrubium vulgare*; *Carthamus lanatus*; *Sisymbrium irio*; *Bromus molliformis*; *Conyza bonariensis*; *Opuntia stricta* var. *stricta*.

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

Threatened Plants: None recorded.

Threatened Fauna: Five-clawed Worm-skink; Kultarr; Australian Bustard; Bush Stone-curlew; Major Mitchell's Cockatoo; Red-tailed Black-Cockatoo; Glossy Black-Cockatoo; Pied Honeyeater; Little Pied Bat; Grey Falcon; Square-tailed Kite; Hooded Robin (south-eastern form); Black-chinned Honeyeater (eastern subspecies); Barking Owl; Eastern Long-eared Bat (south eastern form); Grey-crowned Babbler (eastern subspecies); Grey-crowned Babbler (eastern subspecies); Redthroat; Yellow-bellied Sheathtail-bat; Stripe-faced Dunnart; Diamond Firetail; Masked Owl.

Mean Species Richness: 38±3 (floristic Group 20 in Lewer et al. 2003 in 20 x 20 m plots).

Rainforest Structure (Webb): Not applicable.

Structure (WH): Woodland; Open Woodland; Isolated Trees; Open Forest.

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

Vegetation Description: Tall woodland of about 12 m high, dominated by Belah (*Casuarina cristata*). Other tree species include Black Box (*Eucalyptus largiflorens*) and Coolabah (*Eucalyptus coolabah*) in depressions and on higher ground Western Grey Box (*Eucalyptus microcarpa*) and Poplar Box (*Eucalyptus populnea* subsp. *bimbil*). Weeping Myall (*Acacia pendula*) may be present as an associate but not as a dominant species. Tall shrubs include Wilga (*Geijera parviflora*), Western Rosewood (*Alectryon oleifolius*), Budda (*Eremophila mitchellii*), Warrior Bush (*Apophyllum anomalum*), Wild Orange (*Capparis mitchellii*) and Supplejack (*Ventilago viminalis*). Shrubs include Western Boobialla (*Myoporum montanum*), Thorny Rhagodia (*Rhagodia spinescens*), Maireana *enchylaenoides*, Spotted Fuchsia Bush (*Eremophila maculata*) and *Eremophila deserti*. Lignum (*Muehlenbeckia florulenta*) may be present in frequently flooded areas. Ground cover includes the low shrubs such as Ruby Saltbush (*Enchylaena tomentosa*), many species of copperburrs including Galvanized Burr (*Sclerolaena birchii*), *Sclerolaena divaricata*, grasses such as Curly Windmill Grass (*Enteropogon acicularis*), wallaby grasses including *Monachather paradoxus* and *Austrodanthonia setacea*, *Austrostipa scabra*, *Austrodanthonia fulva*, *Austrostipa aristiglumis*, *Austrostipa verticillata*, *Aristida leptopoda*, *Paspalidium gracile*, *Sporobolus caroli* and *Panicum queenslandicum*. Forbs include *Einadia nutans*, *Oxalis chnoodes*, *Vittadinia cuneata*, *Boerhavia dominii*, *Goodenia fascicularis* and *Solanum esuriale*. Sedges such as *Eleocharis pallens*, rushes such as *Juncus radula* and Nardoo (*Marsilea drummondii*) occur in depressions. Common weed species include *Rapistrum rugosum*, *Carthamus lanatus* and *Medicago polymorpha*. Occurs on alluvial brown or grey clay soils that may be gilgaied on floodplains and alluvial plains and on black loam soils derived from basalt. Often lines intermittent drainage lines or on flats. Distributed in the northern and central wheatbelt of NSW mainly in the Darling Riverine Plains and Brigalow Belt South Bioregions but extending south into the NSW South-western Slopes Bioregion. Mostly cleared and an endangered community.

Level of Classification: Sub-formation.

Classification Confidence Level: High.

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

State Veg Map (Keith 2004): North-west Floodplain Woodlands.

State Landscape (Mitchell 2002): Not Assessed.

NVIS Major Veg Sub-Groups: *Casuarina* and *Allocasuarina* forests and woodlands.

Forest Type (RN 17): 212 - Belah (P).

Authority(s): (Quantitative Data). Community P8, part of map unit P7 in Sivertsen & Metcalfe (1995, 2001) and Bedward et al. (2001). Map unit FLP2 in Lewer et al. (2003). Map unit BVT30 in Kerr et al. (2003). Part of floristic group 16, part of map unit 4a in Cannon et al. (2002). Part of Belah unit in Peasley (2000). Eastern Belah stands in NFPC (2004). Gwydir watercourse Belah in McCoster (2000). Map unit N02 - N02d Moree Plains Shire in Peasley (2001). Probably community 22 in Austin et al. (2000). Probably Floristic Groups 195 & 196 in RACAC (2004). C4 in Hunter (2000c). Map unit ALP3 in Ismay et al. (2004).

Interstate Equivalent(s): Queensland: similar to regional ecosystems 6.4.2 or 6.4.3 in Mulga Lands Bioregion and 11.3.28 in BBS Bioregion (Sattler & Williams (1999).

Mapped/Modelled: Current extent partly mapped or modelled.

Plot Sampling: Adequate.

Mapping Info: P7 in Sivertsen & Metcalfe (2001), mapped by Peasley (2000) in east Walgett Shire and Peasley (2001) for Moree Plains Shire. Pre-European mapped for Moree Plains in White (2002). Mapped in central NSW FLP2 in Lewer et al. (2003) and for Bellata and Biniguy areas by Cannon et al. (2002).

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

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

IBRA Sub-Region: Bogan-Macquarie (1-30%); Canbelego Downs (1-30%); Castlereagh-Barwon (1-30%); Northern Outwash (1-30%); Pilliga sub (1-30%); Pilliga Outwash (1-30%); Lower Slopes (1-30%); Liverpool Plains (1-30%).

Botanical Division: North Western Plains (NWP) (30-70%); North Western Slopes (NWS) (1-30%); Central Western Slopes (CWS) (1-30%).

Local Govt. Areas: Bogan (1-30%); Brewarrina (1-30%); Dubbo (1-30%); Gilgandra (1-30%); Liverpool Plains (1-30%); Moree Plains (1-30%); Narrabri (1-30%); Narromine (1-30%); Walgett (1-30%); Warren (1-30%); Warrumbungle (1-30%); Lachlan (1-30%); Parkes (1-30%).

CMAs: Border Rivers-Gwydir (1-30%); Central West (1-30%); Namoi (1-30%); Western (1-30%); Lachlan (1-30%).

MD Basin: Yes.

Substrate Mass: Alluvium; Volcanic rocks.

Lithology: Alluvial loams and clays; basalt.

Great Soil Group: Brown earth; Brown clay; Chocolate soil; Grey clay.

Soil Texture: Clay loam; Clay loam, sandy; Medium clay.

Landform Patterns: Alluvial plain; Flood plain; Plain; Stagnant alluvial plain.

Landform Elements: Drainage depression; Hillslope; Plain.

Land Use: Cropping and Horticulture; Grazing.

Impacts of European Settlement: Major reduction (>70%) in extent and/or range.

Pre-European Extent: 350000 ha \pm 30%. Estimated from extant vegetation maps: part range.

Pre-European Extent Comments: 171800 ha is mapped as the pre-European extent of Belah in Moree Plains Shire by White (2002a) and 111700 ha for the Castlereagh Macquarie region (Kerr et al. 2003).

Current Extent: 60000 ha \pm 30% or 17% \pm 50% of pre-European extent remaining.

Current Extent Comments: (Estimated from mapped extant vegetation: part range). 24000 ha mapped as P8 by Sivertsen & Metcalfe (2001) and 14000 ha in Sivertsen. 67,000 ha modelled as FGs 195 and 196 in RACAC (2004). Peasley (2001) maps 40000 ha in N02 map units in Moree Plains Shire. Cannon et al. (2002) map 9200 ha in the Bellata and Biniguy regions east of Moree. McCosker maps 1225 ha on Gwydir Watercourse. 620 ha is mapped in Pilliga forests (Lindsay 1967). Kerr et al. (2003) consider that only 9% (10500) remain in the Castlereagh-Macquarie region of central NSW. 350 ha mapped on Liverpool Plains (Ismay et al.2004). Austin et al. (2000) estimate only 900 ha (6%) remains in the central Lachlan region at the southern edge of its distribution.

Conservation Reserves: Boronga NR 20 (E2); Budelah NR 1 (M); Careunga NR 395 (M); Kirramingly NR 5 (E2); Macquarie Marshes NR 30 (M); Wilbertroy FR 6 (M); Boomi NR 20 (E2); Boomi West NR 15 (E2); Brigalow SCA 50 (E2); Pilliga West CCAZ1 62 (E1); Pilliga CCAZ3 73 (M); Pilliga CCAZ1 270 (M); Pilliga West CCAZ3 155 (E1); Leard CCAZ3 50 (E2); Gwydir Wetlands SCA 128 (M).

Reserves Total Area: 1280 ha.

No. Representatives in Reserves: 15

Protected Area Explanation: Budelah NR from Peasley (2001). Kirramingly NR from Peasley (2001). Boronga NR estimated Hunter (2006a). Boomi and Boomi West NRs estimates from part community 3 and all of community 6 in Hunter (2006a). Macquarie Marshes NR record from Johnson & Wilson (1991) - eastern 2003 addition. Carunga NP Hunter (2006c). Brigalow SCA C4 and C5 in Hunter (2006d). Wilbertroy FR area Lewer et al. (2003). Pilliga West CCAZ1 C6 in Porteners (2007a). Pilliga NP & Pilliga SCA from Lindsay (1967) Belah type. Leard VCA half of Belah in Hunter (2008g). VCA008 from map unit FLP2 in Lewer et al. (2003). Gwydir Wetlands SCA from Bowen & Simpson (2009).

Secure Property Agreements: VCA008 VCA 25 (M).

No. Representatives in Secure Property Agreements: 1

Secure PAs Total Area: 25 ha.

No. Representatives in Protected Areas: 16

Protected Current Extent: 2.17% 1305 ha \pm 30%.

Protected Pre-European Extent: 0.37% which is inadequately protected across distribution.

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

Key Sites for Protection: Near Marra Marra Creek. Creekline on the southern border of Kirramingly Nature Reserve. Small areas on Liverpool Plains.

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: Species composition varies with soil type. Sedges are more common in low lying areas. Belah sprouts from rootstock after disturbance and seedlings are relatively rare. Structure varies from open forest after regrowth from clearing to an open woodland.

Fire Regime: Unknown - now uncommon due to clearing and grazing.

Adjoining Communities: Grades into Poplar Box - Belah (ID56) and Western Grey Box woodlands, Black Box or Coolabah woodlands near rivers on heavy clays or into Weeping Myall woodlands. Grades into viney Belah (ID378) in the BBS Bioregion.

Threatening Processes: An endangered community because it is mostly cleared and highly fragmented. Remnants are often overgrazed and there is localised salinity. Weeds include *Lycium ferocissimum* and *Rapistrum rugosum*.

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

Threat Category: Endangered.

Threat/Protected Area Code: E/5a

Threat Criteria: 1; 2; 4; 5.

Planning Controls:

Planning and Management: Should be listed as an EEC. Requires protection in the northern wheatbelt of NSW.

Listed Under Legislation: None.

Recovery Plan: Doesn't exist, but required.

Reference List: (288; 283; 38; 194; 32; 318; 293; 185; 239; 68; 210; 87; 34; 46; 286; 183; 34; 389; 390; 393; 335; 424; 470). Bedward, M., Sivertsen, D.P., Metcalfe, L.M., Cox, S.J. & Simpson, C.S. (2001) Monitoring the rate of native woody vegetation change in the New South Wales wheatbelt. Natural Heritage Trust report. (NSW National Parks and Wildlife Service: Hurstville); Cannon, G., Cannon, M., Harding, W., McCosker, R., Spunner, B., Steenbeeke, G. & Watson G. (2002) Native vegetation map report No 3: Bellata, Gravesend, Horton and Boggabri 1:100 000 map sheets (NSW Department of Land and Water Conservation); Clarke, P.J., Gardener, M.R., Nano, C.E. & Whalley, R.D.B. (1998) The vegetation and plant species of Kirramingly. (Division of Botany, University of New England: Armidale); Hunter, J.T. (2000c) Floristic classification of sites sampled on the Mogil Mogil and Burrenbar 1:50 000 map sheets, north-western NSW. Unpublished report to the Department of Land and Water Conservation: Inverell; Johnson, W. & Wilson, R. (1991) Macquarie Marshes vegetation map. Unpublished. (NSW National Parks and Wildlife Service: Hurstville); Kerr, M., Jowett, A. & Robson, D. (2003) Reconstructed distribution and extent of native vegetation within the lower Macquarie-Castlereagh Region. Unpublished Report. (NSW National Parks and Wildlife Service, Western Directorate: 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; Lindsay, D.A. (1967) Forest type mapping of the Pilliga State Forests. (Forestry Commission of NSW: Sydney); McCosker, R. (2000) Gwydir Watercourse vegetation map. Unpublished report to the Department of Land and Water Conservation. (Landmax Pty. Ltd); Peasley, B. (2000) East Walgett vegetation mapping extant vegetation. Unpublished GIS vegetation map. (DLWC: Sydney, Inverell); Peasley, B. (2001) Vegetation map of Moree Plains Shire. (Department of Land and Water Conservation: Inverell); Sattler, P.S. & Williams, R.D. (1999) (eds.) The Conservation Status of Queensland's Bioregional Ecosystems. (Environmental Protection Agency: Brisbane); 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; Sivertsen, D. & Metcalfe, L. (2001) Northern wheatbelt vegetation mapping. Unpublished 1:250 000 scale vegetation maps and vegetation descriptions covering northern NSW wheatbelt. (NSW National Parks and Wildlife Service: Hurstville); White, M. (2002a) The reconstructed distribution and extent of indigenous vegetation types in the Moree Plains Shire. Report to NSW National Parks and Wildlife Service (Ecology Australia Pty. Ltd.: Farfield, Victoria); Austin, M.P., Cawsey, E.M., Baker, B.L., Yialeoglou, M.M., Grice, D.J. & Briggs, S.V. (2000) Predicted vegetation cover in the central Lachlan region. National Heritage Trust Project AA 1368.97. (CSIRO Division of Wildlife and Ecology: Canberra); 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; Hunter, J.T. (2006a) Vegetation and floristics of Boronga, Boomi and Boomi West Nature Reserves. Report to NSW Parks and Wildlife Service; Hunter, J.T. (2006c) Vegetation and floristics of Careunga Nature Reserve. Report to NSW National Parks and Wildlife Service, DECC; Hunter, J.T. (2006d) Vegetation and floristics of Brigalow Park and Clarmont Nature Reserves. Report to NSW National Parks and Wildlife Service DECC; Resource and Conservation Assessment Council of NSW (RACAC) (2004) Joint vegetation mapping project, Brigalow Belt South Western Regional Assessment Stage 2 Resource and Conservation Division, Department of Infrastructure, Planning and Natural Resources; Ismay, K., Lewer, S., Deluca, S., Powrie, S., McKenzie-Gay, M., Ryan, C. Burns, M. & Chaffey, C. (2004). Draft Vegetation maps of Coonabarabran, Tambar Springs, Mendooran, Coolah & Cobbora 1:100,000 map sheets. Unpublished maps and floristic group profile; Hunter, J.T.(2008g) Vegetation and Floristics of Leard State Conservation Areas. Report to the New South Wales National Parks and Wildlife Service, Narrabri.

NSW Vegetation Classification - Vegetation ID

Vegetation Community ID 26

Common Name: Weeping Myall open woodland of the Riverina and NSW South-western Slopes
Bioregions

Scientific Name: *Acacia pendula* - *Casuarina cristata* / *Rhagodia spinescens* - *Maireana decalvans* - *Chenopodium nitriaceum*; *Amyema quandang* var. *quandang* / *Austrodanthonia caespitosa* - *Atriplex semibaccata* - *Einadia nutans* subsp. *nutans* - *Rhodanthe corymbiflora*

Veg. Comm. ID.: 26 **Original Entry:** John Benson 31/12/2005

Last Modified: J.S. Benson 4/08/2008

Photo 1: ID26a_img014pc.jpg *Acacia pendula* woodland, Lake Urana Nature Reserve, [AGD66 35°16'09.8"S 146°08'32.9"E], 9/4/02, Jaime Plaza.



Photo 2: ID26b_img153pc.jpg *Acacia pendula* woodland Grenfell-West Wyalong Road, [AGD66 33°48'02.1"S 147°37'15.9"E], 19/4/02, Jaime Plaza.



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

Trees: *Acacia pendula*; *Casuarina cristata*; *Casuarina pauper*; *Eucalyptus largiflorens*; *Eucalyptus camaldulensis* subsp. *camaldulensis*; *Eucalyptus melliodora*; *Eucalyptus microcarpa*.

Shrubs/Vines/Epiphytes: *Rhagodia spinescens*; *Maireana decalvans*; *Chenopodium nitriaceum*; *Amyema quandang* var. *quandang*; *Atriplex nummularia*; *Maireana aphylla*; *Maireana pentagona*; *Muehlenbeckia florulenta*; *Acacia stenophylla*; *Acacia oswaldii*; *Acacia salicina*; *Hakea tephrosperma*; *Hakea leucoptera*; *Santalum lanceolatum*; *Exocarpos aphyllus*.

Ground Cover: *Austrodanthonia caespitosa*; *Atriplex semibaccata*; *Einadia nutans* subsp. *nutans*; *Rhodanthe corymbiflora*; *Austrostipa aristiglumis*; *Atriplex spinibractea*; *Atriplex leptocarpa*; *Enchylaena tomentosa*; *Alternanthera denticulata*; *Austrostipa nodosa*; *Austrodanthonia setacea*; *Sporobolus caroli*; *Myriocephalus rhizocephalus*; *Centipeda cunninghamii*; *Vittadinia cuneata* var. *cuneata* f. *cuneata*; *Lepidium pseudohyssopifolium*; *Austrostipa scabra* subsp. *falcata*.

Weed Species: *Xanthium occidentale*; *Echium plantagineum*; *Medicago polymorpha*; *Medicago truncatula*; *Bromus madritensis*; *Hordeum leporinum*; *Lolium perenne*; *Vulpia myuros*; *Bromus diandrus*; *Sonchus oleraceus*; *Trifolium angustifolium*; *Cotula bipinnata*; *Hordeum leporinum*.

Weediness: Medium (5-15%) with 10-30% cover.

Threatened Plants: *Swainsona plagiotropis* (E); *Swainsonia murrayana* (V); *Brachyscome chrysoglossa* (E); *Lepidium monoplacoides* (E).

Threatened Fauna: Painted Honeyeater, Superb Parrot.

Mean Species Richness: 39±2 (Lewer et al. 2003 in 20x20 m plots).

Rainforest Structure (Webb): Not applicable.

Structure (WH): Isolated Trees; Open Woodland; Woodland.

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

Vegetation Description: Mid-high open woodland up to 8 m high dominated by Weeping Myall (*Acacia pendula*). Other tree species include Belah (*Casuarina cristata*), while Black Box (*Eucalyptus largiflorens*) and River Red Gum (*Eucalyptus camaldulensis*) may occur

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in depressions. Chenopod shrubs may be common or absent. They include *Rhagodia spinescens*, *Maireana decalvans*, *Atriplex nummularia*, *Chenopodium nitriaceum*, *Hakea leucoptera*, *Santalum lanceolatum*, *Exocarpos aphyllus* and *Maireana aphylla*. The ground cover may be dense or sparse depending on rainfall. It is dominated by grass species such as *Austrodanthonia caespitosa*, *Austrodanthonia setacea*, *Austrostipa aristiglumis*, *Austrostipa scabra*, *Austrostipa nodosa* and *Sporobolus caroli*. Saltbush species include *Atriplex spinibractea*, *Atriplex leptocarpa* and *Atriplex semibaccata*. Forb species include *Alternanthera denticulata*, *Myriocephalus rhizocephalus*, *Centipeda cunninghamii*, *Rhodanthe corymbiflora* and *Vittadinia cuneata* var. *cuneata*. Occurs on brown clays or loam soils on alluvial plains mainly in the Riverina and NSW South-western Slopes Bioregions of south-western NSW. Apparently extinct in Victoria. Prior to European settlement this community probably contained a dense understorey of saltbush. Much of its original extent has now altered to be a derived native grassland dominated by native grasses and forbs. Weeping Myall is a threatened community due its past extent of clearing and overall is in poor condition.

Level of Classification: Sub-formation.

Classification Confidence Level: High.

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

State Veg Map (Keith 2004): Riverine Plain Woodlands.

State Landscape (Mitchell 2002): Murrumbidgee Source-bordering Dunes;

NVIS Major Veg Sub-Groups: Other Acacia forests and woodlands.

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

Authority(s): (Combination of Expert Opinion and Quantitative Data). Beadle (1948 and 1981) breaks Weeping Myall alliance into north and south communities based on different understorey species composition. This southern community has been mapped on Hay Plain as community 25 by Porteners (1993) and Scott (1992). Map unit 12 in Horner et al. (2002) covering part of the Hay Plain. Moore (1953, 1953a) maps it on the south western slopes. Coarsely mapped in Leigh & Mulnam (1977). Eardley (1999) maps Weeping Myall for Riverina Bioregion using RBG mapping and Landsat Satellite Imagery extension mapping. Miles (2001) maps pre-European distribution in Murray catchment. Western Riverina Vegetation Management Committee (2001) map and describe this community. Modelled and mapped in central Lachlan River region by Austin et al. (2000). Map unit R5 in Sivertsen & Metcalfe (1995) in the Forbes and Cargelligo regions. Floristic group 7 and part of map unit ALP3 in Lewer et al. (2003) for the Lachlan River region. Includes Biolandscapes SouA82 in Friday (2006). Includes BVT 58 in DEC (2006, 2006a).

Interstate Equivalent(s): None known. May have occurred in Victoria prior to clearing and may be extinct there.

Mapped/Modelled: Current extent partly mapped or modelled.

Plot Sampling: Inadequate.

Mapping Info: Mappable with good quality aerial photographs but Satellite imagery often fails to detect Weeping Myall. Mapped in part around Forbes and Cargelligo (Sivertsen & Metcalfe 1995), by Porteners (1993) and Horner et al. (2002) for western Riverine Plain. The Jerilderie and Lockhart regions are not yet mapped as of 2008. Some pre-European areas mapping by Miles (2001) and WRVMC (2001).

Climate Zone: Temperate: no dry season (hot summer); Semi-arid: warm (winter rain).

IBRA Bioregion (v6): Cobar Peneplain (1-30%); NSW South-western Slopes (30-70%); Riverina (30-70%).

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

Botanical Division: Central Western Slopes (CWS) (1-30%); South Western Plains (SWP) (>70%); South Western Slopes (SWS) (1-30%).

Local Govt. Areas: Berrigan (1-30%); Bland (1-30%); Carrathool (1-30%); Conargo (1-30%); Coolamon (1-30%); Corowa (1-30%); Deniliquin (1-30%); Forbes (1-30%); Greater Hume (1-30%); Griffith (1-30%); Hay (1-30%); Jerilderie (1-30%); Lachlan (1-30%); Leeton (1-30%); Lockhart (1-30%); Murrumbidgee (1-30%); Narrandera (1-30%); Urana (1-30%); Wagga Wagga (1-30%).

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

MD Basin: Yes.

Substrate Mass: Alluvium.

Lithology: Clay.

Great Soil Group: Brown clay; Grey clay; Red-brown earth.

Soil Texture: Heavy clay; Medium heavy clay; Sandy clay loam.

Landform Patterns: Plain; Rises; Stagnant alluvial plain.

Landform Elements: Plain.

Land Use: Cropping and Horticulture; Grazing.

Impacts of European Settlement: Major reduction (>70%) in extent and/or range; Major alteration of species composition.

Pre-European Extent: 1600000 ha \pm 30%. Estimated from pre-European map.

Pre-European Extent Comments: Based on estimates of 1100000 ha from pre-European mapping in Western Riverina draft RVM Plan (WRC 2001). This was partly based on mapping of western Riverina by Porteners (1993). Areas occur to the east of this. Miles (2001) estimates that about 500000 ha of Weeping Myall occurred in the Murray catchment.

Current Extent: 160000 ha \pm 30% or 10% \pm 50% of pre-European extent remaining.

Current Extent Comments: (Estimated from a more broadly classified vegetation map). WRVC (2001) estimate that 107000 ha remains in the western Riverina. Additional areas are added to this as this community extends to the east of the WRVC area. However, little remains in the southern/central wheatbelt - only 215 ha is mapped in the Forbes area. Horner et al. (2002) map over 11000 ha on part of the Hay Plain.

Conservation Reserves: Lake Urana NR 10 (E3); Oolambeyan NP 715 (M); Yanga SCA 20 (E3).

Reserves Total Area: 745 ha.

No. Representatives in Reserves: 3

Protected Area Explanation: No large areas are known to be reserved as of 2008. Areas in Oolambeyan National Park mapped by Roberts & Roberts (2001). A small patch occurs in Lake Urana NR (NPWS 2001a and Benson 1999-2004). Porteners (1993) mapped areas that warrant investigation. PA DE9905 from overlaying Porteners (1993). Yanga SCA estimate from J. Brickhill (pers. comm.).

Secure Property Agreements: DE9905 PA 88 (M).

Secure PAs Total Area: 88 ha.

No. Representatives in Secure Property Agreements: 1

Protected Current Extent: 0.52% 833 ha \pm 10%.

No. Representatives in Protected Areas: 4

Protected Pre-European Extent: 0.05% which is inadequately protected across distribution.

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

Key Sites for Protection: The report by Eardley (1999) for the Riverina Bioregion highlights areas of potential conservation importance for a range of vegetation communities. Regions north of Jerilderie may be important.

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: Much of the present Austrodanthonia grasslands of the Riverina may have been derived from a pre-European Acacia pendula - Atriplex nummularia woodland/shrubland. The chenopods, and presumably Weeping Myall, were eliminated from vast regions through a combination of clearing and over-grazing.

Fire Regime: Unknown - occasional wildfire sweeps across the plains - an extensive fire burnt part of the Riverina in 1991. This resulted in the mass germination of Swainsona and other legume species. Presumably, the seed of Acacia pendula is long-lived and may germinate after fire.

Adjoining Communities: Grades into grassland, Bladder Saltbush, White Cypress Pine or Buloke communities and Black Box along creeks or in depressions.

Threatening Processes: A critically endangered and very poorly reserved community. Mostly cleared for grazing and crops in the southern wheatbelt and in the Riverina. Existing remnants threatened by further clearing. Continuous grazing by stock and rabbits have altered the understorey. Climate change may be impacting on recovery.

Threatening Process List: Clearing for agriculture; Dryland cropping; Irrigated cropping (incl. horticulture); Forestry activities including logging; Salinity; Unsustainable grazing and trampling by stock; Unsustainable grazing by introduced animals; Weed (exotic) invasion.

Threat Category: Critically Endangered.

Threat/Protected Area Code: CE/5a

Threat Criteria: 1; 4; 5.

Planning Controls:

Planning and Management: The Lachlan, Murrumbidgee and Murray Catchment Management Plans should protect what remains of this community. No more clearing of this community should be allowed under these plans and some areas should be encouraged to regrow through fencing schemes that control stock grazing pressure.

Listed Under Legislation: Listed TSC Act, E: Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes Bioregions (Part); Listed EPBC Act, E: Weeping Myall Woodlands (Part).

Recovery Plan: Doesn't exist, but required.

Reference List: (183; 73; 3; 308; 16; 289; 145; 293; 293; 67; 246; 166; 144; 14; 247; 13; 34; 146; 356; 372; 373). Austin, M.P., Cawsey, E.M., Baker, B.L., Yialeoglou, M.M., Grice, D.J. & Briggs, S.V. (2000) Predicted vegetation cover in the central Lachlan region. National Heritage Trust Project AA 1368.97. (CSIRO Division of Wildlife and Ecology: Canberra); Beadle, N.C.W. (1948) The vegetation and pastures of western New South Wales. (NSW Department of Conservation: Sydney); Beadle, N.C.W. (1981) The vegetation of Australia. (Cambridge University Press: Cambridge); Benson, J.S. (1999-2009) Unpublished field note books recording species at various locations in western NSW. (Royal Botanic Gardens and Domain Trust: Sydney); Eardley, K.A. (1999) A foundation for conservation in the Riverina Bioregion. Unpublished Report. (NSW National Parks and Wildlife Service); 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); Leigh, J.H. & Mulham, W.E. (1977) Vascular plants of the Riverine Plain of New South Wales with notes on distribution and pastoral use. Telopea 1(4): 225-291; 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; 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); Miles, C. (2001) NSW Murray Catchment: biodiversity action plan. (Nature Conservation Working Group Inc.: Albury); Moore, C.W.E. (1953a) The vegetation of the south-eastern Riverina, New South Wales 1: the climax communities. Aust. J. Botany 1: 485-547; Moore, C.W.E. (1953b) The vegetation of the south-eastern Riverina, New South Wales 2: the disclimax communities. Aust. J. Botany 1: 548-567; 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; Roberts, I. & Roberts, J. (2001) Plains Wanderer (Pedionmus torquatus) habitat mapping, including woody vegetation and other landscape features Riverina Plains NSW. Report to NSW National Parks and Wildlife Service (Earth Resources Analysis Pty. Ltd.); Scott, J.A. (1992) The natural vegetation of the Balranald - Swan Hill area. Cunninghamia 2(4): 597-652; 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; Western Riverina Regional Vegetation Committee (2001) Draft Western Riverina Regional Vegetation Management Plan. (Western Riverina RVC: Deniliquin); Priday, S. (in prep. 2006) The native vegetation of the New South Wales South Western Slopes Bioregion (Lachlan, Murrumbidgee and Murray Catchments). Unpublished report to DEC Southern Office Queanbeyan; DEC (2006) Reconstructed and extant distribution of native vegetation in the Central West Catchment. Unpublished report (NSW Department of Environment and Conservation: Dubbo); 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 20

Common Name: Buloke - Moonah - Black Box open woodland on sandy rises of semi arid (warm) climate zone (mainly Riverina and Murray Darling Depression Bioregions)

Scientific Name: *Eucalyptus largiflorens* / *Allocasuarina luehmannii* - *Melaleuca lanceolata* - *Hakea tephrosperma* / *Austrodanthonia caespitosa* - *austrostipa nodosa* - *Atriplex leptocarpa*

Veg. Comm. ID.: 20 **Original Entry:** John Benson 31/12/2005

Photo 1: ID20a_img011pc.jpg *Allocasuarina luehmannii* - *Callitris glaucophylla* woodland near Lake Urana Nature Reserve, [AGD66 35°17'08.0"S 146°07'38.2"E], 9/4/02, Jaime Plaza.



Photo 2: ID20b_img036pc.jpg *Allocasuarina luehmannii* - *Melaleuca lanceolata*. woodland, Echuca-Barham Rd, [AGD66 35°40'45.2"S 144°27'21.8"E], 11/4/02, Jaime Plaza.



Photo 3: ID20c_img037pc.jpg *Allocasuarina luehmannii* - *Melaleuca lanceolata*. woodland, Echuca-Barham Rd, [AGD66 35°40'45.2"S 144°27'21.8"E], 11/4/02, Jaime Plaza.



Characteristic Vegetation: (Quantitative Data)

Trees: *Allocasuarina luehmannii*; *Eucalyptus largiflorens*; *Melaleuca lanceolata*; *Callitris gracilis* subsp. *murrayensis*; *Callitris glaucophylla*.

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Shrubs/Vines/Epiphytes: *Hakea tephrosperma*; *Acacia acinacea*; *Pittosporum angustifolium*; *Acacia melvillei*; *Sclerolaena muricata* var. *muricata*; *Teucrium racemosum*; *Maireana humillima*.

Ground Cover: *Austrodanthonia caespitosa*; *Austrostipa nodosa*; *Atriplex leptocarpa*; *Einadia nutans* subsp. *nutans*; *Aristida leptopoda*; *Austrostipa elegantissima*; *Enteropogon ramosus*; *Wahlenbergia luteola*; *Austrostipa eremophila*; *Chondrilla juncea*; *Vittadinia gracilis*; *Vittadinia cuneata* var. *cuneata* f. *cuneata*; *Vittadinia cervicalis* var. *cervicalis*; *Vittadinia dissecta* var. *hirta*; *Austrodanthonia setacea*; *Sida corrugata*; *Oxalis perennans*; *Wahlenbergia luteola*; *Austrostipa eremophila*; *Sida corrugata*; *Oxalis perennans*; *Chenopodium desertorum* subsp. *desertorum*; *Austrostipa blackii*; *Lomandra effusa*; *Salsola tragus* subsp. *tragus*.

Weed Species: *Trifolium arvense*; *Silene apetala*; *Bromus diandrus*; *Chondrilla juncea*; *Spergularia rubra*.

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

Threatened Plants: Not assessed.

Threatened Fauna: Not assessed.

Mean Species Richness: Not assessed.

Rainforest Structure (Webb): Not applicable.

Structure (WH): Open Woodland; Isolated Trees.

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

Vegetation Description: Open woodland dominated by Buloke (*Allocasuarina luehmannii*) sometimes with a taller tree layer of Black Box (*Eucalyptus largiflorens*) or with Moonah (*Melaleuca lanceolata*) and Hooked Needlewood (*Hakea tephrosperma*). White Cypress Pine (*Callitris glaucophylla*) or Slender Cypress Pine (*Callitris gracilis* subsp. *murrayensis*) may be present. Scattered bluebush (*Maireana* spp.) and Black Roly Poly (*Sclerolaena muricata*) may occur. The ground cover is often sparse being composed of wallaby grass (*Austrodanthonia caespitosa*), wiregrass (*Aristida leptopoda*), corkscrew grass (*Austrostipa nodosa*) and *Enteropogon ramosus*. Several species of the daisy genus *Vittadinia* are usually present. Exotic grass species such as *Bromus* or *Hordeum* are common. This community usually occurs on red-brown loam soils with alkaline sub-soils on small sandy rises on the alluvial plain. Distributed in the semi-arid (warm) climate zone of south-western NSW from Urana and east of Deniliquin to Euston along the Murray River, receiving 300-450 mm of average annual rainfall. This community has mostly been cleared and the stands that remain are generally over-grazed and subject to rabbit grazing and burrowing due to loamy soil. In most locations there are few signs of regeneration. This is a critically endangered and a poorly conserved community urgently requiring fencing and other protection mechanisms.

Level of Classification: Association.

Classification Confidence Level: High.

Formation Group: Casuarina Woodlands of the Inland Slopes and Plains.

State Veg Map (Keith 2004): Riverine Sandhill Woodlands.

State Landscape (Mitchell 2002): Not Assessed.

NVIS Major Veg Sub-Groups: Casuarina and *Allocasuarina* forests and woodlands.

Forest Type (RN 17): 213 - Bull Oak (P).

Authority(s): (Combination of Expert Opinion and Quantitative Data). Includes a combination of groups 8 and 9 in Sluiter et al. (1997) that may reflect variations due to land use. Includes community 25 in Smith & Smith (1990). May include part of community 25 in Scott (2002). Generally east of Shrubby Buloke - Slender Pine community (ID22) that occurs near Balranald. Species noted in Benson (1999-2009).

Interstate Equivalent(s): South Australia: includes *Allocasuarina luehmannii* association in Davies (1982, page 32); Victoria: part of either EVC 97 Pine Buloke Woodland or EVC826 Plains Savannah.

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

Plot Sampling: Inadequate.

Mapping Info: Mappable by mapping loam-sandy rises. Described from numerical analysis of Sluiter et al. (1997). Partly mapped along Murray River by Margules & Partners (1990). Other occurrences not mapped as of 2005.

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

IBRA Bioregion (v6): Riverina (>70%).

IBRA Sub-Region: Murray Fans (>70%); Murray Scroll Belt (1-30%); Murrumbidgee (1-30%).

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

Local Govt. Areas: Balranald (1-30%); Berrigan (1-30%); Deniliquin (1-30%); Murray (30-70%); Wakool (1-30%); Urana (1-30%).

CMAs: Lower Murray-Darling (1-30%); Murray (>70%).

MD Basin: Yes.

Substrate Mass: Eolian sand; Eolian sediment.

Lithology: Alluvial loams and clays; Alluvial sand.

Great Soil Group: Red calcareous soil; Red-brown earth.

Soil Texture: Clay loam, sandy; Clayey sand; Loam.

Landform Patterns: Flood plain.

Landform Elements: Dune; Plain.

Land Use: Cropping and Horticulture; Grazing.

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

Pre-European Extent: 8000 ha \pm 50%. Expert estimate not based on any mapped vegetation.

Pre-European Extent Comments: Estimate only but restricted by soil type.

Current Extent: 1000 ha \pm 50% or 12% \pm 80% of pre-European extent remaining.

Current Extent Comments: (Expert estimate). Estimate only, most has been cleared and remaining areas are senescing and not regenerating. Only small patches remain.

Conservation Reserves: Lake Urana NR 5 (E2); Wiesners Swamp NR 1 (E2).

Reserves Total Area: 6 ha.

No. Representatives in Reserves: 2

Protected Area Explanation: Lake Urana NR estimate by Benson (1999-2009). Mentioned in NSW NPWSW for Wiesners Swamp NR.

Secure Property Agreements: None.

Secure PAs Total Area: 0 ha.

No. Representatives in Secure Property Agreements: 0

Protected Current Extent: 0.6% 6 ha ± 50%.

No. Representatives in Protected Areas: 2

Protected Pre-European Extent: 0.07% which is inadequately protected across distribution.

Restricted in 1750: Code 5b: <5% of pre-European extent in protected areas (1,000<area<10,000 ha).

Key Sites for Protection: Remnants on private land and roadsides on Murray and Murrumbidgee River floodplains as far east as Mulwala. Stands observed on the Barnham road (Benson 1999-2004). Scott (1992) reports locations in the Balranald region as being on the Euston-Pringle road north of Euston, near the Red-Bank Weir and on the southern edge of Pitarpunga Lake.

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: Most of the remnants are now so disturbed by overgrazing and clearing that natural disturbances are less relevant.

Fire Regime: Unknown: fragmentation and lack of ground cover probably imply that fire is very rare now. Intense fire may kill Buloke and associated species.

Adjoining Communities: Grades into White Cypress Pine woodland (ID28) on sandier soil, into ID19 on source bordering dunes along Murray river, into Weeping Myall woodland (ID26) or grassland on clay soils and into Black Box woodland (e.g. ID13) in more regularly flooded areas.

Threatening Processes: Much of the eastern occurrences have been cleared and over grazing by stock and rabbits has led to a lack of regeneration of palatable woody shrubs and trees. Trees and shrubs are senescing. Weed invasion has affected the ground cover.

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; Weed (exotic) invasion.

Threat Category: Critically Endangered.

Threat/Protected Area Code: CE/5b

Threat Criteria: 1; 2; 4; 5.

Planning Controls: Other

Planning and Management: The Murray Regional Environmental Plan may protect stands of this community. The Murray Catchment Management Plan should protect this community from clearing and set targets for its protection and rehabilitation. Fencing is urgently required to protect remnants from grazing. Before this can happen priority sites need to be documented.

Listed Under Legislation: Listed TSC Act, E: Allocasuarina luehmannii Woodland in the Riverina and Murray-Darling Depression Bioregions (Part); Listed EPBC Act, E: Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions (Part).

Recovery Plan: Exists.

Reference List: (308; 323; 13; 21; 9; 146; 357). Benson, J.S. (1999-2009) Unpublished field note books recording species at various locations in western NSW. (Royal Botanic Gardens and Domain Trust: Sydney); NSW National Parks and Wildlife Service (2001c) Wiesners Swamp Nature Reserve. Draft Plan of Management. (NSW National Parks and Wildlife Service: Hurstville); Scott, J.A. (1992) The natural vegetation of the Balranald - Swan Hill area. *Cunninghamia* 2(4): 597-652; Sluiter, I.R.K., Minchin, P.R. & Jaensch, S.C. (1997) The Buloke and pine woodlands of semi-arid and dry sub-humid Victoria and nearby areas. Report to Environment Australia. (Victorian Dept. Natural Resources and Environment: Mildura); Smith, P. & Smith J. Ecological Consultants (1990) Floristic Communities. In River Murray Riparian Vegetation Study. (Murray-Darling Basin Commission: Canberra); Western Riverina Regional Vegetation Committee (2001) Draft Western Riverina Regional Vegetation Management Plan. (Western Riverina RVC: Deniliquin); Cheal, D.C. & Lucas, A. (2005) Recovery plan for Buloke Woodlands of the Riverina and Murray-Darling Depression bioregions 2005-2009. A recovery plan under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (Arthur Rylah Instit.

NSW Vegetation Classification - Vegetation ID

Vegetation Community ID 28

Common Name: White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone

Scientific Name: *Callitris glaucophylla* / *Hakea leucoptera* subsp. *leucoptera* - *Pittosporum angustifolium* - *Maireana pyramidata* - *Maireana enchylaenoides* / *Enchylaena tomentosa* - *Dissocarpus paradoxus* - *Austrostipa scabra* subsp. *scabra* - *Tribulus terrestris* -

Veg. Comm. ID.: 28 **Original Entry:** John Benson 31/12/2005

Photo 1: ID28a_img069pc.jpg *Callitris glaucophylla* - *Maireana pyramidata* woodland, 40 kms nth Wentworth, [AGD66 33°41'22.1"S 141°47'32.0"E], 13/4/02, Jaime Plaza.



Photo 2: ID28b_img310pc.jpg *Callitris glaucophylla* open woodland with chenopod shrub ground cover on a prior stream, SW NSW, May 1994, J.S. Benson.



Photo 3: ID28c_img159pc.jpg Cleared *Callitris glaucophylla* woodland near Deniliquin, [AGD66 35°39'51.0"S 145°20'18.0"E], 10/4/02, Jaime Plaza.



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

Trees: *Callitris glaucophylla*; *Myoporum platycarpum* subsp. *platycarpum*; *Allocasuarina luehmannii*; *Alectryon*

oleifolius subsp. *canescens*; *Eucalyptus largiflorens*.

Shrubs/Vines/Epiphytes: *Hakea leucoptera* subsp. *leucoptera*; *Pittosporum angustifolium*; *Maireana pyramidata*; *Maireana enchylaenoides*; *Rhagodia spinescens*; *Geijera parviflora*; *Hakea tephrosperma*; *Eremophila longifolia*; *Acacia oswaldii*; *Dodonaea viscosa* subsp. *angustissima*; *Exocarpos aphyllus*; *Atriplex nummularia*; *Mesembryanthemum crystallinum*; *Acacia hakeoides*; *Acacia victoriae* subsp. *arida*; *Jasminum lineare*.

Ground Cover: *Enchylaena tomentosa*; *Dissocarpus paradoxus*; *Austrostipa scabra* subsp. *scabra*; *Tribulus terrestris*; *Sclerolaena diacantha*; *Sclerolaena obliquicuspis*; *Tetragonia tetragonioides*; *Calandrinia eremaea*; *Calotis hispidula*; *Zygophyllum ammophilum*; *Aristida behriana*; *Enneapogon nigricans*; *Enteropogon ramosus*; *Austrodanthonia caespitosa*; *Austrostipa elegantissima*; *Einadia nutans* subsp. *nutans*; *Crassula colorata* var. *colorata*; *Wahlenbergia stricta* subsp. *stricta*; *Paspalidium constrictum*; *Boerhavia dominii*; *Sida corrugata*; *Actinobole uliginosum*.

Weed Species: *Schismus barbatus*; *Brassica tournefortii*; *Medicago polymorpha*; *Lycium ferocissimum*; *Heliotropium europaeum*; *Bromus rubens*; *Asphodelus fistulosus*; *Hypochaeris glabra*; *Erodium cicutarium*; *Sisymbrium irio*; *Cucumis myriocarpus* subsp. *leptodermis*; *Echium plantagineum*; *Trifolium arvense*; *Hypochaeris glabra*; *Maireana enchylaenoides*.

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

Threatened Plants: *Acanthocladium dockeri* (Endangered).

Threatened Fauna: Not assessed.

Mean Species Richness: 9±1 (Horner et al. 2003 in 20x20 m plots but during drought).

Rainforest Structure (Webb): Not applicable.

Structure (WH): Open Woodland; Isolated Trees.

Height Class (WH): Mid-High; Tall.

Vegetation Description: Open woodland or a derived grassland with scattered trees up to 15 m high dominated by White Cypress Pine (*Callitris glaucophylla*). Associated small trees or tall shrubs include Buloke (*Allocasuarina luehmannii*), Needlewood (*Hakea leucoptera*), Hooked Needlewood (*Hakea tephrosperma*), Sugarwood (*Myoporum platycarpum*), *Pittosporum angustifolium*, Western Rosewood (*Alectryon oleifolius* subsp. *canescens*), Emu Bush (*Eremophila longifolia*) and Wilga (*Geijera parviflora*). Common chenopod shrub species include Black Bluebush (*Maireana pyramidata*), *Maireana enchylaenoides* and Thorny Saltbush (*Rhagodia spinescens*). Copperburr low shrubs include *Sclerolaena diacantha* and *Sclerolaena obliquicuspis*. Forb species include *Tetragonia tetragonioides*, *Calandrinia eremaea*, *Calotis hispidula*, *Tribulus terrestris* and *Zygophyllum ammophilum*. Many stands contain a very sparse shrub understorey that has been grazed out with the ground being dominated by native and exotic grasses and forbs. Native grass species include *Austrostipa scabra* subsp. *scabra*, *Austrodanthonia caespitosa*, *Aristida behriana*, *Enneapogon nigricans* and *Paspalidium constrictum*. Exotic species include *Schismus barbatus*, *Brassica tournefortii* and *Medicago polymorpha*. Occurs on sandy loam soils on prior streams, source bordering sand dunes and sand plains in south-western NSW. Often present in a mosaic with Belah - Western Rosewood, *Acacia* or *Eucalyptus* communities. Few sites are in good condition due to grazing and clearing. Many sites are highly degraded and eroded with a few trees remaining, little regeneration and a depleted understorey. A threatened community requiring protection from grazing, regeneration, soil erosion control and improved reservation.

Level of Classification: Alliance / Sub-formation.

Classification Confidence Level: High.

Formation Group: Cypress Pine (*Callitris*) Woodlands Mainly of the Inland.

State Veg Map (Keith 2004): Riverine Sandhill Woodlands.

State Landscape (Mitchell 2002): Not Assessed.

NVSI Major Veg Sub-Groups: *Callitris* forests and woodlands.

Forest Type (RN 17): 188 - White Cypress Pine (P).

Authority(s): (Combination of Expert Opinion and Quantitative Data). Part of broader map units (excluding *Callitris gracilis* subsp. *murrayensis* dominated communities) 16 and 27 in Porteners (1993), Porteners et al. (1997), community 16 in Scott (1992), and mentioned as part of map units 4 and 11 in Fox (1991). Equivalent to the broad vegetation community 6 in WRRVP (2001) and community 6 in Kerr et al. (2000). Probably part of floristic group and map unit 24 in Horner et al. (2002). Also equivalent to community 36 in Smith & Smith, community 1c in Westbrooke et al. (1998) and Westbrooke & Miller (1995) and community 4 in Morcom & Westbrooke (1990). The majority of the scattered Cypress Pine-grass floristic group 9 in Horner et al. (2002) mapped as map unit 21 in their mapping near Hay (this also includes Buloke communities). Sampled in Oolambeyan NP (Roberts & Roberts 2001). Zara Sand Hill documented by Stafford & Eldridge (2000). Part of BVT 48 in DEC (2006a).

Interstate Equivalent(s): Victoria: included in EVC 97 Pine-Buloke woodland but little of this community occurs in Victoria; South Australia: probably the *Callitris glaucophylla* community in the eastern pastoral region of South Australia e.g. on Quondong Station (Davies 1982).

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

Mapping Info: Mostly mapped except for small areas. Very mappable using API due to crown shape of *Callitris*. Mapped in the south western corner of NSW in the various reports produced by the Royal Botanic Gardens and in reserves there by a number of authors.

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

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

IBRA Sub-Region: Darling Depression (1-30%); Great Darling Anabranch (1-30%); Lachlan (1-30%); Menindee (1-30%); Murray Fans (1-30%); Murray Scroll Belt (1-30%); Murrumbidgee (1-30%); South Olary Plain, Murray Basin Sands (30-70%).

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

Local Govt. Areas: Balranald (30-70%); Carrathool (1-30%); Central Darling (1-30%); Conargo (1-30%); Wentworth (1-30%); Corowa (1-30%); Urana (1-30%).

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

MD Basin: Yes.

Substrate Mass: Eolian sand; Eolian sediment.

Lithology: Eolian sand or loam.

Great Soil Group: Brown earth; Red earth.

Soil Texture: Clay loam; Loamy sand; Sandy clay loam; Sandy loam.

Landform Patterns: Alluvial plain; Sand plain; Stagnant alluvial plain.

Landform Elements: Dune; Lunette; Plain; Prior stream.

Land Use: Grazing; Nature Conservation; Timber Production.

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

Pre-European Extent: 300000 ha ±30%. Estimated based on maps of current vegetation.

Pre-European Extent Comments: Estimated from current extant maps and extrapolation to cleared areas and expert opinion. White (2002) estimates that about 190000 ha of Callitris woodland occurred in the Riverina Bioregion. Additional areas occurred in the Murray-Darling Depression Bioregion to the west.

Current Extent: 80000 ha ±30% or 27% ± 50% of pre-European extent remaining.

Current Extent Comments: (Measured from map of extant vegetation). Overall it is estimated that less than 30% remains and most of this is in very poor condition with a weedy ground cover and lack of regeneration of the Pines. Only 13% of eastern-most stands remain Miles (2000). Estimate of remaining extent is derived by addition of areas of community 16 in the various vegetation maps produced by the Royal Botanic Gardens covering south-western NSW. Where this community is mapped as a mosaic with one or more other communities a proportion of the area has been assigned. Estimates have been made to exclude areas near Murray River that are dominated by Slender Pine (*Callitris gracilis*) - see IDs 19 and 21. Includes areas mapped as 16sc (scattered trees) and mapped under other communities as a mosaic. Also present outside RBG mapped areas to the north-east. Horner et al. (2002) map about 3300 ha of Pine on part of the Hay Plain.

Conservation Reserves: Kalyarr NP 15 (M); Mallee Cliffs NP 200 (E3); Mungo NP 2150 (E2); Oolambeyan NP 1540 (M); Tarawi NR 10 (E3); Willandra NP 1 (E3); Paroo-Darling NP 12 (E1).

Reserves Total Area: 3928 ha.

No. Representatives in Reserves: 7

Protected Area Explanation: Areas conserved in Mungo NP from map units 16, 16sc and proportion of mosaic polygons in Porteners et al. (1997). Mentioned in Morcom & Westbrooke (1990) as being in Mallee Cliffs NP as small areas. Mentioned by Westbrooke et al. (1998) as covering <1% of the Scotia 1:100 000 map sheet and only a small area is in Tarawi NR (J. Warren pers. comm.). Area measured in Oolambeyan NP from Roberts & Roberts (2001). Also present on private land on the Zara Sand dune that has been fenced off from grazing but is not reserved. Eroded lunettes in the Darling River Ana-Branch contain some unusual mixes of species. VCA006 measurement from Roberts & Roberts (2001). Kalyarr NP from map unit 21 in Horner et al. (2002). Very poorly reserved over range and highly degraded. PA DE9905 from overlaying Porteners (1993). Two isolated trees remain in Willandra NP (J. Brickhill pers. comm. 2004). Small area in Coonavitra section of Paroo Darling NP (Westbrooke & Gowans 2006a).

Secure Property Agreements: DE9905 PA 462 (M); VCA006 VCA 16 (M).

Secure PAs Total Area: 478 ha.

No. Representatives in Secure Property Agreements: 2

Protected Current Extent: 5.5% 4406 ha ± 30%.

No. Representatives in Protected Areas: 9

Protected Pre-European Extent: 1.46% 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: A key site for protection is the "Zara" sand dune near Wanganella on the Riverine Plain. This is documented by Stafford & Eldridge (2000) and has recently been fenced off by owners F.S. Falkiner and Sons through assistance funding from various organisations. Also, 2 km north-east of "Lyle" near Balranald (Scott 1992) and possibly in Thulibin State Forest near Deniliquin occurring with Buloke.

Degree of Fragmentation: Human induced highly fragmented small stands with <30% extent remaining and high 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: A number of associations could be selected from this sub-formation but plot data are lacking over much of the range for analysis. However, some of this variation is due to land use history - e.g. loss of understorey shrub layer. It is interesting that *Callitris glaucophylla* is not or only poorly regenerating in south western NSW in this community compared to its level of regeneration in central NSW to the north. Grazing pressure or rainfall pattern may explain this difference.

Fire Regime: Intense fire may kill *Callitris*. Fire rarely burns remnants due to lack of ground cover and fragmentation of remnants.

Adjoining Communities: Grades into box woodlands of Belah - Western Rosewood on fine-texture soils. Grades into similar community in far north western NSW (ID68). Shares some species with Lunette Shrubland (ID152) in the Mungo and Darling Ana-Branch regions.

Threatening Processes: Clearing for agriculture and intensive grazing has destroyed most of the original extent. The greatest current threat is lack of recruitment of key species due to grazing by stock and rabbits (that burrow into the sandy soil). This lack of recruitment from seedlings is resulting in an aging population of trees many of which are senescing. Often isolated trees of a once extensive stand remain. Most of the original shrub understorey has been removed at most locations. Common weed species include *Heliotropium europaeum*, *Bromus rubens*, *Actinobole uliginosum* and *Asphodelus fistulosus*.

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; Weed (exotic) invasion.

Threat Category: Vulnerable.

Threat/Protected Area Code: V/4a

Threat Criteria: 2; 3; 4; 5; 1.

Planning Controls:

Planning and Management: Prevent further clearing and fence off areas to protect them from over-grazing to allow regeneration of *Callitris* and other species. This includes the control of rabbits which are a major threat to this community. A priority for property agreements and fencing initiatives in the Murray, Murrumbidgee and Lower Murray-Darling Catchment Management Areas.

Listed Under Legislation: Nominated Commonwealth EPBC Act; Listed TSC Act, E: Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes Bioregions (Part).

Recovery Plan: Doesn't exist, but required.

Reference List: (309; 12; 289; 216; 165; 17; 42; 14; 25; 247; 13; 9; 141; 33; 41; 146; 285; 373; 397). Davies, R.J.P. (1982) The conservation of major plant associations in South Australia. (Conservation Council of South Australia Incorporated: Adelaide); Fox, M.D. (1991) The natural vegetation of the Ana Branch - Mildura 1:250 000 map sheet (New South Wales). *Cunninghamia* 2(3): 443-494; Horner, G., McNellie, M., Nott, T.A., Vanzella, B., Schliebs, M., Kordas, G.S., Turner, B. & Hudspeth, 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); Kerr, M., Milne, R. & Gibson, M (2000) Vegetation mapping study. Report to Lower Murray Darling Rangeland Management Action Plan inc. and Sunrise 21 Inc. (Centre for Environmental Management, University of Ballarat: Victoria); Miles, C. (2000) Classification and mapping of broad vegetation types (BVTs) for the NSW Murray Catchment. Unpublished. (Murray Catchment Trust: Albury); Morcom, L. & Westbrooke, M. (1990) The vegetation of Mallee Cliffs National Park. *Cunninghamia* 2(2): 147-166; NSW National Parks and Wildlife Service (1998) Existing vegetation in Kajuligah Nature Reserve. Unpublished report. (NPWS: Western Region Office); 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; Porteners, M.F., Ashby, E.M. & Benson, J.S. (1997) The natural vegetation of the Pooncarie 1:250 000 map. *Cunninghamia* 5(1): 139-232; Roberts, I. & Roberts, J. (2001) Plains Wanderer (*Pedionmus torquatus*) habitat mapping, including woody vegetation and other landscape features Riverina Plains NSW. Report to NSW National Parks and Wildlife Service (Earth Resources Analysis Pty. Ltd.); Scott, J.A. (1992) The natural vegetation of the Balranald - Swan Hill area. *Cunninghamia* 2(4): 597-652; Smith, P. & Smith J. Ecological Consultants (1990) Floristic Communities. In River Murray Riparian Vegetation Study. (Murray-Darling Basin Commission: Canberra); Stafford, M.J. & Eldridge, D.J. (2000) Vegetation, soils and management of "Zara": a sandhill remnant on the Riverine Plain. *Cunninghamia* 6(3): 717-746; Westbrooke, M.E. & Miller, J.D. (1995) The vegetation of Mungo National Park, western New South Wales. *Cunninghamia* 4(1): 63-80; Westbrooke, M.E., Miller, J.D. & Kerr, M.K.C. (1998) The vegetation of the Scotia 1:100

000 map sheet, western New South Wales. *Cunninghamia* 5(3): 665-684; Western Riverina Regional Vegetation Committee (2001) Draft Western Riverina Regional Vegetation Management Plan. (Western Riverina RVC: Deniliquin); White, M. (2002b) Pre-European mapping of the Riverina. Unpublished GIS map. (Ecology Australia: Fairfield, Victoria); DEC (2006a) Reconstructed and extant distribution of native vegetation in the Lachlan Catchment. Unpublished report (NSW Department of Environment and Conservation: Dubbo); Westbrooke, M. & Gowans, S. (2006a) The vegetation of the Coonavitra area, Paroo Darling National Park, western New South Wales. Report to NSW NPWS (DECC) (Centre for Environment Management, University of Ballarat).

NSW Vegetation Classification - Vegetation ID

Vegetation Community ID 48

Common Name: White Cypress Pine - Drooping Sheoak grassy open woodland of the Riverine Plain

Scientific Name: *Callitris glaucophylla* - *Allocasuarina verticillata* / *Thyridolepis mitchelliana* - *Themeda australis* - *Stackhousia monogyna* - *Austrostipa eremophila*

Veg. Comm. ID.: 48 **Original Entry:** John Benson 31/12/2005

Photo 1: ID48a_img284pc.jpg *Thyridolepis mitchelliana* - *Stackhousia monogyna* - *Themeda australis*, derived grassland with *Allocasuarina verticillata* and *Callitris glaucophylla* low woodland on a broad sand dune, 1km west of Lake Urana, [AMG66 zone 55 421800E 6093300N], 14/9/95, M.F. Porteners.



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

Trees: *Callitris glaucophylla*.

Shrubs/Vines/Epiphytes: *Allocasuarina verticillata*; *Hakea leucoptera* subsp. *leucoptera*; *Eremophila longifolia*; *Pimelea micrantha*.

Ground Cover: *Thyridolepis mitchelliana*; *Themeda australis*; *Stackhousia monogyna*; *Austrostipa eremophila*; *Drosera glanduligera*; *Levenhookia dubia*; *Minuria leptophylla*; *Thysanotus patersonii*; *Ptilotus polystachyus* var. *polystachyus*; *Chrysocephalum apiculatum*; *Bulbine bulbosa*; *Lomandra effusa*; *Hyalosperma semisterile*; *Cheilanthes sieberi* subsp. *sieberi*; *Actinobole uliginosum*; *Wahlenbergia luteola*; *Wahlenbergia stricta* subsp. *alternata*; *Aristida jerichoensis* var. *jerichoensis*; *Monachather paradoxus*; *Diuris lanceolata*; *Dianella porracea*.

Weed Species: *Trifolium arvense*; *Aira elegantissima*; *Hypochaeris glabra*; *Avena fatua*; *Arctotheca calendula*; *Romulea minutiflora*; *Parentucellia latifolia*.

Weediness: Medium (5-15%) with 10-30% cover.

Threatened Plants: Not assessed.

Threatened Fauna: Not assessed.

Mean Species Richness: Not assessed.

Rainforest Structure (Webb): Not applicable.

Structure (WH): Open Woodland; Grassland.

Height Class (WH): Mid-High.

Vegetation Description: Open woodland dominated by White Cypress Pine (*Callitris glaucophylla*) and Drooping Sheoak (*Allocasuarina verticillata*). Needlewood (*Hakea leucoptera*) is often present. The ground cover may be mid-dense or sparse and includes grass species such as *Thyridolepis mitchelliana*, *Themeda australis*, *Austrostipa eremophila* and forb species such as *Stackhousia monogyna*, *Drosera glanduligera*, *Levenhookia dubia*, *Minuria leptophylla*, *Thysanotus patersonii*, *Ptilotus polystachyus* var. *polystachyus*, *Chrysocephalum apiculatum* and *Bulbine bulbosa*. The graminoid *Lomandra effusa* may be common. Occurs on low rises composed of red-brown clay loam soils sometimes with quartz sandstone at the eastern edge of the Riverine Plain, Riverina Bioregion and the western edge of the NSW South-western Slopes Bioregion - from Naranderra in the north to Urana in the south. Most of the community has been degraded or destroyed by grazing.

Level of Classification: Association.

Classification Confidence Level: Low.

Formation Group: Cypress Pine (*Callitris*) Woodlands Mainly of the Inland.

State Veg Map (Keith 2004): Riverine Sandhill Woodlands.

State Landscape (Mitchell 2002): Not Assessed.

NVIS Major Veg Sub-Groups: *Callitris* forests and woodlands.

Forest Type (RN 17): 188 - White Cypress Pine (*P*).

Authority(s): (Combination of Expert Opinion and Quantitative Data). Community 2 in Benson et al. (1997). Only one site observed in this survey and it appears to be a rare community in NSW confined to the eastern Riverina.

Interstate Equivalent(s): None known but may occur in Victoria.

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

Plot Sampling: Inadequate.

Mapping Info: Not mapped but because it occurs on sandy rises it may be possible to map it with field survey.

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

IBRA Bioregion (v6): NSW South-western Slopes (1-30%); Riverina (>70%).

IBRA Sub-Region: Lower Slopes (1-30%); Murrumbidgee (30-70%).

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

Local Govt. Areas: Lockhart (1-30%); Narrandera (1-30%); Urana (30-70%); Corowa (1-30%).

CMAs: Murray (30-70%); Murrumbidgee (1-30%).

MD Basin: Yes.

Substrate Mass: Eolian sand; Eolian sediment.

Lithology: Eolian sand or loam.

Great Soil Group: Red-brown earth.

Soil Texture: Clay loam.

Landform Patterns: Alluvial plain.

Landform Elements: Dune.

Land Use: Grazing.

Impacts of European Settlement: Major reduction (>70%) in extent and/or range; Major alteration of species composition.

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

Pre-European Extent Comments: Estimate only

Current Extent: 500 ha \pm 50% or 10% \pm 80% of pre-European extent remaining.

Current Extent Comments: (Expert estimate). Estimate only as area not mapped as of 2005 but a very rare community.

Conservation Reserves: None.

Reserves Total Area: 0 ha.

No. Representatives in Reserves: 0

Protected Area Explanation: Although this community is recorded a few km south of Lake Urana Nature Reserve, it is not recorded as being in the reserve.

Secure Property Agreements: None.

Secure PAs Total Area: 0 ha.

No. Representatives in Secure Property Agreements: 0

Protected Current Extent: Not known to be protected.

No. Representatives in Protected Areas: 0

Protected Pre-European Extent: 0% which is inadequately protected across distribution.

Restricted in 1750: Code 5b: <5% of pre-European extent in protected areas (1,000<area<10,000 ha).

Key Sites for Protection: Site 3 in Benson et al. (1997) on Cocketgedong farm west of Lake Urana. This site is possibly unique and contains 71 species including a rich forb and grass composition because it has been fenced off for decades. Kangaroo grass survives here yet it has been grazed out over much of the Riverina. More survey is required to discover other sites - some may occur further north near Narranderra.

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: The one fenced off area illustrates what the floristic composition of this open woodland/grassland would have been like. Grazing affects the composition of species and has prevented the regrowth of Drooping Sheoak.

Fire Regime: Now very rare due to lack of ground cover. Pre-European fire regimes unknown.

Adjoining Communities: Grades into various riverine grasslands on the clay plains and into Yellow Box - White Cypress Pine (ID75) on the sandy loams of low rises.

Threatening Processes: Over grazing by stock and rabbits and clearing have destroyed this community over most of its original extent. One fenced off site of less than 1 ha is known.

Threatening Process List: Soil erosion; Unsustainable grazing and trampling by stock; Weed (exotic) invasion.

Threat Category: Critically Endangered.

Threat/Protected Area Code: CE/5b

Threat Criteria: 1; 2; 4.

Planning Controls:

Planning and Management: A rare community that requires fencing off from stock to allow shrubs and ground cover to recover.

Listed Under Legislation: Nominated Commonwealth EPBC Act; Listed TSC Act, E: Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes Bioregions (Part).

Recovery Plan: Doesn't exist, but required.

Reference List: (60). Benson, J.S., Ashby, E.M. & Porteners, M.F. (1997) The native grasslands of the Riverine Plain, New South Wales. *Cunninghamia* 5(1): 1-48;.

NSW Vegetation Classification - Vegetation ID

Vegetation Community ID 75

Common Name: Yellow Box - White Cypress Pine grassy woodland on deep sandy-loam alluvial soils of the eastern Riverina and western NSW South-western Slopes Bioregions

Scientific Name: *Eucalyptus melliodora* - *Callitris glaucophylla* / *Acacia deanei* subsp. *deanei* - *Eremophila longifolia* / *Enchylaena tomentosa* - *Sida corrugata* - *Austrostipa scabra* subsp. *falcata* - *Chloris truncata*

Veg. Comm. ID.: 75 **Original Entry:** John Benson 31/12/2005

Photo 1: ID75a_img013pc.jpg *Eucalyptus melliodora* - *Callitris glaucophylla* woodland, Lake Urana Nature Reserve, [AGD66 35°16'15.6"S 146°08'54.8"E], 9/4/02, Jaime Plaza.



Photo 2: ID75b_img012pc.jpg *Eucalyptus melliodora* - *Callitris glaucophylla* woodland, Lake Urana Nature Reserve, [AGD66 35°16'15.6"S 146°08'54.8"E], 9/4/02, Jaime Plaza.



Photo 3: ID75c_img010pc.jpg Cleared *Eucalyptus melliodora* - *Callitris glaucophylla* woodland, north of Urana, [AGD66 35°00'42.7"S 146°30'30.5"E], 9/4/02, Jaime Plaza.



Characteristic Vegetation: (Qualitative Estimate)

Trees: *Eucalyptus melliodora*; *Callitris glaucophylla*; *Allocasuarina luehmannii*; *Brachychiton populneus* subsp. *populneus*; *Eucalyptus microcarpa*.

Shrubs/Vines/Epiphytes: *Acacia deanei* subsp. *deanei*; *Eremophila longifolia*; *Pittosporum angustifolium*; *Dodonaea viscosa* subsp. *cuneata*; *Acacia decora*; *Senna form taxon 'filifolia'*; *Acacia decora*; *Maireana decalvans*; *Rhagodia spinescens*; *Sclerolaena muricata*.

Ground Cover: *Enchylaena tomentosa*; *Sida corrugata*; *Austrostipa scabra* subsp. *falcata*; *Chloris truncata*; *Dichopogon fimbriatus*; *Cheilanthes austrotenuifolia*; *Calostemma purpureum*; *Solanum esuriale*; *Dianella revoluta* var. *revoluta*; *Wahlenbergia luteola*; *Salsola tragus* subsp. *tragus*; *Microseris lanceolata*; *Crassula sieberiana* subsp. *sieberiana*; *Themeda australis*; *Poa sieberiana*; *Eryngium ovinum*.

Weed Species: *Heliotropium europaeum*; *Marrubium vulgare*; *Cucumis myriocarpus* subsp. *leptodermis*; *Arctotheca calendula*; *Anagallis arvensis*; *Briza maxima*; *Lolium perenne*.

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

Threatened Plants: Not assessed.

Threatened Fauna: Not assessed.

Mean Species Richness: Not assessed.

Rainforest Structure (Webb): Not applicable.

Structure (WH): Woodland.

Height Class (WH): Mid-High; Tall.

Vegetation Description: Mid-high to tall woodland dominated by Yellow Box (*Eucalyptus melliodora*) and White Cypress Pine (*Callitris glaucophylla*) sometimes with Kurrajong (*Brachychiton populneus*). The small tree Buloke (*Allocasuarina luehmannii*), may be present. Shrub species are sparse and may include Hooked Needlewood (*Hakea tephrosperma*), *Pittosporum angustifolium*, Deane's Wattle (*Acacia deanei* subsp. *deanei*), Emu Bush (*Eremophila longifolia*), Puntly Bush (*Senna artemisoides* subsp. *filicifolia*), Thorny Saltbush (*Rhagodia spinescens*), Western Golden Wattle (*Acacia decora*) and *Maireana decalvans*. Ground cover density varies with the seasons but is usually sparse and includes the small shrub *Enchylaena tomentosa*; the grasses *Austrostipa scabra*, *Chloris truncata*, *Themeda australis* and *Poa sieberiana*; the forbs *Sida corrugata*, *Dichopogon fimbriatus*, *Calostemma purpureum*, *Solanum esuriale*, *Dianella revoluta* var. *revoluta*, *Wahlenbergia luteola* and *Microseris lanceolata* may occur. Weed species may be abundant and they include *Heliotropium europaeum*, *Marrubium vulgare* and *Cucumis myriocarpus* subsp. *leptodermis*. This community occurs on well drained, deep, medium and light textured, sandy-loam soils, often on sandy rises, or sandhills on floodplains or on rolling downs. Mainly found west of the line between Temora and Culcain and between Naranderra and Urana with western limits south west of Darlington Point and north to Boree Creek in the lower slopes sub-region of the NSW South Western Slopes and eastern Riverina Bioregions. This community has largely been eliminated by clearing and cropping and is endangered and very poorly represented in protected areas.

Level of Classification: Association.

Classification Confidence Level: Medium.

Formation Group: Eucalyptus (Mostly Grassy) Box Woodlands of the Inland Plains.

State Veg Map (Keith 2004): Riverine Sandhill Woodlands.

State Landscape (Mitchell 2002): Not Assessed.

NVIS Major Veg Sub-Groups: Eucalyptus woodlands with a grassy understorey.

Forest Type (RN 17): 193 - White Cypress Pine-Box (P).

Authority(s): (Expert Opinion). Described by Moore (1953a, p509) who lists this community under his Western Grey Box alliance. Brickhill (1985) lists it as being in the Riverina and considers it has mainly been cleared. Possibly community c1.3 in Bos & Lockwood (1996) for western Lower slopes sub-region. Probably Biolandscape EasR25b in Friday (2006). Limited floristic information available. Probably part of Sandhill Woodland BVT in Miles (2001). A summary is given in the Lake Urana NR plan of Management (NPWS 2001a). Some sites checked by Benson (1999-2009) and noted to have once been extensive between Narranderra and Urana on red sandy-loam soils.

Interstate Equivalent(s): Victoria: part of EVC 264 Sand Ridge Woodland.

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

Plot Sampling: None.

Mapping Info: Mappable with ground checking. Need to distinguish from *Eucalyptus microcarpa* woodlands. Partly mapped in Roberts & Roberts (2001). Some areas typed in state forests. Limited sampling in ground plots as of 2005.

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

IBRA Bioregion (v6): NSW South-western Slopes (30-70%); Riverina (30-70%).

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

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

Local Govt. Areas: Lachlan (1-30%); Greater Hume (1-30%); Lockhart (1-30%); Narranderra (1-30%); Urana (30-70%);Coolamon (1-30%).

CMAs: Murray (30-70%); Murrumbidgee (30-70%).

MD Basin: Yes.

Substrate Mass: Alluvium; Eolian sand; Eolian sediment.

Lithology: Eolian sand or loam.

Great Soil Group: Earthy sand.

Soil Texture: Loam; Loamy sand.

Landform Patterns: Flood plain; Plain.

Landform Elements: Dune; Lunette; Plain.

Land Use: Cropping and Horticulture; Grazing.

Impacts of European Settlement: Major alteration of species composition; Major reduction (>70%) in extent and/or range.

Pre-European Extent: 100000 ha \pm 50%. Expert estimate not based on any mapped vegetation.

Pre-European Extent Comments: Moore's (1953a) suggests this community covered large areas in this region prior to clearing.

Current Extent: 8000 ha \pm 30% or 8% \pm 70% of pre-European extent remaining.

Current Extent Comments: (Expert estimate). Remnants in state forests south-west of Temora and between Urana and Narranderra. Part of Sandhill Woodland unit in Miles (2001) which is estimated to have 13% remaining in the Murray Catchment. However, the Yellow Box component of Miles unit has been cleared to a great extent.

Conservation Reserves: Lake Urana NR 271 (M); Wilbertray FR 86 (E1).

Reserves Total Area: 357 ha.

No. Representatives in Reserves: 2

Protected Area Explanation: Lake Urana area from Roberts & Roberts (2001). Wilbertray Flora Reserve area from Yellow Box-Pine and Pine-Yellow Box forest type areas mapped in the reserve. VCA117 estimate from NSW DECC file notes.

Secure Property Agreements: VCA117 North Berry Jerry Cemetry VCA 3 (E1).

Secure PAs Total Area: 0 ha.

No. Representatives in Secure Property Agreements: 0

Protected Current Extent: 4.46% 357 ha ± 30%.

No. Representatives in Protected Areas: 2

Protected Pre-European Extent: 0.35% which is inadequately protected across distribution.

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

Key Sites for Protection: Some State Forests between Temora, Culcairn, Mulawa and Naranderra such as Wahgunyah and Buckingham. However the woodlands of most state forests have been "timber stand improved" to reduce eucalypts in favour of cypress pine. Some roadside remnants may be worth protecting.

Degree of Fragmentation: Human induced highly fragmented small stands with <30% extent remaining and high 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: Little is known about the impacts of natural disturbance because human-induced disturbance has been so profound.

Fire Regime: Unknown. Rarely burns due to fragmentation of the landscape.

Adjoining Communities: Grades into Western Grey Box - White Cypress Pine woodland (ID80) on finer texture soils and in western areas into White Cypress Pine (ID28) woodland on sandier soils.

Threatening Processes: Mostly cleared for agriculture - although some areas in state forests. Occurs on suitable soils for some cropping including sandhill potatoes. Rabbits and stock grazing affect understorey and regeneration of trees and shrubs. May be affected by salinity in some areas.

Threatening Process List: Age class of woody vegetation; Clearing for agriculture; Dryland cropping; Salinity; Unsustainable grazing and trampling by stock; Unsustainable grazing by introduced animals; Weed (exotic) invasion.

Threat Category: Endangered.

Threat/Protected Area Code: E/5a

Threat Criteria: 5; 4; 1.

Planning Controls:

Planning and Management: Requires detailed survey and protection of what remains under Murrumbidgee and Murray Catchment Management Plans. If it is not included in the broad White Box - Yellow Box ecological community listing under NSW TSC Act, it should be listed as a separate community.

Listed Under Legislation: None.

Recovery Plan: Doesn't exist, but required.

Reference List: (308; 177; 148; 16; 147; 246; 166; 35; 195; 247; 356). Benson, J.S. (1999-2009) Unpublished field note books recording species at various locations in western NSW. (Royal Botanic Gardens and Domain Trust: Sydney); Bos, D. & Lockwood, M. (1996) Flora, fauna and other features of the south west slopes biogeographic region, NSW. Report No. 59, Johnson Centre of Parks, Recreation and Heritage. (Charles Sturt University: Albury); Brickhill, J. (1985) Vegetation by geographic region: Southern Riverina. Paper No. 13. Review of Nature Conservation Programs. Unpublished. (NSW National Parks and Wildlife Service: Sydney); Eardley, K.A. (1999) A foundation for conservation in the Riverina Bioregion. Unpublished Report. (NSW National Parks and Wildlife Service); Forestry Commission of NSW (1989) Forest types in New South Wales. Research Note 17. (Forestry Commission of NSW: Sydney); Miles, C. (2001) NSW Murray Catchment: biodiversity action plan. (Nature Conservation Working Group Inc.: Albury); Moore, C.W.E. (1953a) The vegetation of the south-eastern Riverina, New South Wales 1: the climax communities. Aust. J. Botany 1: 485-547; NSW National Parks and Wildlife Service (1978a) Information sheet - Narranderra Nature Reserve. RN 36. John Brickhill. (NSW National Parks and Wildlife Service: Griffith); NSW National Parks and Wildlife Service (2001a) Lake Urana Nature Reserve Plan of Management (NSW National Parks and Wildlife Service: Hurstville); Roberts, I. & Roberts, J. (2001) Plains Wanderer (*Pedionmus torquatus*) habitat mapping, including woody vegetation and other landscape features Riverina Plains NSW. Report to NSW National Parks and Wildlife Service (Earth Resources Analysis Pty. Ltd.); Priday, S. (in prep. 2006) The native vegetation of the New South Wales South Western Slopes Bioregion (Lachlan, Murrumbidgee and Murray Catchments). Unpublished report to DEC Southern Office Queanbeyan.

NSW Vegetation Classification - Vegetation ID

Vegetation Community ID 173

Common Name: Sandplain mallee of central NSW

Scientific Name: *Eucalyptus socialis* - *Eucalyptus dumosa* - *Eucalyptus gracilis* / *Olearia pimeleoides* - *Eremophila glabra* - *Melaleuca uncinata* / *Triodia scariosa* subsp. *scariosa* - *Dianella revoluta* var. *revoluta* - *Lomandra effusa*

Veg. Comm. ID.: 173 **Original Entry:** John Benson 31/12/2005

Photo 1: ID173a_img123pc.jpg *Eucalyptus socialis* sandplain mallee shrubland, just north of Kajuligah Nature Reserve, [AGD66 32°33'24.0"S 144°42'11.5"E], 17/4/02, Jaime Plaza.



Photo 2: ID173b_img137pc.jpg *Eucalyptus socialis* - *E.gracilis* sandplain mallee woodland, Loughnan Nature Reserve, [AGD66 33°34'18.6"S 145°47'03.1"E], 18/4/02, Jaime Plaza.



Photo 3: ID173c_img140pc.jpg *Eucalyptus socialis* - *E.dumosa* sandplain mallee woodland, Hillston-Rankins Springs Rd, [AGD66 33°37'52.8"S 146°00'18.6"E], 18/4/02, Jaime Plaza.



Characteristic Vegetation: (Quantitative Data)

Trees: *Eucalyptus socialis*; *Eucalyptus dumosa*; *Eucalyptus gracilis*; *Eucalyptus oleosa*; *Eucalyptus leptophylla*; *Callitris verrucosa*; *Casuarina cristata*; *Eucalyptus intertexta*; *Callitris glaucophylla*; *Eucalyptus microcarpa*.

Shrubs/Vines/Epiphytes: *Olearia pimeleoides*; *Eremophila glabra*; *Melaleuca uncinata*; *Acacia rigens*; *Acacia brachybotrya*; *Acacia tindaleae*; *Acacia havilandiorum*; *Dodonaea viscosa* subsp. *cuneata*; *Senna form taxon 'fillifolia'*; *Geijera parviflora*; *Beyeria opaca*; *Templetonia aculeata*; *Bossiaea walkeri*; *Acacia colletioides*; *Bertya cunninghamii*; *Pittosporum angustifolium*; *Pimelea microcephala* subsp. *microcephala*; *Hakea tephrosperma*; *Eremophila longifolia*; *Acacia oswaldii*; *Acacia homalophylla*.

Ground Cover: *Triodia scariosa* subsp. *scariosa*; *Dianella revoluta* var. *revoluta*; *Lomandra effusa*; *Halgania cyanea*; *Austrostipa elegantissima*; *Stackhousia viminea*; *Daucus glochidiatus*; *Chrysocephalum apiculatum*; *Hyalosperma semisterile*; *Vittadinia pterochaeta*; *Sclerolaena diacantha*; *Austrostipa scabra* subsp. *scabra*.

Weed Species: *Echium plantagineum*; *Hyalosperma semisterile*; *Hypochaeris radicata*; *Bromus rubens*; *Vulpia myuros*.

Weediness: Low (<5%) with 10-30% cover.

Threatened Plants: Not assessed.

Threatened Fauna: Mallee Fowl.

Mean Species Richness: 19±2 (Porteners 2003 in 20x20 m plots).

Rainforest Structure (Webb): Not applicable.

Structure (WH): Open Mallee Shrubland; Sparse Mallee Shrubland.

Height Class (WH): Tall; Very Tall.

Vegetation Description: Very tall, open mallee shrubland generally up to 6 m tall dominated by White Mallee (*Eucalyptus dumosa*), Red Mallee (*Eucalyptus socialis*), Snap and Rattle (*Eucalyptus gracilis*). Either White Cypress Pine (*Callitris glaucophylla*) or Mallee Pine (*Callitris verrucosa*) may occur in some locations. The mallee structure can either be bull mallee or whipstick mallee depending on time since disturbance (including fire) and soil type. A shrubby understorey is often present but sometimes absent, the density of which depends on grazing pressure, time since fire and soil type. Common shrub species include *Olearia pimeleoides*, *Eremophila glabra*, Broombush (*Melaleuca uncinata*), *Acacia rigens*, *Acacia brachybotrya*, *Acacia tindaleae*, *Acacia havilandiorum*, *Dodonaea viscosa* subsp. *cuneata* and *Senna artemisioides*. Ground cover is sparse with Porcupine Grass (*Triodia scariosa* subsp. *scariosa*), *Dianella revoluta* var. *revoluta*, *Lomandra effusa*, *Chrysocephalum apiculatum* and *Austrostipa* spp. *Triodia* is not as common in this community as in dune-mallee community (ID171). Occurs on red, sandy loam or sandy clay soils on undulating or flat plains in central NSW including the Paddington-Yathong-Nombinnie regions of the Western Division and areas to the south and east in the Central Division (southern NSW wheatbelt). Widespread with some western areas protected in reserves but most of the eastern areas have been cleared. Weeds such as *Hypochaeris radicata*, *Vulpia myuros*, Paterson's Curse and (*Echium plantagineum*) may be present. Grades into green mallee upslope or into Belah or White Cypress Pine woodlands on more loamy soils.

Level of Classification: Association.

Classification Confidence Level: High.

Formation Group: Mallee Woodlands and Shrublands of Inland Sandplains and Sand Dunes.

State Veg Map (Keith 2004): Sand Plain Mallee Woodlands.

State Landscape (Mitchell 2002): Not Assessed.

NVIS Major Veg Sub-Groups: Mallee *Eucalyptus* low open woodlands.

Forest Type (RN 17): 225 - Mallee (P).

Authority(s): (Quantitative Data). Map units P1, P2 and part of P5 (mosaic unit) in Sivertsen & Metcalfe (1995) (P2 appears to be mainly a modified P1). Includes communities P1 and P3 in Cohn(1995) for Nombinnie area - P1 is more widespread and disturbed and has less *Triodia*. P3 contains Mallee Pine but the other floristics are similar. Community 1 in Parker et al. (1979) for Yathong NR. Probably floristic groups 59 and 57 in Austin et al. (2000) for western Lachlan region. Eastern occurrences of map unit 3b in Porteners (1993) covering the Booligal region and part of the broad map unit 20 in Pickard & Norris (1994). Probably BVT28 in Kerr et al. (2003) an eastern outlier. Listed as Red Mallee woodland in the Mid-Lachlan RVMP area in Mid-Lachlan RVMC (1999). Includes southern parts of the Sandplain Mallee map unit in Dykes (2002) for the Cobar Shire. Part of BVT 38 in DEC (2006, 2006a). This broadly classified community occurs on sandy loam soil on undulating sandplains. Somewhat similar to ID170 in far south west NSW in that it occurs on sandplains rather than sand-dunes and contains less *Triodia* than dunefield mallee. Grades into ID174 to the north on flats of eastern Cobar Peneplain Bioregion.

Interstate Equivalent(s): None.

Mapped/Modelled: Current extent partly mapped or modelled.

Plot Sampling: Inadequate.

Mapping Info: Mapped for wheatbelt by Sivertsen & Metcalfe (1995). Mapped for Nombinnie NR by Cohn(1995) as map units P1 and P3. Mapped for Cobar Shire by Dykes (2002) but it may cover a larger area than this in the Nombinnie region. Mapped on edge of Booligal map sheet by Porteners (1993). Part of map unit 20 in Pickard & Norris (1994). Well sampled in plots over part of range but not sampled in Yathong Nature Reserve.

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

IBRA Bioregion (v6): Cobar Peneplain (1-30%); Murray-Darling Depression (30-70%); NSW South-western Slopes (1-30%).

IBRA Sub-Region: Darling Depression (1-30%); Lachlan Plains (1-30%); Lower Slopes (1-30%); Nymagee (1-30%).

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

Local Govt. Areas: Bland (1-30%); Carrathool (1-30%); Cobar (1-30%); Lachlan (1-30%).

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

MD Basin: Yes.

Substrate Mass: Eolian sand; Eolian sediment.

Lithology: Eolian sand or loam.

Great Soil Group: Desert loam; Earthy sand.

Soil Texture: Loamy sand; Sandy clay loam; Sandy loam.

Landform Patterns: Plain; Sand plain.

Landform Elements: Duneslope; Plain; Swale.

Land Use: Cropping and Horticulture; Grazing.

Impacts of European Settlement: Medium reduction (30-70%) in extent and/or range.

Pre-European Extent: 700000 ha ±30%. Estimated from extant vegetation maps: part range.

Pre-European Extent Comments: Pickard & Norris (1994) map about 600000 ha of their sandplain map unit 20 centred on Paddington north-east of Yathong - but some of this may include other mallee or woodland types. Additional areas occurred to the south and east of their mapping - partly mapped in extant vegetation maps. Dykes predicts 269000 ha occurred in the Cobar Shire.

Current Extent: 350000 ha ±30% or 50% ± 50% of pre-European extent remaining.

Current Extent Comments: (Estimated from mapped extant vegetation: part range). Most of the eastern-most occurrence have been cleared but large areas remain in the Western Division. Dykes (2002) maps 233000 ha of sandplain mallee in the Cobar Shire with about 6% of this area estimated to have been cleared but this is west of the regions that have had substantial clearing. Sivertsen & Metcalfe

(1995) map about 32000 ha in the Forbes-Cargelligo region in map units P1, P2 and half of P5 (P2 is disturbed). Porteners (1993) maps about 2000 ha on the Booligal map sheet near Roto. Cohn(1995) maps 113600 ha in map units P1, P2 and P3 in the Nombinnie -Round Hill region. Parker et al. (1979) estimate 13000 ha occurs in Yathong NR. Other areas occur outside these mapped areas. Probably includes most of map unit 20 (sandplain mallee) in Pickard & Norris (1994) for the Paddington - Yathong area of which it is estimated that about 35 % has been cleared using 1991 M305 data. Mostly cleared in eastern areas e.g.near Dubbo where only 13% remains (Kerr et al. 2003).

Conservation Reserves: Gubbata NR 146 (E1); Kajuligah NR 4000 (E3); Langtree NR 32 (E1); Loughnan NR 360 (E1); Mount Grenfell HS 100 (E2); Nombinnie NR 57590 (E1); Nombinnie SCA 33830 (E2); Pulletop NR 135 (E1); Round Hill NR 12540 (E1); Scrubby Mountain FR 250 (E3); Yathong NR 13400 (E2).

Reserves Total Area: 122383 ha.

No. Representatives in Reserves: 11

Protected Area Explanation: Nombinnie NR, Nombinnie SCA and Round Hill NR estimates from map units P1 and P3 in Cohn(1995). Yathong NR area estimated in Parker et al. (1979). Loughnan NR from Sivertsen & Metcalfe (1995). Brickhill (1976) notes three types of mallee in Kajuligah NR adding up to 6000 ha - they have been subdivided evenly until more data to hand. Pulletop and Gubbata NR based on NSW NPWS (1987). Langtree NR from NPWS file report and sketch map of vegetation. Scrubby Mountain Flora Reserve from map unit SPM and 30% of Mallee Mosaic map unit MOM in Dykes (2002). Mt Grenfell HS from one third of map unit MOM in Dykes (2002). PAs WE9906 and WE9907 from DIPNR PA database.

Secure Property Agreements: WE9906 PA 24 (M); WE9907 PA 35 (M).

Secure PAs Total Area: 59 ha.

No. Representatives in Secure Property Agreements: 2

Protected Current Extent: 34.98% 122442 ha \pm 10%.

No. Representatives in Protected Areas: 13

Protected Pre-European Extent: 17.49% which is adequately protected across distribution.

Common in 1750: Code 2a: 15-25% of pre-European extent in protected areas (>10,000 ha).

Key Sites for Protection: Well represented in protected areas. Additions to small NSW southern wheatbelt reserves are required where possible to protect eastern stands. Taleeban Mallee mining reserve near Rankins Springs samples this mallee type.

Degree of Fragmentation: Human induced fragmented stands with <60% >30% extent remaining and moderate 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: Triodia, Mallee Pine (*Callitris verrucosa*) and other understorey plant species recover slowly after fire. In the long absence of fire the mallee habit can change from whipstick to bull.

Fire Regime: Wildfires may burn mallee every few decades or so, but in fragmented areas fire may be rare. Some lands are regularly burnt by landholders to stimulate herbaceous forage for stock that tends to last for 5-10 years. Frequent fire with inter-fire intervals of less than 10 years reduces food resources required for the survival of the Mallee Fowl (M. Ellis pers. comm).

Adjoining Communities: Grades into Broombush, White Cypress Pine and Belah communities that form patches within the mallee. Fire and clearing affects the understorey composition of the mallee. Grades into a more open less shrubby bull mallee on clay soils (ID193) that is mainly cleared and endangered. Grades into a similar mallee type on the Cobar Peneplain (ID174).

Threatening Processes: Clearing in the NSW wheatbelt and into the Western Division has reduced the extent of this community. Trampling and grazing throughout its range by stock and feral animals has impacted on the understorey and the protective soil cryptogam crusts. Soil erosion is major problem due to friable soils. Some weed invasion. Frequent fire affects the abundance of certain species including the endangered Mallee Fowl and species richness in many locations.

Threatening Process List: Clearing for agriculture; Dryland cropping; Inappropriate fire regimes; Soil erosion; Unsustainable grazing and trampling by stock; Unsustainable grazing by introduced animals.

Threat Category: Near Threatened.

Threat/Protected Area Code: NT/2a

Threat Criteria: 1; 4.

Planning Controls:

Planning and Management: Requires protection from further clearing in both the Central and Western Divisions. The soils are very prone to wind and sheet erosion. Key remnants need to be fenced off from stock. Control goats.

Listed Under Legislation: None.

Recovery Plan: Doesn't exist and not required.

Reference List: (183; 77; 39; 282; 318; 67; 43; 27; 14; 273; 34; 46; 372; 373). Austin, M.P., Cawsey, E.M., Baker, B.L., Yialeloglou, M.M., Grice, D.J. & Briggs, S.V. (2000) Predicted vegetation cover in the central Lachlan region. National Heritage Trust Project AA 1368.97. (CSIRO Division of Wildlife and Ecology: Canberra); Brickhill, J. (1976c) Kajuligah Nature Reserve proposal including sketch map of vegetation. Unpublished HO file M350. (NSW National Parks and Wildlife Service: Hurstville); 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); Kerr, M., Jowett, A. & Robson, D. (2003) Reconstructed distribution and extent of native vegetation within the lower Macquarie-Castlereagh Region. Unpublished Report. (NSW National Parks and Wildlife Service, Western Directorate: Dubbo); Mid-Lachlan Regional Vegetation Committee (1999) Plan Draft Mid-Lachlan Regional Vegetation Management Plan for Public Exhibition. (Mid-Lachlan RVC: Forbes); Parker, B.S., Thackway, R.M. & Menzies, W.J. (1979) An introduction to Yathong Nature Reserve. Unpublished report. (CSIRO Division of Wildlife and Research: Canberra); Pickard, J. & Norris, E.H. (1994) The natural vegetation of north-western New South Wales: notes to accompany the 1:1 000 000 vegetation map sheet. *Cunninghamia* 3(3): 423-464; 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; Porteners, M.F. (2001a) Vegetation survey of Woggon and Tollingo Nature Reserves. Report for the NSW National Parks and Wildlife Service; 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; Sivertsen, D. & Metcalfe, L. (2001) Northern wheatbelt vegetation mapping. Unpublished 1:250 000 scale vegetation maps and vegetation descriptions covering northern NSW wheatbelt. (NSW National Parks and Wildlife Service: Hurstville); DEC (2006) Reconstructed and extant distribution of native vegetation in the Central West Catchment. Unpublished report (NSW Department of Environment and Conservation: Dubbo); 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 174

Common Name: Mallee - Gum Coolabah woodland on red earth flats of the eastern Cobar Peneplain Bioregion

Scientific Name: *Eucalyptus socialis* - *Eucalyptus dumosa* - *Eucalyptus viridis* - *Eucalyptus intertexta* / *Acacia deanei* subsp. *deanei* - *Eremophila glabra* subsp. *glabra* - *Bertya cunninghamii* - *Eremophila mitchellii* / *Triodia scariosa* subsp. *scariosa* - *Sclerolaena birchii* - *Austrostipa scabra* subsp. *scabra* - *Calotis cuneifolia*

Veg. Comm. ID.: 174 **Original Entry:** John Benson 31/12/2005

Photo 1: ID174a_dsc_1877.jpg *Eucalyptus socialis* - *Callitris glaucophylla* sandplain mallee, southern edge of Mt Grenfell Historic Site, [AGD66 31°19'33"S 145°18'13"E; 18/8/03, Jaime Plaza.



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

Trees: *Eucalyptus socialis*; *Eucalyptus dumosa*; *Eucalyptus viridis*; *Eucalyptus intertexta*; *Eucalyptus leptophylla*; *Eucalyptus microcarpa*; *Eucalyptus sideroxylon*; *Brachychiton populneus* subsp. *populneus*; *Acacia doratoxylon*; *Casuarina cristata*; *Alectryon oleifolius* subsp. *canescens*; *Callitris glaucophylla*; *Santalum acuminatum*.

Shrubs/Vines/Epiphytes: *Acacia deanei* subsp. *paucijuga*; *Eremophila glabra* subsp. *glabra*; *Bertya cunninghamii*; *Pimelea microcephala* subsp. *microcephala*; *Dodonaea viscosa* subsp. *cuneata*; *Eremophila deserti*; *Eremophila mitchellii*; *Cassinia laevis*; *Cassinia adunca*; *Olearia pimeleoides*; *Olearia decurrens*; *Dodonaea viscosa* subsp. *spatulata*; *Dodonaea boroniifolia*; *Myoporum montanum*; *Senna* form taxon 'zygophylla'; *Bossiaea walkeri*; *Templetonia aculeata*; *Acacia buxifolia* subsp. *buxifolia*; *Acacia havilandiorum*; *Acacia lineata*; *Hakea leucoptera* subsp. *leucoptera*; *Eremophila longifolia*; *Westringia eremicola*; *Westringia rigida*; *Geijera parviflora*; *Eremophila mitchellii*; *Philothea difformis* subsp. *difformis*; *Jasminum lineare*; *Melaleuca uncinata*; *Phebalium glandulosum* subsp. *glandulosum*; *Micromyrtus striata*; *Dodonaea viscosa* subsp. *cuneata*; *Apophyllum anomalum*; *Choretrum glomeratum*; *Philothea brevifolia*; *Jasminum lineare*; *Senna* form taxon 'filifolia'; *Olearia ramulosa*.

Ground Cover: *Sclerolaena birchii*; *Triodia scariosa* subsp. *scariosa*; *Austrodanthonia fulva*; *Austrostipa scabra* subsp. *scabra*; *Austrodanthonia caespitosa*; *Solanum ellipticum*; *Calotis cuneifolia*; *Vittadinia cervicalis* var. *cervicalis*; *Enchylaena tomentosa*; *Ptilotus obovatus* var. *obovatus*; *Solanum coactiliferum*; *Solanum ferocissimum*; *Xerochrysum bracteatum*; *Dianella revoluta* var. *revoluta*; *Goodenia hederacea* subsp. *hederacea*; *Halgania cyanea*; *Lomandra effusa*; *Scaevola humilis*; *Vittadinia cuneata* var. *hirsuta*; *Daucus glochidiatus*; *Brachyscome multifida* var. *multifida*; *Cryptandra amara* var. *floribunda*; *Sclerolaena bicornis* var. *horrida*; *Vittadinia cervicalis*; *Euchiton sphaericus*; *Plantago cunninghamii*; *Cheilanthes sieberi* subsp. *sieberi*.

Weed Species: *Hypochaeris glabra*; *Hypochaeris radicata*; *Echium plantagineum*.

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

Threatened Plants: *Rulingia procumbens*.

Threatened Fauna: Striated Grasswren; Kultarr; Major Mitchell's Cockatoo; Shy Heathwren; Pied Honeyeater; Little Pied Bat; Chestnut Quail-thrush; Leopard Ctenotus; Marble-faced Delma; Fat-tailed Gecko; Crowned Gecko; Grey Falcon; Painted Honeyeater; Malleefowl; Yellow-tailed Plain Slider; Square-tailed Kite; Hooded Robin (south-eastern form); Scarlet-chested Parrot; Eastern Long-eared Bat (south eastern form); Gilbert's Whistler; Grey-crowned Babbler (eastern subspecies); Grey-crowned Babbler (eastern subspecies); Sandy Inland Mouse; Redthroat; Yellow-bellied Sheath-tail-bat; Narrow-banded Snake; Diamond Firetail; Western Blue-tongued Lizard; Inland Forest Bat.

Mean Species Richness: 19±2 (Porteners 2003 in 20x20 m plots).

Rainforest Structure (Webb): Not applicable.

Structure (WH): Closed Mallee Forest; Open Mallee Forest; Mallee Woodland.

Height Class (WH): Tall; Very Tall.

Vegetation Description: Tall mallee forest or woodland up to 15 m tall but usually about 8 m tall, or post-disturbance shrubland about 5 m tall, dominated by Red Mallee (*Eucalyptus socialis*) and White Mallee (*Eucalyptus dumosa*) sometimes with Narrow-leaved Red Mallee (*Eucalyptus leptophylla*). A taller tree layer, to 25 m tall, is often present composed of Gum Coolabah (*Eucalyptus intertexta*). In some places this may be a dominant layer over the top of mallee. Other trees include Western Grey Box (*Eucalyptus microcarpa*), Mugga Ironbark (*Eucalyptus sideroxylon*) and Kurrajong (*Brachychiton populneus*). White Cypress Pine (*Callitris glaucophylla*) occurs in patches. A sparse shrub layer is composed of Deane's Wattle (*Acacia deanei*), *Acacia colletioides*, *Acacia havilandiorum*, *Acacia buxifolia* subsp. *buxifolia*, Gooma Bush (*Bertya cunninghamii*), Tar Bush (*Eremophila glabra* subsp. *glabra*), Budda (*Eremophila mitchellii*), Wilga (*Geijera parviflora*), Dead Finish (*Acacia tetragonophylla*), Turkeybush (*Eremophila deserti*), Emubush (*Eremophila longifolia*), *Philothea difformis* subsp. *difformis* and various species of hopbush (*Dodonaea* spp.). Ground cover includes the low shrubs Galvanised Burr (*Sclerolaena birchii*) and Ruby Saltbush (*Enchylaena tomentosa*); the grass species *Austrostipa scabra* subsp. *scabra*, *Austrodanthonia caespitosa* and Spinifex (*Triodia scariosa* subsp. *scariosa*); the forb species Purple Burr-daisy (*Calotis cuneifolia*), Ivy Goodenia (*Goodenia hederacea* subsp. *hederacea*), *Xerochrysum bracteatum*, *Dianella revoluta* var. *revoluta* and *Ptilotus obovatus* var. *obovatus*. The

restricted species *Choretrum glomeratum* and *Philotheca brevifolia* occur in Tollingo Nature Reserve. This community occurs on sandy-loam or gravel soils on flats and low rises on peneplains that are composed of basic volcanics or metasediment substrates. Mainly distributed on the eastern edge the Cobar Peneplain Bioregion including parts of the Honeybugle basic volcanic intrusion. A high proportion of the eastern areas is cleared and further clearing remains a threat. Many areas are scalded from soil erosion.

Level of Classification: Association.

Classification Confidence Level: Medium.

Formation Group: Mallee Woodlands and Shrublands of Inland Sandplains and Sand Dunes.

State Veg Map (Keith 2004): Sand Plain Mallee Woodlands.

State Landscape (Mitchell 2002): Not Assessed.

NVIS Major Veg Sub-Groups: Mallee *Eucalyptus low open woodlands*.

Forest Type (RN 17): 225 - Mallee (P).

Authority(s): (Combination of Expert Opinion and Quantitative Data). Includes most of map unit P1 (map code 4031) in Sivertsen & Metcalfe (2001) and Metcalfe et al. (2003). May include some of the eastern most areas of sandplain mallee mapped by Dykes (2002) in Cobar Shire. This differs from the sand plain mallee community (ID173) mapped as P1 in Sivertsen & Metcalfe (1995) to the south in the Murray-Darling Depression Bioregion and Nombinnie Nature Reserve (Cohn1995). Similar to community 7 in Masters & Foster (2000) for the Cobar region. Described in Quanda Nature Reserve by Porteners (2003). Part of BVT 38 in DEC (2006, 2006a). Similar to map unit H7 (ID175) in Sivertsen & Metcalfe (2001) and Metcalfe et al. (2003) but ID175 occurs on hills and slopes and lacks *Triodia*. Part of map units 20 and 21 on the south-east corner of the broad map in Pickard & Norris (1994).

Interstate Equivalent(s): None: restricted to central NSW.

Mapped/Modelled: Current extent partly mapped or modelled.

Plot Sampling: Adequate.

Mapping Info: Mapped and sampled as map unit P1 in the Nymagee- Cobar- Nyngan mapping of Sivertsen & Metcalfe (2001) and Metcalfe et al. (2003).

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 (30-70%).

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

Local Govt. Areas: Bogan (1-30%); Cobar (30-70%).

CMAs: Central West (1-30%); Lachlan (1-30%); Western (30-70%).

MD Basin: Yes.

Substrate Mass: Eolian sediment; Igneous rocks; Metamorphic rocks.

Lithology: Igneous rock (unidentified); Metamorphic rock (unidentified).

Great Soil Group: Red earth.

Soil Texture: Clay loam; Sandy clay loam.

Landform Patterns: Peneplain; Rises.

Landform Elements: Foothills; Hillslope; Plain.

Land Use: Cropping and Horticulture; Grazing.

Impacts of European Settlement: Major alteration of species composition; Medium reduction (30-70%) in extent and/or range.

Pre-European Extent: 80000 ha \pm 30%. Estimated from pre-European map: part range.

Pre-European Extent Comments: Estimated from extant vegetation patterns. This community mainly occurs on the eastern fall of the Cobar Peneplain where clearing is occurring.

Current Extent: 35000 ha \pm 30% or 44% \pm 50% of pre-European extent remaining.

Current Extent Comments: (Estimated from pre-European map: part range). Sivertsen & Metcalfe (2001) map about 27000 ha of map unit P1 in the C and D bands (series 4 and 5) of the northern wheatbelt mapping. It appears from this mapping that much of the eastern part of this community has been cleared but less of the western occurrences have been cleared.

Conservation Reserves: Quanda NR 2200 (E1); Tollingo NR 3180 (M); Woggoon NR 5500 (E1).

Reserves Total Area: 10880 ha.

No. Representatives in Reserves: 3

Protected Area Explanation: Quanda NR combines communities 2, 2sc, and 3 mapped by Porteners (2003). Tollingo and Woggoon NR estimates derived by summing areas of communities 1 and 4 in Porteners (2001a).

Secure Property Agreements: None.

Secure PAs Total Area: 0 ha.

No. Representatives in Secure Property Agreements: 0

Protected Current Extent: 31.08% 10880 ha \pm 30%.

No. Representatives in Protected Areas: 3

Protected Pre-European Extent: 13.6% which is inadequately protected across distribution.

Common in 1750: Code 3a: 5-15% of pre-European extent in protected areas (>10,000 ha).

Key Sites for Protection: Moderately represented in protected areas as it is in several reserves but much of this community is threatened by further fragmentation through clearing. Additions could be made to existing reserves and investigation of other remnants could be undertaken.

Degree of Fragmentation: Human induced fragmented stands with <60% >30% extent remaining and moderate edge to area ratio.

Recoverability: Moderate health as structure and/or composition altered. Likely to recover considerably if causal factors and secondary impacts removed.

Variation & Disturbance: Forms a dense whipstick structure for decades after fire with the structure changing to taller mallee trees over time. Spinifex (*Triodia scariosa*) may or may not be present in the ground layer. *Eucalyptus intertexta* tends to mix with mallee throughout range.

Fire Regime: Probably burnt by wildfires every few decades or more but some lands are regularly burnt by landholders to stimulate herbaceous forage for stock that tends to last 5-10 years.

Adjoining Communities: Grades into Gum Coolabah (ID104), Poplar Box (IDs 103 & 105) or Western Grey Box woodlands (ID76). Grades into sandplain mallee (ID173) on sandier soils.

Threatening Processes: Further clearing in the Cobar-Nyngan regions for crops or grazing. Overgrazing of some remnant areas has resulted in severe soil erosion and scalding. Some woody native shrub invasion. Grazing and browsing by goats may threaten some areas. Considered to be vulnerable due to pressures for clearing and its overall poor condition. If clearing is controlled it should be

downgraded to Near Threatened.

Threatening Process List: Clearing for agriculture; Dryland cropping; Soil erosion; Unsustainable grazing and trampling by stock; Unsustainable grazing by introduced animals; Woody shrub (native) invasion.

Threat Category: Vulnerable.

Threat/Protected Area Code: V/3a

Threat Criteria: 5; 4; 1.

Planning Controls:

Planning and Management: Control further clearing as past clearing has led to soil erosion and a loss of about half of this community. Also prevent too-frequent fire that can eliminate mallee.

Listed Under Legislation: None.

Recovery Plan: Doesn't exist, but required.

Reference List: (282; 206; 307; 27; 273; 203; 46; 372; 373). Dykes, P. (2002) Vegetation communities of the Cobar Shire. Unpublished report. (Department of Land and Water Conservation, Far West Region: Dubbo); Masters, P. & Foster, E. (2000) Investigating fauna distribution on the Cobar Peneplain. Report to the NSW National Parks and Wildlife Service: Hurstville; Metcalfe, L., Sivertsen, D.P., Tindall, D.R. & Ryan, K.M. (2003) Natural vegetation of the New South Wales wheatbelt (Cobar-Nyngan-Gilgandra-Nymagee-Narromine-Dubbo 1:250 000 vegetation sheets). *Cunninghamia* 8(2) 252-284; Pickard, J. & Norris, E.H. (1994) The natural vegetation of north-western New South Wales: notes to accompany the 1:1 000 000 vegetation map sheet. *Cunninghamia* 3(3): 423-464; Porteners, M.F. (2001a) Vegetation survey of Woggoon and Tollingo Nature Reserves. Report for the NSW National Parks and Wildlife Service; Porteners, M.F. (2003b) Vegetation survey of Quanda Nature Reserve. Unpublished report (NSW National Parks and Wildlife Service: Dubbo); Sivertsen, D. & Metcalfe, L. (2001) Northern wheatbelt vegetation mapping. Unpublished 1:250 000 scale vegetation maps and vegetation descriptions covering northern NSW wheatbelt. (NSW National Parks and Wildlife Service: Hurstville); DEC (2006) Reconstructed and extant distribution of native vegetation in the Central West Catchment. Unpublished report (NSW Department of Environment and Conservation: Dubbo); 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 57

Common Name: Belah/Black Oak - Western Rosewood - Wilga woodland of central NSW including the Cobar Peneplain Bioregion

Scientific Name: *Casuarina cristata* - *Casuarina pauper* / *Geijera parviflora* - *Exocarpos aphyllus* - *Apophyllum anomalum* - *Alectryon oleifolius* subsp. *canescens* / *Maireana decalvans* - *Maireana georgei* - *Rhagodia spinescens* / *Enchylaena tomentosa* - *Atriplex stipitata* - *Zygophyllum glaucum*

Veg. Comm. ID.: 57 **Original Entry:** John Benson 31/12/2005

Photo 1: ID57a_img124pc.jpg *Casuarina cristata* - *Exocarpos aphyllus* woodland north of Kajuligah Nature Reserve, [AGD66 32°33'44.7"S 144°43'01.8"E], 17/4/02, Jaime Plaza.



Photo 2: ID57b_img127pc.jpg *Casuarina cristata* - *Geijera parviflora* woodland, Yathong Nature Reserve, [AGD66 32°31'54.4"S 145°34'37.2"E], 17/4/02, Jaime Plaza.



Photo 3: ID57c_dsc_1945.jpg *Casuarina cristata* - *Alectryon oleifolius* woodland, approx. 50km north west of Cobar, [AGD66 31°10'2"S 145°30'31"E], 19/8/03, Jaime Plaza.



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

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

glaucophylla.

Shrubs/Vines/Epiphytes: *Alectryon oleifolius* subsp. *canescens*; *Geijera parviflora*; *Apophyllum anomalum*; *Exocarpos aphyllus*; *Senna* form taxon 'filifolia'; *Maireana decalvans*; *Maireana georgei*; *Rhagodia spinescens*; *Maireana pyramidata*; *Eremophila mitchellii*; *Eremophila sturtii*; *Eremophila glabra*; *Eremophila deserti*; *Capparis mitchellii*; *Olearia pimeleoides*; *Hakea tephrosperma*; *Hakea leucoptera* subsp. *leucoptera*; *Eremophila longifolia*; *Dodonaea viscosa* subsp. *cuneata*; *Jasminum lineare*.

Ground Cover: *Enchylaena tomentosa*; *Atriplex stipitata*; *Sclerolaena diacantha*; *Sclerolaena birchii*; *Zygophyllum glaucum*; *Salsola tragus* subsp. *tragus*; *Chenopodium desertorum* subsp. *anidiophyllum*; *Calotis cuneifolia*; *Rhodanthe floribunda*; *Aristida jerichoensis* var. *subspinulifera*; *Austrodanthonia caespitosa*; *Austrostipa scabra* subsp. *scabra*.

Weed Species: Not assessed.

Weediness: Medium (5-15%) with 10-30% cover.

Threatened Plants: Not assessed.

Threatened Fauna: Not assessed.

Mean Species Richness: Not assessed.

Rainforest Structure (Webb): Not applicable.

Structure (WH): Open Woodland; Woodland; Isolated Trees.

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

Vegetation Description: Low to mid-high woodland or open woodland dominated by Belah (*Casuarina cristata*) intergrading with Black Oak (*Casuarina pauper*) with Western Rosewood (*Alectryon oleifolius* subsp. *canescens*) and Wilga (*Geijera parviflora*), Leafless Cherry (*Exocarpos aphyllus*) and Warrior Bush (*Apophyllum anomalum*) and low shrubs dominated by Bluebushes (*Maireana*) and other chenopods. Occurring on texture contrast soils of brown to red-brown sandy loams sometimes overlying red to red-brown clays or on claypans of silty clay on the eastern and northern edges of the Hay Plain from near Lake Cowal in the east to Gunbar to Ivanhoe to Round Hill/Hillston mainly in the Riverina Bioregion on the south west plains of NSW with outliers on the lower slopes of the NSW South-western Slopes Bioregion. Largely cleared especially in eastern areas.

Level of Classification: Association.

Classification Confidence Level: Medium.

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

State Veg Map (Keith 2004): Semi-arid Sand Plain Woodlands.

State Landscape (Mitchell 2002): Murrumbidgee Source-bordering Dunes;

NVIS Major Veg Sub-Groups: *Casuarina* and *Allocasuarina* forests and woodlands.

Forest Type (RN 17): 212 - Belah (P).

Authority(s): (Combination of Expert Opinion and Quantitative Data). Includes community 28 in Porteners (1993) on the north-eastern edge of the Riverina Bioregion, community P5 in Cohn (1995) for Nombinnie/Round Hill Nature Reserves. Possibly includes floristic group 8 (*Casuarina pauper* with forbland ground cover) in the Gunbar region in Horner et al. (2002). Includes map unit BRW and estimated to be 70% of the Belah-Mallee mosaic map unit BCW in Dykes (2002), covering the Cobar Shire. Part of BVT 39 in DEC (2006, 2006a). Grades into Black Oak (*Casuarina pauper*) - Western Rosewood (ID58) on deep loamy sands in Murray-Darling Depression to the south and ID59 (Black Oak - Western Rosewood - Leopardwood) to the north-west. Limited site data as of 2005.

Interstate Equivalent(s): None, confined to central NSW.

Mapped/Modelled: Current extent partly mapped or modelled.

Plot Sampling: Inadequate.

Mapping Info: Extant south-western occurrences (35 000 ha) mapped by Porteners (1993) as community 28. Dykes (2002) maps this as BRW and 70% of BCW in the Cobar Shire, but also estimated to be 70% of Mallee Mosaic MOM map unit. Cohn (1995) mapped this community in Nombinnie and Round Hill Nature Reserves. Northern and eastern occurrences are not fully mapped.

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

IBRA Bioregion (v6): Cobar Penplain (30-70%); Murray-Darling Depression (30-70%); NSW South-western Slopes (1-30%); Riverina (1-30%).

IBRA Sub-Region: Darling Depression (30-70%); Murrumbidgee (30-70%); Lower Slopes (1-30%).

Botanical Division: South Western Plains (SWP) (>70%); Central Western Slopes (CWS) (1-30%).

Local Govt. Areas: Carrathool (>70%); Cobar (1-30%); Lachlan (1-30%); Urana (1-30%).

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

MD Basin: Yes.

Substrate Mass: Eolian sediment.

Lithology: Clay; Sand.

Great Soil Group: Brown earth; Red-brown earth.

Soil Texture: Clay loam; Clay loam, sandy; Loam; Sandy clay loam.

Landform Patterns: Penplain; Plain.

Landform Elements: Plain.

Land Use: Cropping and Horticulture; Grazing; Nature Conservation.

Impacts of European Settlement: Major alteration of species composition; Medium reduction (30-70%) in extent and/or range; Older age class over most of distribution.

Pre-European Extent: 350000 ha \pm 30%. Estimated based on maps of current vegetation.

Pre-European Extent Comments: Estimate only.

Current Extent: 200000 ha \pm 30% or 57% \pm 50% of pre-European extent remaining.

Current Extent Comments: (Estimated from mapped extant vegetation: part range). About 35000 ha is mapped as map unit 28 for north-eastern Hay Plain region by Porteners (1993). Dykes (2002) maps about 170000 ha of Belah - Western Rosewood being all of his map unit BRW and 70% of his Mallee Mosaic map unit in the Cobar Shire to the north of this. This community is mainly in the Western Division and historically clearing has been controlled. Eastern-most areas on the edge of the Central Division have largely been cleared.

Conservation Reserves: Kajuligah NR 6000 (E3); Langtree NR 200 (M); Mount Grenfell HS 380 (E3); Nombinnie NR 3900 (E1); Nombinnie SCA 1000 (E2); Oolambeyan NP 1 (M); Round Hill NR 251 (M); Scrubby Mountain FR 500 (E3); Yathong NR 7200 (E2).

Reserves Total Area: 19432 ha.

No. Representatives in Reserves: 9

Protected Area Explanation: Nombinnie NR, Nombinnie SCA and Round Hill Nature Reserves from Cohn (1995). Recorded from Langtree NR (NPWS 2000b) based on overlying a vegetation map of Brickhill (1982) with current boundaries of the reserve. Map unit 12 in Roberts & Roberts (2001) covering Oolambeyan NP. 130 ha may be in Murrumbidgee Valley NR based on mapping by Kerr et al. (2000) but this

mapping is Landsat-based and requires checking. Yathong NR estimate from Parker et al. (1979). Community 1 in Hunter & Fallavollita (2003) for Thilta Karra section of Paroo-Darling NP and map unit BRW in Dykes (2002). Estimate for Kajuligah NR from Brickhill (1976) which was half of that mapped at small scale in Pickard & Norris (1994). Estimate for Scrubby Mountain Flora Reserve from Mallee Mosaic map unit in Dykes (2002). Mt Grenfell Historic site is 2/3s of map unit MOM Dykes (2002) but this may be inaccurate.

Secure Property Agreements: None.

Secure PAs Total Area: 0 ha.

No. Representatives in Secure Property Agreements: 0

Protected Current Extent: 9.71% 19432 ha ± 30%.

No. Representatives in Protected Areas: 9

Protected Pre-European Extent: 5.55% which is adequately protected across distribution.

Common in 1750: Code 3a:5-15% of pre-European extent in protected areas (>10,000 ha).

Key Sites for Protection: Areas in Gunbar region and elsewhere on the sandplain clay overlap zone on the western side of the Riverine Plain Bioregion. Some stands west and north of Ivanhoe on the Cobar Peneplain - see mapping by Dykes (2002).

Degree of Fragmentation: Human induced fragmented stands with <60% >30% extent remaining and moderate 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: The main tree species in this community rarely recruit from seed as they tend to resprout from roots. Seedling recruitment may only occur during with a series of wet years and may only happen if grazing is light.

Fire Regime: Unknown. Rarely burns due to lack of ground cover to carry a fire.

Adjoining Communities: Grades into similar communities to west (ID58, 59) on deeper loams and into mallee on sandier soil.

Threatening Processes: Clearing, rabbits and weed infestation. Clearing has been extensive on the eastern edge of the NSW Western Division and most of the community has been cleared in the Central Division hence it is coded as Near Threatened. Areas in the Western Division are threatened with clearing or lack of regrowth of key species over the long term.

Threatening Process List: Age class of woody vegetation; Clearing for agriculture; Dryland cropping; Salinity; Soil erosion; Unsustainable grazing and trampling by stock; Weed (exotic) invasion.

Threat Category: Near Threatened.

Threat/Protected Area Code: NT/3a

Threat Criteria: 1; 4; 5; 3.

Planning Controls:

Planning and Management: Protected in some reserves but susceptible to clearing on the edge of the Western Division of NSW.

Listed Under Legislation: None.

Recovery Plan: Doesn't exist and not required.

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