



## 1. Application details

### 1.1. Permit application details

Permit application No.: 3777/1  
Permit type: Area Permit

### 1.2. Proponent details

Proponent's name: Kevin Laurence Smeathers

### 1.3. Property details

Property: LOT 9962 ON PLAN 203114 ( BOORARA BROOK 6262)  
LOT 9961 ON PLAN 203114 ( BOORARA BROOK 6262)  
Local Government Area: Shire of Manjimup  
Colloquial name:

### 1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
38		Burning	Grazing & Pasture

## 2. Site Information

### 2.1. Existing environment and information

#### 2.1.1. Description of the native vegetation under application

Vegetation Description	Clearing Description	Vegetation Condition	Comment
Shepherd (2007) describes mapped vegetation association 1002 as medium open woodland; jarrah	The vegetation under application was cleared in 2008, this matter is currently under investigation. The condition of vegetation, if left to regenerate would be considered to be in a very good (Keighery, 1994) condition. Prior to clearing the vegetation under application would have been dominated by Melaleuca sp. Species observed directly adjacent to the application area include; Beaufortia sparsa, Cassytha sp., Acacia sp. and Podocarpus drouynianus (DEC, 2010a).	Very Good: Vegetation structure altered; obvious signs of disturbance (Keighery 1994)	The condition of the vegetation under application was determined through observance of surrounding vegetation during two site visits conducted by DEC (2010a and 2010b) and via digital imagery (Northcliffe, 50cm Orthomosaic - Landgate 2004).
Vegetation association 27 is described as low woodland; paperbark (Melaleuca sp) (primary vegetation type cleared)			
Vegetation association 1 is described as Tall forest; karri (Eucalyptus diversicolor)			

## 3. Assessment of application against clearing principles

### (a) Native vegetation should not be cleared if it comprises a high level of biological diversity.

#### Comments

#### Proposal is at variance to this Principle

The area under application has recently been subject to impacts through clearing (that is the subject of an investigation). If the vegetation is left to regenerate, the environmental values of the area under application will recover therefore, the assessment considered the regenerative capacity of the vegetation under application. In order to assess the regenerative capacity of the area under application DEC looked at condition of the remaining native vegetation adjacent to the project area (observed during the DEC site inspections undertaken in March 2010 and June 2010) and the vegetation that has regenerated since the 2008 clearing.

The vegetation structure prior to clearing would have largely been intact and likely to comprise a high level of biological diversity and provide a significant habitat for wetland dwelling fauna species, being directly adjacent to the D'Entrecasteaux National Park (DEC, 2010a)

Within the road verge to Lot 9962, priority fauna Galaxiella nigrostriata (Black-stripe Minnow) has been recorded. Declared Threatened Fauna Nannatherina balstoni (Balston's Pygmy Perch) and Galaxiella munda (Western Mud Minnow) have been recorded 2km to the south of the property.

Approximately 300 metres south of the cleared area there are 3 known occurrence of Declared Rare Flora (DRF) *Meziella trifida*, a prostrate perennial herb that grows in sandy clays on winter-wet flats (WA Herbarium, 1998 -). This species was recorded on the same vegetation and soil type as the area under application. As the area under application contains suitable conditions for this DRF species it is likely that if the area is left to regenerate *Meziella trifida* may occur within this area.

Fourteen priority flora species have been recorded within 10km of the property. The closest to the application area were *Stylidium leeuwinense*, *Gonocarpus pusillus*, *Amperea protensa* and *Cyathochaeta stipoides*. It is possible that these species may occur within the area under application as they were all found in similar habitat to what is on the property.

The cleared area is within the Doggerup Creek System, a wetland listed in the Directory of Important Wetlands in Australia (an Environmentally Sensitive Area).

The property is approximately 5km north of the Threatened Ecological Community: *Reedia* swamps (CDN/W23) which supports sedgeland of *Reedia spathacea* (a species listed as Critically Endangered under the Environment Protection and Biodiversity Act 1999 and Declared Rare Flora under the Wildlife Conservation Act 1950).

Considering the above it is likely that if the area under application is left to regenerate it will comprise a high level of biological diversity. Therefore, this application is at variance to this principle.

In response to the information above the proponent's representative submitted that:

- Ten hectares of the application area was blue gum plantation and as such would be exempt under item 14, regulation 5 of the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 and thus should not be considered in this application.
- The area under application does not appear to support flora and fauna of conservation significance. These species are only known to occur within the local area and the closest (Rare Flora, *Meziella trifida*) is 300m from the proposed clearing.

DEC provides the following comments in relation to the points above:

- Item 14, regulation 5 relates to maintaining existing cleared areas for pasture, cultivation or forestry that were lawfully cleared within the past 10 years. DEC is currently investigating this matter.
- The area under application contains the same vegetation complex and soil types that support the known flora and fauna of conservation significance within the local area. The area under application is also part of the Doggerup Creek System, a wetland listed in the Directory of Important Wetlands in Australia, and is surrounded by D'Entrecasteaux National Park.

Therefore the assessment found that the applied clearing is at variance to this clearing principle.

**Methodology** References:  
DEC (2010a)  
WA Herbarium (1998 -)

GIS Database:  
- Clearing Regulations - Environmentally Sensitive Areas - 30 May 2005  
- Northcliffe 50cm Orthomosaic - Landgate 2004  
- Pre European Vegetation - DA 01/01  
- SAC Biodatasets - accessed 15 June 2010

**(b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.**

**Comments** **Proposal may be at variance to this Principle**

The following fauna species have been recorded within the local area (10km radius):

Mammal

-Western False Pipistrelle (*Falsistrellus mackenziei*) P4

Birds

-Little Bittern (*Ixobrychus minutus*) P4

-Forest red-tailed black-cockatoo (*Calyptorhynchus banksii naso*) VU

Fish

-Black-stripe Minnow (*Galaxiella nigrostriata*) P3

-Western Mud Minnow (*Galaxiella munda*) VU

-Pouched Lamprey (*Geotria australis*) P1

-Balston's Pygmy Perch (*Nannatherina balstoni*) VU

Crustaceans

- Fibulacamptus bisetosus P2
- Calamoecia elongate P1
- Daphnia occidentalis P1

The Forest red-tailed black cockatoo is listed on the State's Threatened Fauna List due to its declining population. The Forest red-tailed black cockatoo is restricted to the Jarrah Eucalyptus marginata, Marri Corymbia calophylla and Karri E. diversicolor forests of the lower south-west, from Gingin to Albany (CALM, 2005). Given that the local area has approximately 85% of vegetation retained, the vegetation under application is not considered to be significant habitat for this species.

The freshwater invertebrates (Calamoecia elongate, Daphnia occidentalis & Fibulacamptus bisetosus) and the Pouched Lamprey, Balston's Pygmy Perch, Western Mud Minnow and the Black-stipe Minnow may be impacted by clearing related activities as the application area is part of the Doggerup Creek System. Doggerup Creek system is an ANCA wetland and is listed in the Directory of Important Wetlands in Australia. This wetland extends into the D'Entrecasteaux National Park. The clearing will increase sediment concentration in this wetland and may adversely affect these species.

The two priority 4 species listed above are not likely to be significantly impacted by the clearing activities.

Considering the above the proposed clearing may be at variance to this clearing principle.

The applicant's representative has stated that burning 38 hectares of dead timber would not impact significantly upon habitat for any fauna detailed above.

It is noted that the area under application contains 38 hectares of regrowth native vegetation and piles of dead native vegetation which was cleared in 2008. If the vegetation is left to regenerate the environmental values of the area under application will recover therefore, the assessment considered the regenerative capacity of the vegetation under application. Given the proximity of the recorded fauna species to the area under application and the similar habitat values DEC is of the opinion that when regenerated the area under application will contain vegetation that may be significant habitat for fauna indigenous to Australia.

**Methodology**    References:  
CALM (2005)

GIS Database:  
- SAC Biodatasets - accessed 15 June 2010

**(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.**

**Comments    Proposal may be at variance to this Principle**

The area under application would be considered as having high floristic values and conducive to a number of threatened flora. Within the local area (10km radius) three rare flora species were recorded; Meziella trifida, Kennedia glabrata and Reedia spathacea.

Meziella trifida is listed as vulnerable under the Environment Protection and Biodiversity Act 1999. Six occurrences of Meziella trifida have been recorded in the local area (10km radius), the closest was recorded 337 meters south of the applied area. This species was recorded on the same vegetation and soil type as the area under application. Two populations were recorded on Wheatley Coast Road and the other four were on Chesapeake Road.

Meziella trifida is a semi aquatic herb that is found in open grey sandy clay depressions in winter-wet flats, where it grows in very low heath of teatree (Pericalymma) and twine rushes (Restio and Leptocarpus) (CALM, 1998).

Kennedia glabrata inhabits shallow pockets of soil on granite outcrops (CALM. 1998).

Reedia spathacea is a robust, tufted perennial grass-like or herb (WA Herbarium, 1998 -). This plants preferred habitat is swamps and river edges (WA Herbarium, 1998 -).

DEC site visit (2010b) did not identify any rare flora within the application area, however the area was not surveyed. The area under application contains habitat suitable for rare flora but in order to confirm their presence a survey would need to be conducted at an appropriate time of year.

In response to the information above the applicant's representative submitted that, as the area under application has not been surveyed there is insufficient evidence to conclude that the application may be at variance to this principle.

If the vegetation is left to regenerate the environmental values of the area under application will recover therefore, the assessment considered the regenerative capacity of the vegetation under application. It is noted

that since the clearing in 2008 the native vegetation is regenerating. Given the proximity and suitability of habitat for the rare flora mentioned above it is possible for the rare flora to occur within the application area. DEC agrees that without an extensive survey it is not possible to say for certain that these species do or do not occur.

Therefore, unless a survey is undertaken at an appropriate time of year this application may be at variance to this principle.

**Methodology** References:  
CALM (1998)  
DEC (2010b)  
WA Herbarium (1998 -)

GIS Database:  
- Pre European Vegetation - DA 01/01  
- SAC Biodatasets - accessed 15 June 2010

**(d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.**

**Comments Proposal may be at variance to this Principle**

The property is approximately 6km north east of the Threatened Ecological Community (TEC): Reedia swamps (CDN/W23) which supports sedgelands of Reedia spathacea. (a species listed as Critically Endangered under the Environment Protection and Biodiversity Act 1999 and Declared Rare Flora under the Wildlife Conservation Act 1950.

This TEC is recorded on the same soil type (Tc7) as the area under application. In order to determine the presence of this TEC within the application area a targeted survey would need to be conducted at an appropriate time of year.

Given the above it is concluded that this application may be at variance to this principle.

If the vegetation is left to regenerate the environmental values of the area under application will recover therefore, the assessment considered the regenerative capacity of the vegetation under application. DEC agrees with the applicant's representative "that a targeted survey would need to be conducted at an appropriate time of year". Therefore, unless a survey is undertaken at an appropriate time of year to determine the presence or absence of this TEC the application may be at variance to this principle.

**Methodology** GIS Database:  
- Pre European Vegetation - DA 01/01  
- SAC Biodatasets - accessed 15 June 2010

**(e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.**

**Comments Proposal is not likely to be at variance to this Principle**

	Pre-European (ha)	Current extent (ha)	Remaining (%)
IBRA Bioregions*			
Warren	835 925.47	675 836.26	80.85
Shire*			
Manjimup	697 359.72	595 561.57	85.40
Beard Vegetation Association*			
1	72 206.35	58 638.44	81.21
27	130 365.49	95 260.04	73.07
1002	15 947.73	15 520.79	97.32
Beard Vegetation Association within Bioregion*			
1	69 119.72	56 119.42	81.19
27	70 203.13	53 458.05	76.15
1002	3 074.49	2 657.39	86.43
Mattiske Vegetation Complex**			
COb	21 839.35	19 611.93	89.80
BWp	32 296.06	28 807.08	89.20

\* (Shepherd et al. 2007)

\*\* (Mattiske Consulting 1998)

The national objectives and targets for biodiversity conservation in Australia has a target to prevent clearance of ecological communities with an extent below 30 per cent of that present pre-1750, below which species loss appears to accelerate exponentially at an ecosystem level (Commonwealth of Australia 2001).

The local area (10km radius) contains approximately 80% vegetation. Taking this into account along with the current representation levels of the Beard and Matiske vegetation associations it is not considered likely that the vegetation under application is significant as a remnant in an area that has been extensively cleared.

Therefore, this proposal is not likely to be at variance to this principle.

**Methodology** References:  
Commonwealth of Australia (2001)  
Matiske Consulting (1998)  
Shepherd et al. (2007)

GIS Database:  
- Northcliffe 50cm Orthomosaic - Landgate 2004  
- Local Government Authorities - DLI 8/07/04  
- Pre European Vegetation - DA 01/01  
- SAC Biodatasets - accessed 15 June 2010

**(f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.**

**Comments** **Proposal is at variance to this Principle**

The area under application is within the Doggerup Creek System, a wetland listed in the Directory of Important Wetlands in Australia (an Environmentally Sensitive Area).

Doggerup Creek flows directly into the ocean and not via an inlet. This makes it quite unique as it is one of only two on the south coast that does so (Pen, 1997).

The Directory of Important Wetlands in Australia - Information Sheet (DEWHA, 2009) lists vegetation clearance in the upper catchment as a threat to this wetland.

The area under application is also mapped as a wetland of importance in A Systematic Overview of Environmental Values of the Wetlands, River and Estuaries of the Busselton-Walpole Region (Pen, 1997). Pen (1997) reports that the Doggerup Creek Wetland System has outstanding faunal, naturalness and sanctuary attributes as well as being a good representation of broad wetlands values in the region.

Vegetation should be retained within this wetland to prevent erosion, sedimentation, salinisation and to retain fauna habitat. 90% of this wetland is situated within the D'Entrecasteaux National Park so any adverse effects that the proposed clearing generates will have a flow on effect into this national park.

A minimum vegetation buffer of 50 meters should be retained to protect wetlands from potential adverse impacts and to maintain ecological processes and functions within wetlands (DEC, 2008).

Therefore, this proposal is at variance to this principle.

The applicants representative advised that "A balance needs to be struck between the area of the proposed clearing (38 hectares of cleared timber to be burnt) and the impact that this would have upon the entire upper catchment area, which probably exceeds in area 100 km".

DEC acknowledges this information however the vegetation under application is growing within an environment associated with a wetland and therefore is at variance to this principle. It is noted that if the area under application is left to regenerate the wetland values of the area under application will recover.

**Methodology** References:  
DEC (2008)  
DEWHA (2009)  
Pen (1997)

GIS Database:  
- Acid Sulphate Soil Risk Map, Swan Coastal Plain - DEC 07/08/06  
- ANCA Wetlands  
- Geomorphic Wetlands (Mt Categories), Swan Coastal Plain - 11/04/07  
- Hydrogeology, Linear - DOC13/07/06  
- Hydrogeology, Statewide - DOC13/07/06

**(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.**

**Comments Proposal is at variance to this Principle**

Northcote et al (1968) describes mapped soil type Tc7 as knolls and hillocks-islands of (Dy) and (Gn) soils separated by swampy plains of (Uc) soils: chief soils of the knolls and hillocks are hard, and sandy, acidic yellow mottled soils (Dy3.61) and (Dy5.81) with some red earths (Gn2.15), all frequently containing ironstone gravels. Associated are leached sands (Uc2.2 and Uc2.3) of the swampy plains that vary in size from narrow drainage-ways to plains on which only a few hillocks occur.

Doggerup creek wetlands have been identified as having a high risk of salinity (Short and McConnell, 2000). Western Australia has the largest area of dryland salinity in Australia and the highest risk of increased salinity in the next 50 years. An estimated 4.3 million hectares (16%) of the southwest (mostly agricultural land) has a high potential of developing salinity from shallow watertables (Short and Mc Connell, 2000). The removal of deep-rooted plants will allow the water level to rise bringing with it potentially large quantities of salt.

Area within and surrounding D'Entrecasteaux National Park contain potential acid sulphate soils (CALM, 2005). When iron sulphates are exposed to air through such activities such as clearing, the minerals oxidize to produce large quantities of sulphuric acid and dissolved metals. Exposure of acid sulphate soils through clearing will result in the release of acid water and heavy metals which are likely to cause appreciable land degradation.

The removal of the vegetation under application is likely to accelerate the process of soil and water erosion.

Given the high rain fall within the local region (1300mm) and that the area under application is within a wetland the proposed clearing is likely to raise water tables causing waterlogging.

Therefore, the proposal is at variance to this clearing principle.

The applicant's representative submitted that;

"The proposal is to pile and burn dead timber most of which is presently in windrows. There will be little or no removal of deep rooted plants and therefore the proposed burning will not have any impact upon water level changes. Hence, the proposal will not impact upon salt levels in the soil. The surface soils exposed following the burning will be covered with improved pastures that will not permit the release of acid water and heavy metals as stated in the analysis".

The assessment of the application area identified that if the vegetation is left to regenerate the environmental values of the area under application will recover therefore, the assessment considered the regenerative capacity of the vegetation under application. DEC believes that the clearing as proposed may cause appreciable land degradation in the form of soil and water erosion, change in volume and quality of surface water.

**Methodology**

**References:**

CALM (2005)  
Northcote et al (1968)  
Short and McConnell (2000)

**GIS Database:**

- Acid Sulphate Soil Risk Map, Swan Coastal Plain - DEC 07/08/06  
- Hydrogeology, Linear - DOC13/07/06  
- Hydrogeology, Statewide - DOC13/07/06  
- SAC Biodatasets - accessed 19 May 2010

**(h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.**

**Comments Proposal is at variance to this Principle**

Three sides of the property under application borders D'Entrecasteaux National Park and Boorara - Gardner National Park is located 1.8km to the north of the application area.

D'Entrecasteaux National Park has long been valued for its extensive, varied, unique and nationally significant wetland systems that provides habitat for a range of endemic flora and fauna (CALM, 2005). This national park is valued for its rich mosaic vegetation complexes and its extensive areas of intact fauna habitat (CALM, 2005).

As the property under application lies directly adjacent to the national park the vegetation under application acts as a buffer. The proposed clearing will remove this buffer allowing weeds and disease to spread into the park.

The clearing as proposed has the potential to increase the natural volume and quality of surface water runoff into the park.

The proposed clearing falls within the Doggerup Creek system of which 90% occurs within the national park. The disturbance of soil caused by the clearing will increase siltation levels within this wetland. The increased sediment concentration is likely to affect freshwater invertebrates; Calamoecia elongate, Daphnia occidentalis & Fibulacampus bisetosus) and the Pouched Lamprey, Balston's Pygmy Perch, Western Mud Minnow and the Black-stipe Minnow all of which have been recorded within the local area.

The Draft Management Plan for Shannon and D'Entrecasteaux National Parks lists change to volume and quality of surface water, weeds, siltation of watercourses and erosion as being issues of great concern to the park. Given that the proposed clearing is likely to affect all the environmental values listed above this application is at variance to this principle.

The applicants representative submitted that;

"The proposal involves the windrowing and burning of dead timber and some low level incidental scrub Tea Tree. It is not proposed that any deep rooted timbers be removed and only 38 hectares under consideration be burned. There is no prospect of the clearing increasing the natural volume and quality of surface water run off into the park since the timber is all dead".

The vegetation under application, if left to regenerate, will recover its environmental values therefore, the assessment considered the regenerative capacity of the vegetation under application. DEC remains of the view that clearing the native vegetation will impact the environmental values of the D'Entrecasteaux National Park through change to volume and quality of surface water, weeds, siltation of watercourses and erosion.

**Methodology** References:  
CALM (2005)

GIS Database:  
- DEC Tenure  
- SAC Biodatasets - accessed 15 June 2010

**(i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.**

**Comments Proposal is at variance to this Principle**

The Doggerup Creek System is a wetland listed in the Directory of Important Wetlands in Australia (an Environmentally Sensitive Area).

Wetlands within the Doggerup Creek System have the potential for acid sulphate soils (CALM, 2005). The disturbance of soils through clearing could expose acid sulphate soils which would result in release of acid water and heavy metals. This could have considerable impact on the nationally significant Doggerup Creek wetland system by deteriorating surface and ground water quality.

DEWHA (2009) recognizes that the condition of this wetland is rapidly declining. Broad scale vegetation clearing is one of the threatening processes which is deteriorating the condition of this important wetland (DEWHA, 2009). The clearing as proposed is likely to increase sediment levels within the Doggerup Creek System.

CALM (2005) has highlighted the fragility and interconnectedness of this wetland system and the impacts that additional nutrients and altered hydrology could have on the Doggerup Creek wetland system.

Considering the above this application is at variance to this principle.

The applicant's representative has submitted that the proposed clearing will reduce sediment levels within the Doggerup Creek System as oppose to increasing them. This reduction will be achieved by planting improved pastures which will stabilise soils, reducing surface water run-off and guarding the soil against the effects of wind erosion.

It is noted that the native vegetation is regenerating, and if left will recover its environmental values. The assessment considered the regenerative capacity of the vegetation under application. DEC remains of the view that the clearing will cause deterioration in the quality of surface and underground water.

**Methodology** References:  
CALM (2005)  
DEWHA (2009)

GIS Database:  
- ANCA Wetlands  
- DEC Tenure  
- SAC Biodatasets - accessed 15 June 2010

**(j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.**

**Comments Proposal is not likely to be at variance to this Principle**

Large scale removal of wetland vegetation can affect local hydrology causing waterlogging, however in this instance it is not likely that it will increase the incidence or intensity of flooding.

**Methodology GIS Database:**

- Average Annual Rainfall Isohyets - WRC 29/09/98
- Hydrogeology, Linear - DOC13/07/06
- Hydrogeology, Statewide - DOC13/07/06

**Planning instrument, Native Title, Previous EPA decision or other matter.**

**Comments**

An application was received on 31 May 2010 to clear 38 hectares for grazing. This area is subject to an investigation as clearing has occurred.

The property under application is zoned as rural.

The applicant's representative provided a submission detailing a number of issues. The issues raised have been taken into account, where appropriate, having regard to section 51O of the EP Act and consistent with the objects of the EP Act.

**Methodology GIS Database:**

Town Planning Scheme Zones - MFP 31/08/98

#### **4. References**

- CALM (1998) Western Australia's Threatened Flora, Department of Conservation and Land Management, Western Australia.
- CALM (2005), Shannon and D'Entrecasteaux National Parks, Draft Management Plan 2005, Department of Conservation and Land Management, Conservation Commission of Western Australia.
- Commonwealth of Australia (2001) National Objectives and Targets for Biodiversity Conservation 2001-2005, Canberra.
- DEC (2008) Memo re Standard Wetlands Advice for Native Vegetation Conservation Branch. Dated 17/07/2008. Species and Communities Branch, Department of Environment and Conservation, Western Australia.
- DEC (2010a) Site Inspection Report for Clearing Permit Application CPS 3777/1, Lots 9961 and 9962 Chesapeake Road, Boorara Brook. Site inspection undertaken 29/03/2010. Department of Environment and Conservation, Western Australia.
- DEC (2010b) Site Inspection Report for Clearing Permit Application CPS 3777/1, Lots 9961 and 9962 Chesapeake Road, Boorara Brook. Site inspection undertaken 23/06/2010. Department of Environment and Conservation, Western Australia.
- DEWHA (2009) Biodiversity Assessment - Warren, Important Wetlands. Department of the Environment, water, Heritage and the Arts, Australian Natural Resources Atlas, last updated 2009.
- Keighery, B.J. (1994) Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.
- Mattiske, E.M. and Havel, J.J. (1998) Vegetation Complexes of the South-west Forest Region of Western Australia. Maps and report prepared as part of the Regional Forest Agreement, Western Australia for the Department of Conservation and Land Management and Environment Australia.
- Northcote, K. H. with Beckmann G G, Bettenay E., Churchward H. M., van Dijk D. C., Dimmock G. M., Hubble G. D., Isbell R. F., McArthur W. M., Murtha G. G., Nicolls K. D., Paton T. R., Thompson C. H., Webb A. A. and Wright M. J. (1960-68): 'Atlas of Australian Soils, Sheets 1 to 10, with explanatory data'. CSIRO and Melbourne University Press: Melbourne.
- Pen (1997) A Systematic Overview of Environmental Values of the Wetlands, Rivers and Estuaries of the Busselton - Walpole Region. Water and Rivers Commission, Water Resource Allocation and Planning Series, Report No WRAP 7.
- Shepherd, D.P. (2007) Adapted from: Shepherd, D.P., Beeston, G.R., and Hopkins, A.J.M. (2001), Native Vegetation in Western Australia. Technical Report 249. Department of Agriculture Western Australia, South Perth.
- Shepherd, D.P. (2009) Adapted from: Shepherd, D.P., Beeston, G.R., and Hopkins, A.J.M. (2001), Native Vegetation in Western Australia. Technical Report 249. Department of Agriculture Western Australia, South Perth.
- Short R and McConnell C (2000). National Land and Water Resources Audit- Extent and impacts of dryland salinity. Agriculture Western Australia, Perth.
- Western Australian Herbarium (1998-) FloraBase - The Western Australian Flora. Department of Environment and Conservation. <http://florabase.dec.wa.gov.au/> (Accessed 1 July 2010).



## 5. Glossary

Term	Meaning
BCS	Biodiversity Coordination Section of DEC
CALM	Department of Conservation and Land Management (now BCS)
DAFWA	Department of Agriculture and Food
DEC	Department of Environment and Conservation
DEP	Department of Environmental Protection (now DEC)
DoE	Department of Environment
DoIR	Department of Industry and Resources
DRF	Declared Rare Flora
EPP	Environmental Protection Policy
GIS	Geographical Information System
ha	Hectare (10,000 square metres)
TEC	Threatened Ecological Community
WRC	Water and Rivers Commission (now DEC)