

NSW Vegetation Classification - Vegetation ID

Vegetation Community ID 44

Common Name: Forb-rich Speargrass - Windmill Grass - White Top grassland of the Riverina Bioregion

Scientific Name: *Austrostipa nodosa* - *Chloris truncata* - *Austrodanthonia caespitosa* / *Rhodanthe corymbiflora* - *Maireana pentagona* - *Chrysocephalum apiculatum* - *Calotis scabiosifolia* var. *scabiosifolia*

Veg. Comm. ID.: 44 **Original Entry:** John Benson 31/12/2005

Photo 1: ID44a_img280pc.jpg *Chrysocephalum apiculatum* - *Swainsona behriana* - *Wahlenbergia gracilis* grassland, Jerilderie, [AGD66 35°18.93'S 145°45.79'E], 11/10/95, M.F. Porteners.



Photo 2: ID44b_img273pc.jpg *Austrostipa nodosa* - *Chloris truncata* - *Lomandra effusa*, grassland, [AGD66 33°02'05"S 146°24'33"E], 13/9/95, M.F. Porteners.



Photo 3: ID44c_img281pc.jpg *Austrostipa nodosa* - *A. scabra* - *Rhodanthe corymbiflora* grassland, McLennons Bore Road, [AGD66 35°01'51"S 145°34'10"E], 17/9/95, M. Porteners.



Characteristic Vegetation: (Quantitative Data)

Trees: Generally absent.

Shrubs/Vines/Epiphytes: *Maireana pentagona*; *Maireana excavata*.

Ground Cover: *Austrostipa nodosa*; *Chloris truncata*; *Austrodanthonia caespitosa*; *Rhodanthe corymbiflora*; *Austrostipa scabra* subsp. *falcata*; *Chrysocephalum apiculatum*; *Calotis scabiosifolia* var. *scabiosifolia*; *Leucochrysum molle*; *Daucus glochidiatus* form G; *Sida corrugata*; *Leiocarpa panaetioides*; *Triptilodiscus pygmaeus*; *Goodenia fascicularis*; *Wurmbea dioica* subsp. *dioica*; *Ptilotus exaltatus* var. *exaltatus*.

Weed Species: *Lolium rigidum*; *Medicago truncatula*; *Arctotheca calendula*; *Cotula bipinnata*; *Hypochaeris glabra*; *Avena fatua*; *Romulea rosea* var. *australis*; *Echium plantagineum*.

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

Threatened Plants: *Lepidium monoplacoides* (E); *Swainsona plagiotropis* (E); *Sclerolaena napiformis* (E); *Leptorhynchus scaber* (E); *Brachysome papillosa* (E); *Swainsona murrayana* (ex V restricted); *Microseris lanceolata* (regionally rare).

Threatened Fauna: Plains Wanderer.

Mean Species Richness: 21±native spp., 8±exotic spp. (Benson et al. 1997 in 10x20 m plots).

Rainforest Structure (Webb): Not applicable.

Structure (WH): Closed Grassland; Grassland; Open Grassland; Sparse Grassland.

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

Vegetation Description: Open to closed grasslands usually about 0.3 m high composed of speargrass (*Austrostipa nodosa*), Windmill Grass (*Chloris truncata*) and Whitetop Wallaby Grass (*Austrodanthonia caespitosa*) with forbs including a range of daisies such as *Leucochrysum molle* and *Calotis scabiosifolia* and legumes such as *Swainsona* spp. The bluebush species *Maireana pentagona* and *Maireana excavata* are often present as scattered low shrubs. Occurs on grey-cracking clays and red-brown clays often including scalds on the plains of the southern part of the Riverine Plain Bioregion from Urana in the east to Deniliquin in the west and to the north. A number of threatened plant species such as *Swainsona plagiotropis*, *Leptorhynchus scaber*, *Sclerolaena napiformis* and *Lepidium monoplacoides* have been recorded in this community. About 100 native species and over 40 exotic species have been recorded. Some annual exotic species such as Rye Grass (*Lolium* spp.) and Wild Oats (*Avena* spp.) can dominate cover in Spring then die off leaving native perennial grasses as dominants. This community is "disclimax" in that the grassland of today was probably mixed with chenopod shrublands prior to European settlement. A combination of sheep and rabbit grazing and a drought in the 1880s led to the destruction of the larger saltbushes. Grasslands in best condition are found on roadsides, in travelling stock reserves or in lightly grazed paddocks where ploughing has not occurred.

Level of Classification: Association.

Classification Confidence Level: High.

Formation Group: Grasslands on Fine Texture Soils on the Inland Slopes and Plains.

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

State Landscape (Mitchell 2002): Not Assessed.

NVIS Major Veg Sub-Groups: Other tussock grasslands.

Forest Type (RN 17): 230 - Natural Grassland (P).

Authority(s): (Quantitative Data). Combination of plant communities 1a and 1b in Benson et al. (1997). Partly mapped as a general grassland community (community 26) in Porteners (1993). Included as various types of grassland in Roberts and Roberts (2001) who mapped structure rather than floristics.

Interstate Equivalent(s): Victoria: part of EVC 132 Plains Grassland (Goulburn - Broken region) but this EVC is a broad grouping of grassland communities.

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

Plot Sampling: Adequate.

Mapping Info: Not mapped but plot surveyed by Benson et al. (1997). Mapping floristic grassland communities is difficult. It requires much ground checking in both Spring and Summer.

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

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

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

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

Local Govt. Areas: Berrigan (1-30%); Conargo (1-30%); Corowa (1-30%); Deniliquin (1-30%); Greater Hume (1-30%); Jerilderie (30-70%); Lockhart (1-30%); Murray (1-30%); Urana (1-30%); Murrumbidgee (1-30%); Narrandera (1-30%).

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

MD Basin: Yes.

Substrate Mass: Alluvium.

Lithology: Clay.

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

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

Landform Patterns: Alluvial plain.

Landform Elements: Plain; Scald.

Land Use: Cropping and Horticulture; Grazing.

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

Pre-European Extent: 300000 ha ±50%. Expert estimate not based on any mapped vegetation.

Pre-European Extent Comments: It is likely that over 1000000 ha of grassland of various types occurs on the Riverina Plain (derived largely from Myall woodland and Saltbush shrubland since European settlement). These grasslands have largely been destroyed near rivers through irrigation for rice and improved pasture (Benson et al. (1997). This estimate ignores the loss of previous shrub species - it is assumed that in pre-European times there was a mosaic of grassland with Bladder Saltbush shrubland, Old Man Saltbush shrubland and Weeping Myall woodland but the woody vegetation has been grazed out.

Current Extent: 80000 ha ±50% or 27% ± 80% of pre-European extent remaining.

Current Extent Comments: (Expert estimate). Porteners (1993) combines all Riverina grasslands under community 26 and mapped 290000 on the Booligal-Hay-Deniliquin-Bendigo 1:250000 map sheets but most of this was not this grassland type. An unmapped area (as of 2005) of this grassland occurs to the east centred on Jerilderie. The best remnants are on roadsides.

Conservation Reserves: Jerilderie NR 37 (M); Koonadan HS 5 (E4).

Reserves Total Area: 42 ha.

No. Representatives in Reserves: 2

Protected Area Explanation: Jerilderie NR from Benson et al. (1997). Small but disturbed area in Koonadan Historic Site from Roberts & Roberts (2001). PA DE9905 from overlaying Porteners (1993).

Secure Property Agreements: DE9905 PA 2 (E1).

Secure PAs Total Area: 2 ha.

No. Representatives in Secure Property Agreements: 1

Protected Current Extent: 0.05% 44 ha ± 30%.

No. Representatives in Protected Areas: 3

Protected Pre-European Extent: 0.01% 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: See Benson et al. (1997). South Corre Road near Jerilderie, Boree paddock on Mourundah owned by the Navy and other sites in Benson et al. (1997). It is important to protect key sites from disturbance.

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: Derived from a chenopod shrubland prior to European settlement where grassland probably formed a mosaic with shrubland. Grazing and fire affects species composition and abundance. Species composition alters with the seasons and from year to year depending on rainfall.

Fire Regime: Legumes such as Swainsona appear to germinate profusely after fire. The last fire covering the regions was in 1989 and fire tends to occur every few decades or so. Aboriginal people may have patch burnt grassland among chenopod shrubs but intense frequent fire is likely to eliminate some chenopod shrubs.

Adjoining Communities: Grades into other grassland types (ID45-46) on different soils on the plains, Myall Woodland (ID26) on alluvial plains and Black Box woodland (ID13) on floodplains and White Cypress Pine open woodland/grassland (ID28) on sandy rises or prior streams.

Threatening Processes: Clearing for rice cropping and pastures is the main threat. Continuous grazing has eliminated species from most private land. Only a small proportion of the grassland remains in "good" condition, i.e. contains a high diversity of native forb species. For this reason the community is threatened.

Threatening Process List: Clearing for agriculture; Dryland cropping; Irrigated cropping (incl. horticulture); Salinity; Soil erosion; Unsustainable grazing and trampling by stock; Weed (exotic) invasion.

Threat Category: Endangered.

Threat/Protected Area Code: E/5a

Threat Criteria: 4; 1.

Planning Controls:

Planning and Management: Requires protection from further destruction under Murray and Murrumbidgee Catchment Management Plans. Some areas require to be protected from heavy continuous grazing under property agreements.

Listed Under Legislation: Nominated Commonwealth EPBC Act.

Recovery Plan: Doesn't exist, but required.

Reference List: (60; 61; 247). 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; Diez, S. & Foreman, P. (1996) Practical guidelines for the management of native grasslands on the Riverine Plain of south-eastern Australia. (Department of Natural Resources: Bendigo); 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.).

NSW Vegetation Classification - Vegetation ID

Vegetation Community ID 45

Common Name: Plains Grass grassland on alluvial mainly clay soils in the Riverina and NSW South-western Slopes Bioregions

Scientific Name: *Austrostipa aristiglumis* - *Walwhalleya proluta* - *Sporobolus caroli* - *Austrodanthonia duttoniana* / *Marsilea drummondii* - *Eleocharis pallens* - *Wurmbea dioica* subsp. *dioica*

Veg. Comm. ID.: 45 **Original Entry:** John Benson 31/12/2005

Last Modified: J.S. Benson 10/08/2011

Photo 1: ID45a_img276pc.jpg Plains Grass (*Austrostipa aristiglumis*) grassland. Near Urana, October 1995, J.S. Benson.



Photo 2: ID45b_img282pc.jpg *Austrostipa aristiglumis* - *Calocephalus citreus*, 7km west of Daysdale, [AMG66 zone 55 429800E 6056200N], 15/9/95, M. Porteners.



Photo 3: ID45c_img283pc.jpg *Eulalia aurea* - *Austrostipa aristiglumis*, Coonong, z55 415000 6108900, 16/9/95, M. Porteners.



Characteristic Vegetation: (Quantitative Data)

Trees: Generally absent.

Shrubs/Vines/Epiphytes: *Muehlenbeckia florulenta*; *Sclerolaena muricata* var. *muricata*.

Ground Cover: *Austrostipa aristiglumis*; *Walwhalleya proluta*; *Sporobolus caroli*; *Marsilea drummondii*; *Eleocharis pallens*;

Wurmbea dioica subsp. *dioica*; *Maireana pentagona*; *Rumex dumosus*; *Calotis anthemoides*; *Arthropodium minus*; *Leptorhynchus squamatus* subsp. *A*; *Crassula decumbens* var. *decumbens*; *Goodenia fascicularis*; *Rhodanthe corymbiflora*; *Oxalis perennans*; *Enteropogon ramosus*; *Asperula conferta*; *Dichanthium sericeum* subsp. *sericeum*; *Austrodanthonia duttoniana*; *Chloris truncata*; *Eleocharis pusilla*; *Solanum esuriale*; *Epilobium billardiereum* subsp. *cinereum*; *Elymus scaber* var. *scaber*; *Bulbine semibarbata*; *Swainsona swainsonioides*; *Sida trichopoda*.

Weed Species: *Arctotheca calendula*; *Hypochaeris glabra*; *Lolium rigidum*; *Trifolium arvense*; *Romulea rosea* var. *australis*; *Echium plantagineum*; *Medicago truncatula*; *Phyla canescens*; *Phalaris paradoxa*; *Trifolium angustifolium*.

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

Threatened Plants: *Swainsona plagiotropis* (E).

Threatened Fauna: Brolga, Plains Wanderer.

Mean Species Richness: 21±7 (Benson et al. 1997 in 10x20 m plots).

Rainforest Structure (Webb): Not applicable.

Structure (WH): Closed Grassland; Grassland; Open Grassland; Sparse Grassland.

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

Vegetation Description: Tussock grassland dominated by the grass species Plains Grass (*Austrostipa aristiglumis*), *Walwhalleya proluta*, *Austrodanthonia duttoniana*, *Enteropogon ramosus*, *Sporobolus caroli* and *Chloris truncata*. Queensland Bluegrass (*Dichanthium sericeum* subsp. *sericeum*) occurs in the north and *Austrodanthonia duttoniana* is more common in the south. Nardoo Nardoo (*Marsilea drummondii*) is common throughout along with forbs such as *Wurmbea dioica* subsp. *dioica*, *Rumex dumosus*, *Arthropodium minus*, *Leptorhynchus squamatus* subsp. *A*, *Crassula decumbens* var. *decumbens*, *Goodenia fascicularis*, *Rhodanthe corymbiflora* and several species of *Swainsona*. The sedge *Eleocharis pallens* is often present. *Lignum* (*Muehlenbeckia florulenta*) may occur as scattered shrubs. Weed species are common and at some sites may be dominant. They include Cape Weed (*Arctotheca calendula*), *Hypochaeris glabra*, *Lolium rigidum*, *Trifolium arvense*, *Romulea rosea* var. *australis*, *Echium plantagineum*, *Medicago truncatula* and *Phyla canescens*. Occurs on dark grey, self-mulching clays and clay loam soils in slightly low lying areas of the floodplains and alluvial plains of central NSW extending from the Riverina and Lower Slopes of the NSW SWS Bioregions to north of Warren in the north-central wheatbelt of NSW. Often containing a high proportion of annual exotic species in Spring. Poorly represented in reserves and threatened due to cropping and grazing.

Level of Classification: Association.

Classification Confidence Level: High.

Formation Group: Grasslands on Fine Texture Soils on the Inland Slopes and Plains.

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

State Landscape (Mitchell 2002): Not Assessed.

NVIS Major Veg Sub-Groups: Other tussock grasslands.

Forest Type (RN 17): 230 - Natural Grassland (P).

Authority(s): (Quantitative Data). Includes plant community 3 in Benson et al. (1997). Described and mapped in Biddescome (1963). Probably includes floristic group NW17 in Lewer et al. (2003) for Lachlan River region. Includes the treeless areas of the Plains Grass community BVT35 in Kerr et al. (2003) for north-central NSW. Mapped as a general grassland community (community 26) in Porteners (1993). Probably grassland community 3c in Roberts & Roberts (2001). Part of BVY 75 in DEC (2006, 2006a).

Interstate Equivalent(s): Victoria: part of EVC 132 Plains Grassland (Goulburn - Broken region) but this EVC is a broad grouping of grassland communities.

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

Plot Sampling: Inadequate.

Mapping Info: Surveyed in the Riverina by Benson et al. (1997) but not mapped as of 2005. Mapped by Biddescome (1963) in the Macquarie Marshes region. Difficult to map without detailed ground checking.

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

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

IBRA Sub-Region: Bogan-Macquarie (1-30%); Castlereagh-Barwon (1-30%); Murray Fans (30-70%); Murrumbidgee (30-70%); Lower Slopes (1-30%).

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

Local Govt. Areas: Berrigan (1-30%); Bogan (1-30%); Cowra (1-30%); Jerilderie (30-70%); Murray (1-30%); Murrumbidgee (1-30%); Urana (30-70%); Warren (1-30%); Lockhart (1-30%).

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

MD Basin: Yes.

Substrate Mass: Alluvium.

Lithology: Clay.

Great Soil Group: Alluvial soil; Grey clay; Grey earth.

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

Landform Patterns: Alluvial plain; Flood plain.

Landform Elements: Drainage depression; 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: 250000 ha ±50%. Expert estimate not based on any mapped vegetation.

Pre-European Extent Comments: Originally widespread as documented in the survey by Benson et al. (1997). This estimate ignores the loss of previous shrub species - it is assumed that in pre-European times there was a mosaic of grassland with Bladder Saltbush shrubland, Old Man Saltbush shrubland and Myall woodland but the latter was grazed out. 83000 map as pre-clearing extent In Castlereagh-Macquarie region by Kerr et al. (2003) but this includes treed areas.

Current Extent: 100000 ha ±50% or 40% ± 80% of pre-European extent remaining.

Current Extent Comments: (Expert estimate). Restricted to swampy depressions as documented in the survey by Benson et al. (1997). A minor part of Porteners (1993) Riverina grasslands map unit 26. Part of grassland map units in Lewer et al. (2003) along the Lachlan River. Kerr et al. (2003) estimate about 56% remains in northern occurrences.

Conservation Reserves: Oolambeyan NP 2000 (E3).

Reserves Total Area: 2000 ha.

No. Representatives in Reserves: 1

Protected Area Explanation: For Oolambeyan NP it is assumed that most of map unit 3c in Roberts & Roberts (2001) is this community.

Secure Property Agreements: None.

Secure PAs Total Area: 0 ha.

No. Representatives in Secure Property Agreements: 0

Protected Current Extent: 2% 2000 ha \pm 30%.

No. Representatives in Protected Areas: 1

Protected Pre-European Extent: 0.8% 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: Parts of "Coonong" and other sites in Table 3 of Benson et al. (1997). There may be some sites along the Lachlan River to the north and similar community around the Macquarie Marshes. There is a need for property agreements to be entered into over areas that are in good condition.

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: Probably mostly derived from a chenopod shrubland or woodlands prior to European settlement where grassland probably formed a mosaic with shrubland. Grazing and fire affects species composition and abundance. Species composition alters with the seasons and from year to year depending on rainfall.

Fire Regime: Legumes such as Swainsona appear to favour fire. The last fire was in 1989. Aboriginal people probably patch burnt grassland but intense frequent fire may eliminate some chenopod shrubs.

Adjoining Communities: Grades into other grassland communities (ID44, 46) and Myall woodland (ID26, ID27) on the plains and Black Box woodland (ID13) on floodplains. A similar community, ID102 Liverpool Plains grassland, was once widespread on the basalt soils of the Liverpool Plains.

Threatening Processes: Clearing for rice cropping and pastures is the main threat. Continuous grazing has eliminated species from most private land. Only a small proportion of the grassland remains in "good" condition, i.e. contains a high diversity of native forb species. Many sites are invaded by weeds with *Phyla canescens* becoming more common to the north.

Threatening Process List: Clearing for agriculture; Dryland cropping; Irrigated cropping (incl. horticulture); Hydrology (drainage); Salinity; Unsustainable grazing and trampling by stock.

Threat Category: Vulnerable.

Threat/Protected Area Code: V/5a

Threat Criteria: 1; 4.

Planning Controls:

Planning and Management: Requires protection from further destruction under the Murray, Murrumbidgee, Lachlan and Central West Catchment Management Plans. Some areas require to be protected from heavy continuous grazing.

Listed Under Legislation: Nominated Commonwealth EPBC Act.

Recovery Plan: Doesn't exist, but required.

Reference List: (60; 319; 61; 318; 293; 247; 372; 373). 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; Biddiscome, E.F. (1963) Vegetation survey in the Macquarie Marshes, New South Wales. Technical Paper No. 18 CSIRO Division of Plant Industry. (CSIRO: Melbourne); Diez, S. & Foreman, P. (1996) Practical guidelines for the management of native grasslands on the Riverine Plain of south-eastern Australia. (Department of Natural Resources: Bendigo); 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; 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.); 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 46

Common Name: Curly Windmill Grass - speargrass - wallaby grass grassland on alluvial clay and loam on the Hay Plain, Riverina Bioregion

Scientific Name: *Enteropogon ramosus* - *Austrostipa nodosa* - *Austrodanthonia eriantha*-*Austrodanthonia fulva* / *Rhodanthe corymbiflora* - *Sida corrugata* - *Atriplex leptocarpa*

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Photo 1: ID46a_img271pc.jpg *Austrodanthonia caespitosa*, *Austrostipa* spp. Grassland. Crockets Lane, Hay Plain, SWG033, [AGD66 35°11'.38"S 145°34'. 32"E], M.F.Porteners.



Photo 2: ID46b_img272pc.jpg *Austrodanthonia caespitosa*, Hay Plain, Warwillah Road, SWG047, [AGD66 35°02.29'S 144°53.36'E], 1995, M.F.Porteners.



Characteristic Vegetation: (Quantitative Data)

Trees: Generally absent.

Shrubs/Vines/Epiphytes: *Maireana excavata*; *Maireana aphylla*; *Maireana pentagona*.

Ground Cover: *Enteropogon ramosus*; *Austrostipa nodosa*; *Austrodanthonia eriantha*; *Austrodanthonia fulva*; *Austrodanthonia caespitosa*; *Austrodanthonia setacea*; *Austrostipa scabra*; *Walwhalleya proluta*; *Sclerolaena stelligera*; *Atriplex leptocarpa*; *Rhodanthe corymbiflora*; *Crassula colorata* var. *acuminata*; *Erodium crinitum*; *Leiocarpa panaetioides*; *Oxalis perennans*; *Sida corrugata*; *Goodenia pusilliflora*; *Goodenia fascicularis*; *Vittadinia cuneata* var. *cuneata* f. *cuneata*; *Calotis scabiosifolia* var. *scabiosifolia*; *Calocephalus sonderi*; *Bulbine semibarbata*; *Daucus glochidiatus* form G.

Weed Species: *Lolium rigidum*; *Avena fatua*; *Medicago truncatula*; *Arctotheca calendula*; *Echium plantagineum*; *Cotula bipinnata*; *Erodium cicutarium*; *Vulpia myuros*; *Phalaris aquatica*; *Medicago polymorpha*.

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

Threatened Plants: *Lepidium monolocoides* (E); *Swainsona murrayana* (ex V restricted).

Threatened Fauna: Plains Wanderer.

Mean Species Richness: 15±4 native spp., 8±exotic spp. (community 4 in Benson et al. 1997 in 10x20 m plots); 22±1 (floristic group 3 in Horner et al. 2002 in 20x20 m plots).

Rainforest Structure (Webb): .

Structure (WH): Closed Grassland; Grassland; Open Grassland; Sparse Grassland.

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

Vegetation Description: Open to closed tussock grassland generally about 0.3 m high dominated by Curly Windmill Grass (*Enteropogon ramosus*), corkscrew grass (*Austrostipa nodosa* and/or *Austrostipa scabra*) and a number of wallaby grass species (*Austrodanthonia* spp.) with a range of forbs including *Rhodanthe corymbiflora*, *Crassula colorata* var. *acuminata*, *Erodium crinitum*, *Oxalis perennans*, *Sida trichopoda*, *Sida corrugata*, *Goodenia pusilliflora*, *Goodenia fascicularis*, *Calotis scabiosifolia* var. *scabiosifolia*, *Calocephalus sonderi*,

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Bulbine semibarbata and Daucus glochidiatus form G. A very sparse shrub layer may be present including Sclerolaena stelligera, Maireana excavata and Maireana aphylla. Occurs on medium brown to grey clays and loams on level alluvial plains on the western Riverine Plain (Hay Plain) near Hay and north-east of Deniliquin in the Riverina Bioregion. Contains a high proportion of annual exotic species in Spring dominated by Wimmera Rye Grass (Lolium rigidum) and Wild Oats (Avena fatua). Very poorly represented in protected areas as of 2005 and susceptible to clearing for cropping.

Level of Classification: Association.

Classification Confidence Level: High.

Formation Group: Grasslands on Fine Texture Soils on the Inland Slopes and Plains.

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

State Landscape (Mitchell 2002): Not Assessed.

NVIS Major Veg Sub-Groups: Other tussock grasslands.

Forest Type (RN 17): 230 - Natural Grassland (P).

Authority(s): (Quantitative Data). Equivalent to plant community 4 in Benson et al. (1997). Probably includes floristic groups 3 and 4 being most of map unit 20 in Horner et al. (2002). Mapped as a general grassland community (community 26) in Porteners (1993). Probably equivalent to grassland categories 1 and 2 in Roberts & Roberts (2001) in Oolambeyan NP - in the near Hay region.

Interstate Equivalent(s): Victoria: part of EVC 132 Plains Grassland (Goulburn - Broken region) but this EVC is a broad grouping of grassland communities.

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

Sampling: Adequate.

Mapping Info: Difficult to map out without ground survey in spring and summer. Occurs on the Hay Plain section of the Riverina. Surveyed by Benson et al. (1997) but not specifically mapped as of 2005. Some areas may be mapped as broader grassland communities such as Horner et al. (2002) floristic group 3.

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

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

IBRA Sub-Region: Lachlan (30-70%); Murrumbidgee (30-70%).

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

Local Govt. Areas: Carrathool (1-30%); Conargo (1-30%); Hay (30-70%); Murrumbidgee (1-30%); Jerilderie (1-30%).

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

MD Basin: Yes.

Substrate Mass: Alluvium.

Lithology: Alluvial loams and clays.

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

Soil Texture: Clay loam; Medium clay.

Landform Patterns: Alluvial plain.

Landform Elements: Plain.

Land Use: Cropping and Horticulture; Grazing.

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

Pre-European Extent: 250000 ha \pm 50%. Expert estimate not based on any mapped vegetation.

Pre-European Extent Comments: Widespread as documented in the survey by Benson et al. (1997). This estimate ignores the loss of previous shrub species - it is assumed that in pre-European times there was a mosaic of grassland with bladder saltbush shrubland, Old Man Saltbush shrubland and Myall woodland but the latter was grazed out.

Current Extent: 200000 ha \pm 50% or 80% \pm 80% of pre-European extent remaining.

Current Extent Comments: (Expert estimate). Porteners (1993) combines all Riverina grasslands under community 26 and mapped 290000 on the Booligal-Hay-Deniliquin. Probably most of the 200000 ha in map unit 20 in Horner et al. (2002). The grasslands were probably derived from Weeping Myall woodland and saltbush shrubland since European settlement.

Conservation Reserves: Kalyarr NP 2050 (E2); Oolambeyan NP 15600 (E2); Willandra NP 5445 (E3).

Reserves Total Area: 23095 ha.

No. Representatives in Reserves: 3

Protected Area Explanation: Oolambeyan National Park area from grassland map units 1, 2 and 3 in Roberts & Roberts (2001) but these may include some ID44. Kalyarr NP from map unit 20 in Horner et al. (2002). PA DE9906 from overlaying Roberts & Roberts (2001) but maybe ID44. Willandra NP estimate by halving cotton bush community in Porteners (1993) based on discussion with Brickhill (pers. comm.).

Secure Property Agreements: DE9906 PA 5 (M).

Secure PAs Total Area: 5 ha.

No. Representatives in Secure Property Agreements: 1

Protected Current Extent: 11.55% 23100 ha \pm 50%.

No. Representatives in Protected Areas: 4

Protected Pre-European Extent: 9.24% 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: Site 47 on Warwillah Rd in Benson et al. (1997). Hay Plain.

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: This community probably would have been mixed with chenopod shrubs, particularly Bladder Saltbush, prior to European settlement. The saltbush has been eliminated by grazing and dueback leaving a grassland community. Annual weeds such as Wild Oats and Rye Grass can dominate in spring.

Fire Regime: Occasional wildfires sweep across plains perhaps every few two decades or so.

Adjoining Communities: Grades into other grassland communities (ID44, 45) on the plains. Grades into Bladder Saltbush (ID157) to the west and other chenopod shrublands.

Threatening Processes: Extension of rice cropping is threatening some areas. Weed invasion and over grazing have been the main threats over the last century

Threatening Process List: Clearing for agriculture; Dryland cropping; Irrigated cropping (incl. horticulture); Unsustainable grazing and trampling by stock.

Threat Category: Least Concern.

Threat/Protected Area Code: LC/3a

Threat Criteria: 1; 4.

Planning Controls:

Planning and Management: Requires protection from further destruction under Murray and Murrumbidgee Catchment Management Plans including limitation on bores and associated rice irrigation. Some areas require to be protected from heavy continuous grazing under property agreements.

Listed Under Legislation: Nominated Commonwealth EPBC Act.

Recovery Plan: Doesn't exist and not required.

Reference List: (3; 60; 61; 289; 247). Beadle, N.C.W. (1981) The vegetation of Australia. (Cambridge University Press: Cambridge); 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; Diez, S. & Foreman, P. (1996) Practical guidelines for the management of native grasslands on the Riverine Plain of south-eastern Australia. (Department of Natural Resources: Bendigo); 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); 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.).

NSW Vegetation Classification - Vegetation ID

Vegetation Community ID 165

Common Name: Derived corkscrew grass grassland/forbland on sandplains and plains in the semi-arid (warm) climate zone

Scientific Name: *Austrostipa scabra* subsp. *scabra* - *Austrostipa nodosa* - *Austrostipa nitida* / *Sclerolaena divaricata* - *Salsola tragus* subsp. *tragus* / *Bromus rubens* - *Hordeum leporinum*

Veg. Comm. ID.: 165 **Original Entry:** John Benson 31/12/2005

No Photo Available

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

Trees: *Casuarina pauper*; *Myoporum platycarpum* subsp. *platycarpum*.

Shrubs/Vines/Epiphytes: *Maireana pyramidata*; *Maireana sedifolia*.

Ground Cover: *Austrostipa scabra* subsp. *scabra*; *Austrostipa nodosa*; *Austrostipa nitida*; *Chloris truncata*; *Dissocarpus paradoxus*; *Sclerolaena divaricata*; *Salsola tragus* subsp. *tragus*; *Sclerolaena obliquicuspis*; *Sclerolaena muricata*; *Aristida contorta*; *Einaidia nutans* subsp. *nutans*; *Rhodanthe pygmaea*; *Erodium crinitum*; *Atriplex stipitata*; *Cheilanthes sieberi* subsp. *sieberi*.

Weed Species: *Bromus rubens*; *Hordeum leporinum*; *Echium plantagineum*; *Heliotropium europaeum*; *Silene apetala*; *Salvia verbenaca*; *Psilocaulon tenue*; *Omphalolappula concava*; *Sisymbrium irio*; *Medicago polymorpha*.

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

Threatened Plants: *Calotis moorei*; *Swainsona sericea*.

Threatened Fauna: Kultarr; Australian Bustard; Bush Stone-curlew; Major Mitchell's Cockatoo; Red-tailed Black- Cockatoo; Pied Honeyeater; Little Pied Bat; Collared Whip Snake; Grey Falcon; Squatter Pigeon; Brolga; Stimson's Python; Square-tailed Kite; Plains-wanderer; Flock Bronzewing; Sandy Inland Mouse; Ringed Brown Snake; Interior Blind Snake; Yellow-bellied Shearwater; Narrow-banded Snake; Stripe-faced Dunnart; Masked Owl.

Mean Species Richness: Not assessed.

Rainforest Structure (Webb): Not applicable.

Structure (WH): Open Forbland; Open Grassland; Sparse Chenopod Shrubland.

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

Vegetation Description: Low to mid-high grassland, forbland or sparse shrubland dominated by native and exotic species with the species composition highly variable from place to place and depending on the seasons and rainfall. Native grasses include sickle shaped corkscrew grasses such as *Austrostipa scabra*, *Austrostipa nitida* or *Austrostipa nodosa* and in some locations *Aristida contorta*. Windmill Grass (*Chloris truncata*) may be common. Introduced grasses include *Hordeum leporinum* and *Bromus rubens*. Scattered shrubs may be present including Black Bluebush (*Maireana pyramidata*), Pearl Bluebush (*Maireana sedifolia*), *Salsola kali* and the copperburrs *Sclerolaena divaricata*, *S. muricata* and *S. obliquicuspis*. Native forbs include *Rhodanthe* spp., *Ptilotus* spp. and *Erodium* spp. and introduced forbs include *Salvia verbenacea*, *Sisymbrium irio*, *Echium plantagineum*, *Heliotropium europaeum* and *Silene apetala*. Occurs on sandy loam or clay loam soils in drainage depressions, swales or plains on eolian dunefields, sandplains or higher alluvial plains in the semi-arid and arid climatic zones mainly in south western NSW extending into South Australia and Victoria. The soil of these open, herblands is heavier than that supporting mallee. Some areas are possibly natural but others have probably been derived through heavy grazing disturbance of woody plant communities such as bluebush shrubland or *Casuarina pauper* woodland.

Level of Classification: Alliance / Sub-formation.

Classification Confidence Level: Low.

Formation Group: Grasslands on Fine Texture Soils on the Inland Slopes and Plains.

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

State Landscape (Mitchell 2002): Not Assessed.

NVIS Major Veg Sub-Groups: Other tussock grasslands.

Forest Type (RN 17): 230 - Natural Grassland (P); 220 - Cleared/Partially Cleared (P).

Authority(s): (Combination of Expert Opinion and Quantitative Data). Includes much of the Open Area map unit in Scott (1992), the mallee or sandplain Open Areas (ie excluding the lake bed open areas) mapped in Porteners (1997), community 22 in Kerr et al. (2000), community 5b in Westbrook et al. 1998, community 10 in Morcom & Westbrook (1990). Community P9 in Cohn(1995) and community 7 in Parker et al. (1979). Probably the grassland elements of floristic groups 7,8 & 9 being map unit 24 in Horner et al. (2002). Often described as open areas this sub-formation may be natural or derived from chenopod shrublands. Some similarities with floristic group NW9 in central NSW in Lewer et al. (2003) but this eastern derived community is not included here. There is floristic variation across range and little site data or analysis has been completed as of 2005.

Interstate Equivalent(s): Victoria: Sandplain Grassland EVC; Victoria and South Australia: similar to floristic groups 2 and 3 (Stipa grasslands) in Foulkes and Gillen (2000).

Mapped/Modelled: Current extent partly mapped or modelled.

Mapping Info: Scott (1992), Porteners (1993) and Porteners et al. (1997) map "open areas". Horner et al. (2002) map unit 24 covers part of this on the Hay Plain. Fox (1991) does not map this community yet it probably occurs in that area. It is mapped in more detailed maps of some reserves e.g. Morcom & Westbrooke (1990). Poorly sampled in plots over range as of 2005.

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

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

IBRA Sub-Region: Darling Depression (1-30%); Lachlan (1-30%); Nymagee (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%); Cobar (1-30%); Wentworth (30-70%).

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

MD Basin: Yes.

Substrate Mass: Eolian sand; Eolian sediment.

Lithology: Eolian sand or loam.

Great Soil Group: Brown earth; Grey-brown calcareous soil.

Soil Texture: Loam; Loamy sand; Sandy clay loam; Sandy loam.

Landform Patterns: Dunefield; Sand plain.

Landform Elements: Drainage depression; Plain; Swale.

Land Use: Grazing.

Impacts of European Settlement: Dieback due to disease or senescence; Increased extent/range.

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

Pre-European Extent Comments: Less abundant in pre-European times prior to stock and rabbit grazing and clearing of Acacia shrublands, mallee and Black Oak.

Current Extent: 100000 ha \pm 50% or 333% \pm 80% of pre-European extent remaining.

Current Extent Comments: (Estimated from mapped extant vegetation: part range). Approx. 10000 ha mapped on Balranald-Swan Hill map sheet by Scott (1992). Approx. 200000 ha of open area is mapped on the Booligal-Hay-Deniliquin-Bendigo map sheets by Porteners (1993) but some of this is on clay soils not on sandplains - only 10000 is assigned to the latter. Porteners et al. (1997) map about 40000 ha of open areas on the Pooncarie map sheet. It is assumed half of this (20000) is this community the remainder herbland on clay (lake beds). Fox (1991) did not map herblands on the Mildura-Ann-Branch map sheets but they occur in the mallee there. 10000 ha is added as an estimate from that area. Horner map 14000 ha as map unit 24 on the Hay Plain. An additional 20000 ha is added for areas north and east of the RBG SW NSW mapping including areas in Yathong and Nombinnie Nature Reserves.

Conservation Reserves: Kalyarr NP 45 (E1); Mallee Cliffs NP 3900 (E2); Mungo NP 7500 (E2); Nombinnie NR 1700 (E1); Nombinnie SCA 400 (E2); Oolambeyan NP 5 (E3); Tarawi NR 400 (E1); Yathong NR 6040 (E2).

Reserves Total Area: 19990 ha.

No. Representatives in Reserves: 8

Protected Area Explanation: Tawari NR estimate from average of estimates in Westbrooke et al. (1998) and Wilson (2000a). Mallee Cliffs NP from A. Wilson (2000) adaption of the map by Morcom & Westbrooke (1990). Mungo National Park estimate from Westbrooke & Miller (1995) along with the Open Area map unit in Porteners et al. (1997) covering the 2003 Park area. Nombinnie NR and Nombinnie SCA from P9 in Cohn(1995). Yathong Nature Reserve area from Parker et al. (1979). Kalyarr NP and VCA006 from map unit 20 in Horner et al. (2002). Oolambeyan NP may be map unit 3b in Roberts & Roberts (2001). Nanya and Scotia VCA areas from community 5b in Westbrooke et al. (1998).

Secure Property Agreements: Nanya Ballarat Uni VCA 720 (E1); Scotia AWC VCA 110 (E1); VCA006 VCA 2 (M).

Secure PAs Total Area: 832 ha.

No. Representatives in Secure Property Agreements: 3

Protected Current Extent: 20.82% 20822 ha \pm 30%.

No. Representatives in Protected Areas: 11

Protected Pre-European Extent: 69.4% 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: Not a priority for more conservation action because it is mainly a derived community and is well represented in protected areas as of 2005.

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

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

Variation & Disturbance: Grazing management dictates species composition and degree of shrub cover in these grasslands/herblands.

Fire Regime: Rarely burnt although every few decades or so fires burn adjoining mallee communities so some of these herbland may be burnt at the same time.

Adjoining Communities: Grades into chenopod shrublands, Black Oak - Western Rosewood (ID58) open woodland, mallee and Callitris (ID28) communities. Occurs on more loamy soil compared to the chenopod shrubland ID166 which occurs on more clayey soils. Grades into and contains some species with ID46 grassland on clay soils on the Hay Plain, Riverina Bioregion

Threatening Processes: Overgrazing has led to an expansion of these herblands through the loss of shrubs and trees and other palatable species.

Threatening Process List: 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.

Planning Controls:

Planning and Management: Prevent overgrazing by stock and rabbits to allow original shrubs and trees to regenerate.

Listed Under Legislation: None.

Recovery Plan: Doesn't exist and not required.

Reference List: (39; 282; 302; 289; 216; 293; 17; 43; 25; 247; 13; 33; 41; 232; 78). 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); Foulkes, J.N. & Gillen, J.S. (2000) (eds.) A biological survey of the Murray mallee, South Australia. (Biological Survey and Research, Department for Environment and Heritage, Department for Transport, Urban Planning and the Arts: Adelaide); 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); 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); 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; Morcom, L. & Westbrooke, M. (1990) The vegetation of Mallee Cliffs National Park. *Cunninghamia* 2(2): 147-166; 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); 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; 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; Wilson, A. (2000a) Vegetation map of Tarawi Nature Reserve modified from Westbrooke et al. (1998). Unpublished. (NSW National Parks and Wildlife Service: Western Region); Wilson, A. (2000b) Vegetation map of Mallee Cliffs National Park (derived from M305 data but with field checking). Unpublished map. (NSW National Parks and Wildlife Service: Lower Darling).