Department of
Environment and Conservation

Our environment, our future

Resource Condition Report for Significant Western Australian Wetland

Ewans Lake

2008

Figure 1 – A view across the water body at Ewans Lake.

This report was prepared by:

Anna Nowicki, Technical Officer, Department of Environment and Conservation, PO Box 51, Wanneroo 6946

Stephen Kern, Botanist, Department of Environment and Conservation, Locked Bag 104 Bentley Delivery Centre 6983

Adrian Pinder, Senior Research Scientist, Department of Environment and Conservation, PO Box 51, Wanneroo 6946

Glen Daniel, Environmental Officer, Department of Environment and Conservation, Locked Bag 104 Bentley Delivery Centre 6983

Invertebrate sorting and identification was conducted by:

Nadine Guthrie, Research Scientist, Department of Environment and Conservation, PO Box 51, Wanneroo 6946

Ross Gordon, Project Officer, Department of Environment and Conservation, PO Box 51, Wanneroo 6946

Prepared for:

Inland Aquatic Integrity Resource Condition Monitoring Project, Strategic Reserve Fund, Department of Environment and Conservation

August 2009

Suggested Citation:

DEC (2009). *Resource Condition Report for a Significant Western Australian Wetland: Ewans Lake.* Department of Environment and Conservation, Perth, Western Australia.

Introduction

This Resource Condition Report (RCR) was prepared by the Inland Aquatic Integrity Resource Condition Monitoring project (IAI RCM). The information presented in the current report will supplement the Lake Warden Ecological Character Description (ECD) (Watkins 2008, in preparation). While a brief description of the wetland is provided here, it is intended that reference is made to the Lake Warden ECD for further information and for data collected as part of previous studies.

Ewans Lake is a seasonal saline marsh. This wetland is part of the Lake Warden System, a system of saline lakes and marsh areas behind beachfront dunes east of Esperance (Figure 2). Ewans Lake was selected as a study site in the current project due to its location within the Lake Warden System - a Natural Diversity Recovery Catchment[1]. The Lake Warden System is listed by the Ramsar Convention on Wetlands (Ramsar) and the Directory of Important Wetlands in Australia (Environment Australia 2001). Specifically, the Lake Warden System is a good example of a system of naturally brackish/saline coastal lakes in the bioregion. The wetland system regularly supports over 20,000 waterbirds, including over 10% of the Australian population of Hooded Plover (*Thinornis rubricollis*) (CALM 1999). The system is also listed on the National Estate Register in recognition of its significance for waterbird conservation.

Site Code

Ramsar Site Number: 39.

Directory of Important Wetlands in Australia: WA027.

Register of the National Estate Place ID: 9818.

Inland Aquatic Integrity Resource Condition Monitoring Project: RCM040.

[1] Under the State Salinity Action Plan (now the State Salinity Strategy) the Western Australian Government established a Natural Diversity Recovery Catchment Program to help recover and protect significant natural areas, particularly wetlands, from salinity. Selection of Natural Diversity Recovery Catchments is based on a number of criteria, the most important of which are the nature conservation values at risk and the likelihood of recovering and protecting areas from salinity.

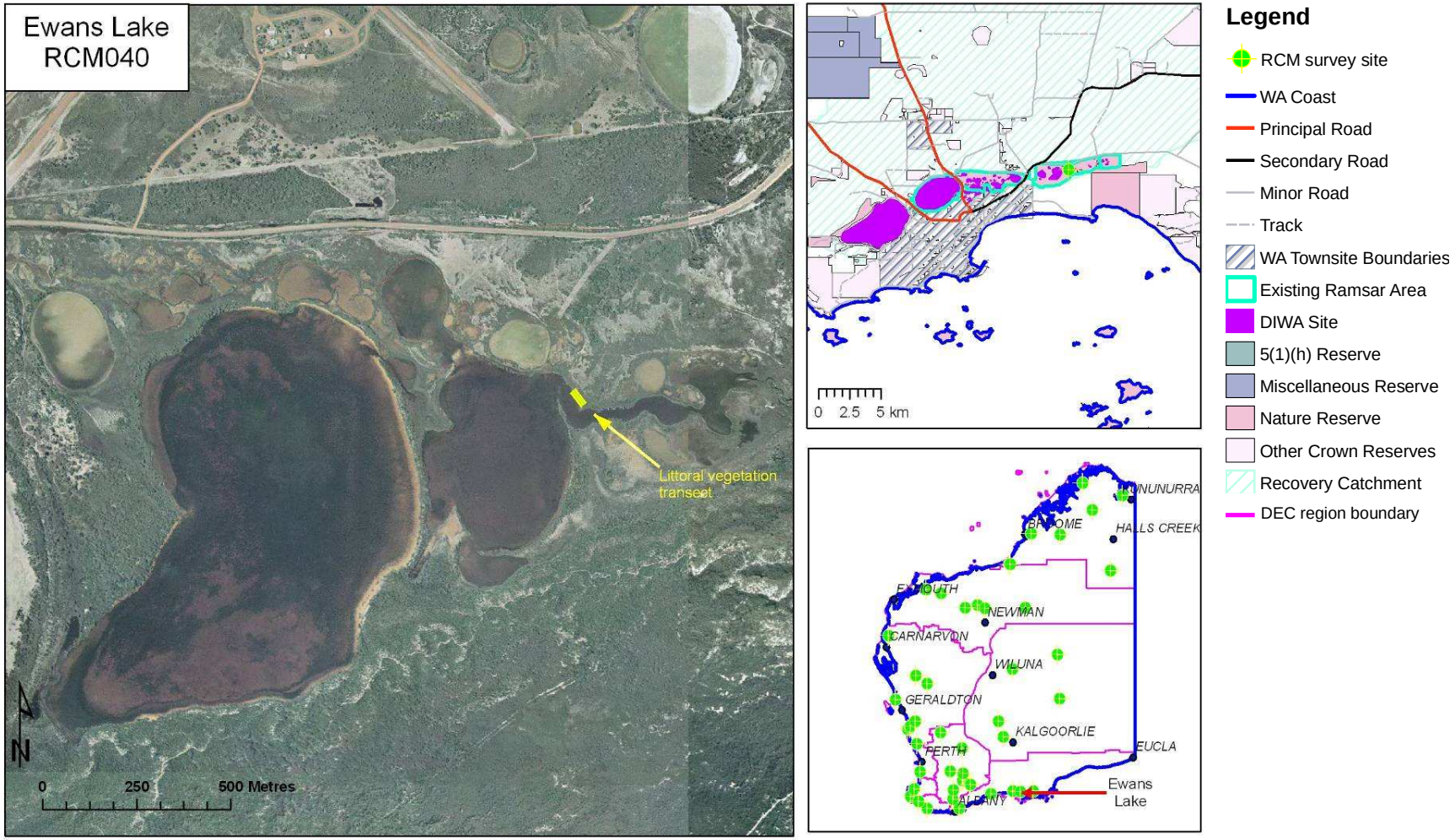

Figure 2 – Aerial photograph showing the location of the vegetation transect at Ewans Lake. Aquatic invertebrates and water quality were sampled adjacent to the transect. The upper insert shows the location of the sampling site relative to the Lake Warden System. The lower insert shows the location of the lake in the state of Western Australia and in relation to the remaining IAI RCM study sites.

Summary of IAI RCM survey findings at Ewans Lake

Ewans Lake was sampled by the IAI RCM project on 13th November 2008 to collect information on vegetation, water quality, aquatic fauna and threats according to the methodology as described by DEC (2008). The results of this sampling are presented below.

Water Quality

Nutrient concentrations (Table 1) were fairly high but not excessive and did not exceed ANZECC default trigger values for southwest wetlands. Ewans Lake is saline (26 g/L) and slightly alkaline (8.57 pH and 170 mg/L alkalinity).

Table 1 – Water quality parameters at Ewans Lake.

pH	8.57
Alkalinity (mg/L)	170
TDS (g/L)	26
Turbidity (NTU)	0.25
Colour (TCU)	43
Total nitrogen (µg/L)	1,200
Total phosphorus (µg/L)	30
Total soluble nitrogen (µg/L)	1,200
Total soluble phosphorus (µg/L)	5
Chlorophyll (µg/L)	6
Na (mg/L)	6,450
Mg (mg/L)	656
Ca (mg/L)	127
K (mg/L)	116
Cl (mg/L)	10,400
SO_4 (mg/L)	1,450
HCO_3 (mg/L)	207
CO_3 (mg/L)	0.5

Benthic Plants

The aquatic plant, *Ruppia ?megacarpa*, and algae (*Chara* sp.) were abundant within the lake.

Littoral Vegetation

A single transect, 30 metres in length, was established within vegetation fringing the north-western margin of Ewans Lake (Table 2).

Table 2 – Site attributes of the Ewans Lake vegetation transect.

Datum		WGS84
Zone		51
Easting		404334
Northing		6259307
Length		30 m
Bearing		340
Wetland state		Full
Soil state (%)	Dry	0
	Waterlogged	50
	Inundated	50
Substrate (%)	Bare	5
	Rock	0
	Cryptogam	0
	Litter	2
	Trash	0
	Logs	0
Time since last fire		Vegetation is not fire prone
Community condition		Natural
Upper Stratum	Cover (%)	-
	Height (m)	-
Mid Stratum	Cover (%)	22.23333
	Height (m)	<1
Ground Cover	Cover (%)	65.1
	Height (m)	<0.4

Transect RCM040-R1

The transect was established within 10 m of the lake's edge (Figure 3). Approximately 50% of the site was inundated with the remaining 50% waterlogged. Therefore, the species composition reflected aquatic dependent species. The upper vegetative stratum consisted of *Juncus kraussii* subsp. *australiensis*, *Tecticornia* sp. mid to high open rushes and samphires, whilst the lower stratum was dominated by *Sarcocornia quinqueflora*, *Suaeda australis*, *Hemichroa pentandra* low shrubland (65.1% cover, <0.4 m tall) (Figure 4). Table 3 provides a complete list of taxa recorded along the transect RCM040-R1. Isolated plants of *Melaleuca cuticularis* and *M*. *brevifolia* to 4 m tall were scattered along the shoreline of Ewans Lake and were in good health.

Isolated plants of the weed species *Parapholis incurva* were recorded along the transect. However, the overall community condition was considered 'natural' (Table 7). The record of *Hemichroa pentandra* along the transect is significant; the species is represented by only four herbarium records from Western Australia. These earlier records come from Rottnest Island and the Kimberley. Hence, the collection at Ewans Lake represents a substantial range extension for the species.

Figure 3 – Ewans Lake vegetation transect RCM040-R1.

Figure 4 – Looking south towards Ewans Lake across samphire-dominated flats, *Melaleuca* spp. can be seen along the shoreline.

According to the National Vegetation Information System (NVIS), the vegetation community may be described as (ESCAVI 2003):

M1 ^*Juncus kraussii* subsp. *australiensis*, *Tecticornia* sp.\rush, samphire shrub\2\i; G1+ ^*Sarcocornia quinqueflora*, *Suaeda australis*, *Hemichroa pentandra*, *Samolus repens* var. *repens*, *Sporobolus virginicus*\shrub, grass\1\c.

Table 3 – Plant taxa recorded along transect RCM040-R1 (in order of stratum then dominance).

Genus	Species	Height (m)	Stratum	Form
Juncus	*kraussii* subsp. *australiensis*	1.3	M1	Rush
Tecticornia	sp.	1	M1	Chenopod
Sarcocornia	*quinqueflora*	0.3	G1	Chenopod
Suaeda	*australis*	0.4	G1	Chenopod
Hemichroa	*pentandra*	0.1	G1	Shrub
Samolus	*repens* var. *repens*	0.2	G1	Shrub
Sporobolus	*virginicus*	0.2	G1	Grass
Puccinellia	*stricta*	0.3	G1	Grass
* *Parapholis*	*incurva*	0.2	G1	Grass
Apium	*annuum*	0.1	G1	Forb
Apium	*prostratum* var. *prostratum*	0.3	G1	Forb
Triglochin	*striata*	0.2	G1	Forb
Tecticornia	sp.	0.2	G1	Chenopod

1 In an NVIS description, 'U' denotes the upper storey, 'M' the mid storey and 'G' the under storey (ground cover). Numerals to denote substrata from tallest (ESCAVI 2003).

* Introduced species.

Aquatic Invertebrates

The number of macroinvertebrate species collected from this wetland was quite low (fourteen species belonging to ten families) (**Error! Reference source not found.**), even considering the salinity of 26 g/L. Between about ten and thirty species would be expected from a wetland with a salinity of 20 to 30 g/L, with an average of about twenty (based on DEC data from previous projects). Most of the species found (Table 4) are common in saline wetlands of south-western Australia but some (such as *Dicrotendipes pseudoconjunctus* and *Cladopelma curtivalva*) are at the limit of their tolerance to salinity. Within the south-west region, *Capitella* polychaete is restricted to saline rivers and wetlands along the south coast, including Lake Gore, and is probably a marine species that has reached Ewans Lake via Bandy Creek and adjoining wetlands. This species does not tolerate drying so has probably colonised since the lake has held permanent water.

Table 4 – Aquatic invertebrate species collected at Ewans Lake.

Class	Order	Family	Lowest ID	Sample*
Polychaeta		Capitellidae	*Capitella* sp.	1,2,3
Gastropoda	Neotaeniglossa	Pomatiopsidae	*Coxiella* sp.	1,2,3
Arachnida	Acariformes	Arrenuridae	*Arrenurus* (*Micruracarus*) sp. 1 (SAP)	3
Crustacea	Amphipoda	Ceinidae	*Austrochiltonia subtenuis*	1,2,3
	Isopoda	Sphaeromatidae	*Exosphaeroma* sp.	3
Insecta	Coleoptera	Dytiscidae	*Necterosoma penicillatus*	2,3
		Hydrophilidae	*Berosus discolor*	2,3
	Diptera	Chironomidae	*Procladius paludicola*	1,2,3
			Tanytarsus fuscithorax/*semibarbitarsus*	1,2,3
			Dicrotendipes pseudoconjunctus	1,2,3
			Cladopelma curtivalva	1,2
	Odonata	Lestidae	*Austrolestes analis*	1,3
			Austrolestes annulosus	2,3
	Trichoptera	Leptoceridae	Leptoceridae (probably *Symphitoneuria*)	2

* Samples 1, 2 and 3 denote the three habitats:

1. Bare sediment
2. Macrophyte/Characeae
3. Edge of wetland with sedges, overhanging riparian vegetation and dead trees

Waterbirds

Several birds were observed utilising Ewans Lake (Table 5). A total of sixty-five species of waterbirds had previously been recorded at the Lake Warden System, including thirty-nine species at Ewans Lake (Jaensch 1992). The Lake Warden System is one of the most important sites in south-western Australia for Chestnut Teals (*Ana castanea*) and Hooded Plovers (*Charadrius rubicollis*) and provides habitat for a declared rare species, Recherche Cape Barren Goose (*Cereopsis novaehollandiae* subsp. *grisea*). The Lake Warden System regularly supports more than 10,000 ducks. A total of 5,500 Australian Shelducks and 3,500 Black Swans were counted in Lake Warden in November 1982, making them the most abundant waterbird species in the system along with the Banded Stilt (Department of Conservation and Land Management 1999). The site is also regionally significant for Musk Ducks. The Lake Warden System serves as a major dry season refuge for waterbirds (Jaensch 1992).

Table 5 – Waterbirds observed on Ewans Lake during the IAI RCM survey in 2008.

Common name	Scientific name	Abundance
Australian Shelduck	*Tadorna tadornoides*	Approx. 200
Black Swan	*Cygnus atratus*	Approx. 110
Australian Pelican	*Pelecanus conspicillatus*	3
Little Black Cormorant	*Phalacrocorax sulcirostris*	1
Musk Duck	*Biziura lobata*	Approx. 300
Hoary-headed Grebe	*Poliocephalus poliocephalus*	12

Recommendation:

Further surveys are needed for priority and migratory species as only historical birds counts available from surveys conducted in 1982 and 1992.

Other Fauna

Fish were observed in Ewans Lake at high abundance. The species of fish were not identified in keeping with the rapid assessment methodology employed (Nowicki *et al.* 2008). A species of mullet (*Aldrichetta sp*.) is known to sometimes enter the Lake Warden System on the Bandy Creek watercourse. Two minnows, including Western Australia's rarest species of minnow - the Trout Minnow, are also known to occur in coastal streams and swamps in the area (Jaensch 1992; Department of Conservation and Land Management 1999).

There was no evidence of other terrestrial vertebrate fauna within the wetland.

Recommendation:

Further surveys are needed to determine abundance and diversity of fish species, particularly considering previous records of rare species.

Threats to the Ecology of Ewans Lake

No local scale threats were observed at Ewans Lake.

References

CALM. (1999) *Management Plan: Esperance Lakes Nature Reserves: A32257 Lake Warden, A15231 Woody Lake, A23825 Mullet Lake, A31197 Shark Lake, C24511 Pink Lake, 1999-2009*. Department of Conservation and Land Management, Perth, Australia.

Department of Conservation and Land Management. (1999) *Esperance Lakes Nature Reserve: Management Plan 1999-2009*. Management Plan No. 39 Prepared for the National Parks and Nature Conservation Authority, Perth, Australia.

Environment Australia. (2001) *A Directory of Important Wetlands in Australia, Third Edition*. Environment Australia, Canberra.

ESCAVI. (2003) *National Vegetation Information System: Australian Vegetation Attribute Manual*. Department of Environment and Heritage, Canberra, Australia. August 2003.

Jaensch, R. P. (1992) Lake Warden System - WA027. In *Australian Wetlands Database*. Department of Environment, Heritage and the Arts. Accessed on 10 January 2009.

Nowicki, A., Daniel, G., and Smith, H. C. (2008) *Methodology: Inland Aquatic Ecosystems Rapid Resource Condition Assessment of Significant Western Australian Wetlands.* Version number 1.0. Prepared for Resource Condition Monitoring Project, Strategic Reserve Fund, Department of Environment and Conservation, Perth. December 2008.

Thackway, R., and Lesslie, R. (2005) *Vegetation Assests, States, and Transitions (VAST): accounting for vegetation condition in the Australian landscape*. Technical Report. Bureau of Rural Sciences, Canberra, Australia.

Watkins, G. (2008) *Ecological Character Description of the Lake Warden System Ramsar Site, Esperance, Western Australia: A Report by the Department of Environment and Conservation*. Department of Environment and Conservation, Perth, Australia (In Preparation).

Appendix

Plant specimens submitted to the Western Australian Herbarium:
Hemichroa pentandra (RCM040-R1-11)
Chara sp. (RCM040-R1-06)
Triglochin striata (RCM040-R1-07)

Table 6 – Herbarium Records for Ewans Lake.

Search Coordinates: NW corner 33.7944°S, 121.9382° E; SE corner 33.8122°S, 121.9721°E

Family	Species	Alien	Cons. Status
Apiaceae	*Apium prostratum*		
Asclepiadaceae	*Gomphocarpus fruticosus*	Y	
Asteraceae	*Angianthus preissianus*		
Asteraceae	*Cotula bipinnata*	Y	
Asteraceae	*Cotula coronopifolia*	Y	
Asteraceae	*Senecio glossanthus*		
Brassicaceae	*Lepidium rotundum*		
Chenopodiaceae	*Atriplex exilifolia*		
Chenopodiaceae	*Sarcocornia blackiana*		
Chenopodiaceae	*Sarcocornia quinqueflora*		
Chenopodiaceae	*Tecticornia arbuscula*		
Chenopodiaceae	*Tecticornia halocnemoides*		
Chenopodiaceae	*Tecticornia indefessa*		P2
Chenopodiaceae	*Tecticornia indica* subsp. *bidens*		
Chenopodiaceae	*Tecticornia syncarpa*		
Convolvulaceae	*Wilsonia humilis*		
Convolvulaceae	*Wilsonia rotundifolia*		
Crassulaceae	*Crassula exserta*		
Cyperaceae	*Isolepis* sp.		
Cyperaceae	*Lepidosperma* sp.		
Dilleniaceae	*Hibbertia racemosa*		
Epacridaceae	*Leucopogon assimilis*		
Goodeniaceae	*Lechenaultia tubiflora*		
Iridaceae	*Patersonia occidentalis* var. *occidentalis*		
Iridaceae	*Romulea rosea*	Y	
Juncaginaceae	*Triglochin mucronata*		
Lobeliaceae	*Isotoma* sp.		
Malvaceae	*Lawrencia squamata*		
Mimosaceae	*Acacia lasiocarpa* var. *bracteolata*		
Myrtaceae	*Baeckea uncinella*		
Myrtaceae	*Darwinia diosmoides*		

Family	Species	Alien	Cons. Status
Myrtaceae	*Darwinia vestita*		
Myrtaceae	*Eucalyptus micranthera*		
Myrtaceae	*Eucalyptus occidentalis*		
Myrtaceae	*Melaleuca brevifolia*		
Myrtaceae	*Melaleuca thymoides*		
Myrtaceae	*Phymatocarpus maxwellii*		
Myrtaceae	*Verticordia plumosa* var. *grandiflora*		
Poaceae	*Austrostipa juncifolia*		
Poaceae	*Avena barbata*	Y	
Poaceae	*Chloris virgata*	Y	
Poaceae	*Ehrharta calycina*	Y	
Poaceae	*Ehrharta longiflora*	Y	
Poaceae	*Eragrostis curvula*	Y	
Poaceae	*Lolium rigidum*	Y	
Poaceae	*Puccinellia stricta*		
Proteaceae	*Conospermum leianthum* subsp. *leianthum*		
Proteaceae	*Hakea adnata*		
Proteaceae	*Hakea ferruginea*		
Restionaceae	*Desmocladus flexuosus*		
Restionaceae	*Hypolaena exsulca*		
Restionaceae	*Hypolaena humilis*		
Restionaceae	*Lyginia imberbis*		
Thymelaeaceae	*Pimelea brachyphylla*		

Table 7 – Overall Vegetation Community Condition Rating as adapted from (Thackway and Lesslie 2005). Shading indicates the condition of Ewans Lake.

Overall Community Condition Rating					
	0	**1**	**2**	**3**	**4**
	RESIDUAL BARE	**NATURAL**	**IMPACTED**	**DEGRADED**	**REMOVED / REPLACED**
Community Condition Class	Areas where native vegetation does not naturally persist	Native vegetation community structure, composition and regenerative capacity intact - no significant perturbation from land management practices	Native vegetation community structure, composition and regenerative capacity intact but perturbed by land management practices	Native vegetation community structure, composition and regenerative capacity significantly altered by land management practices	Species present are alien to the locality and either spontaneous in occurrence or cultivated. Alternatively, vegetation may have been removed entirely
Regenerative Capacity	Natural regenerative capacity unmodified - ephemerals and lower plants	Regenerative capacity intact. All species expected to show regeneration are doing so	Natural regenerative capacity somewhat reduced, but endures under current/past land management practices	Natural regenerative capacity limited and at risk due to land management practices. Rehabilitation and restoration possible through removal of threats	Regenerative potential of native vegetation has been suppressed by ongoing disturbances. There is little potential for restoration
Vegetation Structure	Nil or minimal	Structural integrity of native vegetation is very high. All expected strata, growth forms and age classes are present	Structure is altered but persists, i.e. some elements of a stratum are missing	Structure of native vegetation is significantly altered, i.e. one or more strata are missing entirely	All structural elements of native vegetation are missing or highly degraded
Vegetation Composition	Nil or minimal	Compositional integrity of native vegetation is very high. All species expected at the site are present	Composition of native vegetation is altered. All major species are present, although proportions may have changed. Some minor species may be missing	Significant species are missing from the site and may have been replaced by opportunistic species. Loss of species affects structure of vegetation	Native vegetation removed entirely +/- replaced with introduced species