



Department of
Environment and Conservation

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Resource Condition Report for a Significant Western Australian Wetland

Wetlands of the Muggon ex-Pastoral Lease

2008



Figure 1 – Muggon Lake.

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1. Introduction

This Resource Condition Report (RCR) was prepared by the Inland Aquatic Integrity Resource Condition Monitoring (IAI RCM) project. It describes the ecological character and condition of two wetlands on the Muggon ex-pastoral lease. Both of these wetlands lack official names and so have been allocated descriptors by the IAI RCM project. The first survey site is Muggon Lake, one of a system of salt lakes that runs along the property's western boundary. The second site is Muggon Claypan, an ephemeral, fresh, turbid claypan located near the Muggon homestead.

The sites on Muggon were selected for survey by the IAI RCM project because they are examples of two wetland types that are typical of the Murchison bioregion. Also, the data collected will contribute to an ongoing biological survey of the property that is monitoring changes in environmental conditions following the removal of stock.

1.1. Site Code

Inland Aquatic Integrity Resource Condition Monitoring Project (DEC):

RCM020 (Muggon Lake)

RCM020b (Muggon Claypan)

1.2. Purpose of Resource Condition Report

The objective of this RCR is to provide a summary of information relevant to the ecology of the wetlands of the Muggon ex-pastoral lease. This information is then used to describe the drivers of, and threats to, these ecosystems. The resultant 'snapshot' of ecological character will provide context for future monitoring of the wetlands and assist with gauging the effectiveness of management planning and actions on the property.

1.3. Relevant Legislation and Policy

The following legislation and policy is relevant to the management of the Muggon wetlands:

Western Australian state policy

Wildlife Conservation Act 1950

This Act provides for the protection of wildlife. All fauna (animals native to Australia) in Western Australia is protected under section 14 and all flora (plants native to Western Australia) are protected under section 23 of the *Wildlife Conservation Act 1950*. The Act establishes licensing frameworks for the taking and possession of protected fauna, and establishes offences and penalties for interactions with fauna.

Conservation and Land Management Act 1987

This Act is administered by the State Department of Environment and Conservation (DEC) and applies to public lands. It sets the framework for the creation and management of marine and terrestrial parks, reserves and management areas in Western Australia, and provides protection for flora and fauna within reserve systems.

Aboriginal Heritage Act 1972

The purpose of this Act is to protect Aboriginal remains, relics and sites from undue interference, and to recognise the legitimate pursuit of Aboriginal customs and traditions. Under the Act, it is an offence for a person to excavate, destroy, damage or alter any Aboriginal site or artefact. The Act also allows for a representative body of persons of Aboriginal descent to make use of significant places for purposes sanctioned by the Aboriginal tradition relevant to those places.

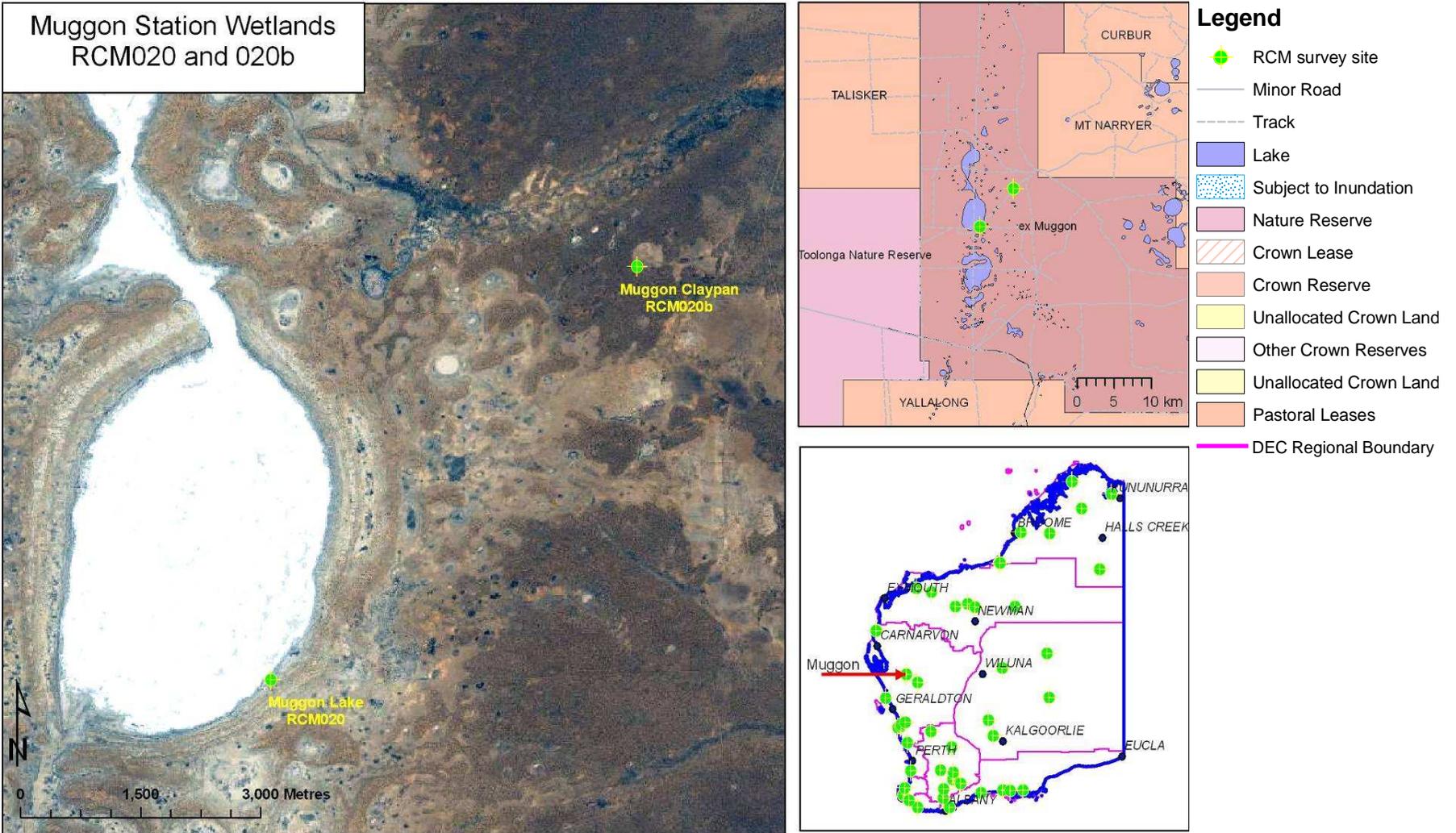


Figure 2 – Aerial photograph showing the location of the survey sites on the Muggon ex-pastoral lease. The upper insert shows the location of the survey sites relative to the wetland system and surrounding tenure. The lower insert shows the location of all IAI RCM survey sites in Western Australia.

2. Overview of the Muggon Wetlands

2.1. Location and Cadastral Information

The Muggon ex-pastoral lease lies approximately 20 km northwest of the Murchison settlement and covers an area of 182,743 ha. The property was a pastoral lease until acquired by the Department of Environment and Conservation (DEC) in the mid-1990s. This land will eventually become part of the conservation estate but is currently Unallocated Crown Land, managed by DEC. Much of Muggon is bounded by active pastoral leases, although the southwest corner of the property abuts Toolonga Nature Reserve.

The two wetlands that were surveyed are both southwest of the homestead, on the track that leads to the Muggon Road tank. The claypan is approximately 3.5 km from the homestead and is the first claypan crossed by that track. The lake is the northernmost of the two large salt lakes near the property's western boundary. The survey location is near the point that the track passes the southern edge of the lake.

2.2. IBRA Region

Muggon lies on the western edge of the western subregion (MUR2) of the Murchison Interim Bioregionalisation of Australia (IBRA) region. This subregion contains the headwaters of the Murchison and Wooramel Rivers, which drain the subregion westwards to the coast.

The Western Murchison is on the Yilgarn Craton and the underlying geology is dominated by granite with greenstone intrusions. These are overlain by extensive hardpan washplains. Surfaces associated with the occluded drainage also occur throughout the subregion.

Mulga low woodlands, often rich in ephemerals and usually with bunch grasses, occur on alluvial and eluvial surfaces. Hummock grasslands are found on areas of sandplain, saltbush shrublands on calcareous soils and *Halosarcia* low shrublands on saline alluvia. (Desmond *et al.* 2001).

The most extensive vegetation types present on Muggon are shrublands dominated by bowgada (*Acacia ramulosa*) scrub, succulent steppe with open scrub, and scattered mulga and other *Acacia* species over saltbush and bluebush (Meinema *et al.* 2000).

2.3. Climate

The nearest Bureau of Meteorology weather station to Muggon is at the Murchison settlement (Bureau of Meteorology 2009). Weather conditions at Muggon would not differ appreciably from those at Murchison.

Murchison experiences an arid climate. It receives a mean annual rainfall of 244.7 mm, in a bimodal pattern (Figure 3). Summer rainfall is usually associated with decaying tropical lows, while winter rainfall results from the occasional cold fronts that penetrate the state's interior. Daily evaporation is not recorded at Murchison, but would be expected to be many times greater than rainfall, meaning that surface water is short lived after rain. Temperatures peak in January with a mean daily minimum/maximum of 22.8 °C/39.2 °C and fall to 6.1 °C/20.9 °C in July.

The Muggon wetlands were surveyed by the IAI RCM project on the 23rd of August 2008. In the six months preceding the survey, Murchison received 331.1 mm of rain. Much of this (183 mm) fell in February, with the last rain recorded on the 31st of July.

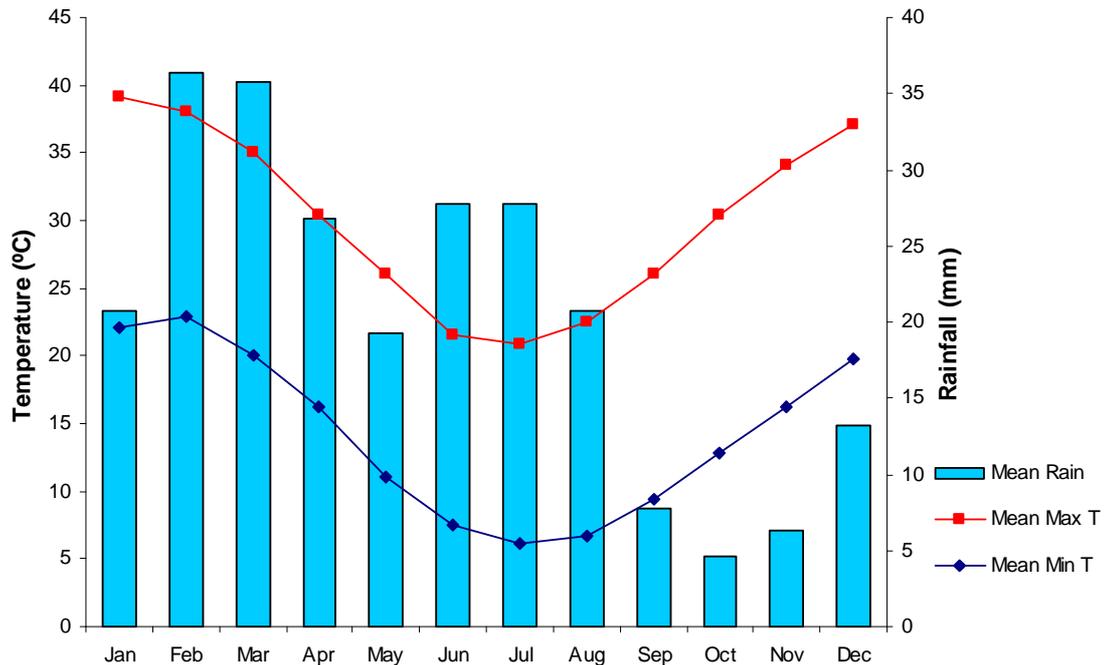


Figure 3 – Climatic averages for Murchison, approximately 55 km southeast of Muggon Lake.

2.4. Wetland Type

Under the categorisation used by the Directory of Important Wetlands in Australia (DIWA) (Environment Australia 2001), the Muggon Lake System may be described as seasonal/intermittent saline lakes (type B8) and seasonal saline marshes (Type B12). Muggon Lake is a megascale irregular elongate lake stretching approximately 10 km north to south. It is surrounded by scattered mesoscale salt pans. Muggon Claypan would be classed as a seasonal/intermittent freshwater pond on inorganic soils (DIWA type B10). It is a round, freshwater, turbid claypan, approximately 350 m in diameter.

2.5. Values of the Muggon Lakes

Values are the internal principles that guide the behaviour of an individual or group. Value systems determine the importance people place on the natural environment and how they view their place within it. Divergent values may result in people pursuing different objectives in relation to nature conservation, having different reasons for desiring a commonly agreed outcome, or favouring different mechanisms to achieve this outcome. Because of this, it is important to be explicit about the values that are driving conservation activities at a wetland.

The Conceptual Framework for Managing Natural Biodiversity in the Western Australian Wheatbelt (Wallace 2003) identified eight reasons that humans value natural biodiversity:

a. Consumptive use

Consumptive use is gaining benefit from products derived from the natural environment without these products going through a market place, for example, the collection and personal use of firewood or 'bushtucker'. No specific information is available regarding consumptive use of the Muggon wetlands, but Local Aboriginal people, the Nanda language group, value the consumptive use of the broad Muggon area. Hunting and gathering

activities conducted on Yallalong and Muggon, particularly around the Badgeradda Ranges, are described in the 2001 Native Title determination (National Native Title Tribunal. 2001).

b. Productive use

Productive use values are derived from market transactions involving products derived from the natural environment. For example, firewood may be collected and sold or exchanged for another commodity, or commercial cattle may be grazed on native grasses. Muggon has a history of use by the pastoral industry, but has been destocked and no longer delivers productive use value.

c. Opportunities for future use

Not all uses of the natural environment may be apparent at the present time. The potential for future benefit from the natural environment is maximised by maintaining the greatest possible biodiversity. The loss of taxa or ecosystems represents lost opportunities. Muggon Lake may support endemic or rare taxa. Such unique features would increase the potential for future opportunities to present.

d. Ecosystem services

There are many naturally occurring phenomena that bring enormous benefit to mankind. For instance, plants generate oxygen, insects pollinate food crops and wetlands mitigate floods by regulating water flows. The term 'ecosystem services', is used as a broad umbrella to cover the myriad of benefits delivered, directly or indirectly, to humankind by healthy ecosystems. The Muggon wetlands would make a relatively small contribution to the ecosystem services delivered by the broader region. That said, given the parlous state of the global environment, every small contribution is important.

e. Amenity

Amenity describes features of the natural environment that make life more pleasant for people. For instance, pleasant views, shade and wind shelter from a stand of trees. It is difficult to quantify the amenity value of isolated sites such as the Muggon wetlands, but the Murchison region is increasing in popularity as a tourist destination. At the time of the IAI RCM survey, there were a large number of native plants in flower, providing spectacular scenery.

f. Scientific and educational uses

Parts of the natural environment that remain relatively unmodified by human activity represent great educational opportunities. Such sites allow us to learn about changes occurring elsewhere in the natural world. They also act as 'control' sites that allow us to benchmark other, altered habitats. The Muggon wetlands are relatively unmodified saline and freshwater wetlands that may present opportunities for advancing the science of wetland ecology.

g. Recreation

Many recreational activities rely on the natural environment (bird watching, canoeing, wildflower tourism, etc.) or are greatly enhanced by it (hiking, cycling, horse riding, photography, etc.). Recreation may deliver economic benefit such as income derived from tourism, and also delivers spiritual and physical health benefits to the recreator. Muggon is a popular stopover for tourists in the Murchison region and the wetlands provide recreational opportunities.

h. Spiritual/philosophical values

People's spiritual and philosophical reasons for valuing natural environment are numerous and diverse. One commonly cited is the 'sense of place' that people derive from elements of their environment. This is evident in many Aboriginal and rural Australians, who strongly identify themselves with their natural environment. Many people also believe that nature has

inherent value, or a right to exist that is independent of any benefit delivered to humans. A sense of spiritual well-being may be derived from the knowledge of healthy environments, even if the individual has no contact with them. The Muggon area is of cultural significance to the local Aboriginal people. Although no registered heritage sites lie on the property, the 2001 Native Title determination describes the spiritual value attached to the landscape by the Nanda people (National Native Title Tribunal. 2001).

The intent of nature conservation is usually to maintain the ecosystem services, scientific and educational uses and opportunities for future uses at a given site. Doing so is likely to have positive effects on the amenity, recreational use and spiritual/philosophical values to which the site's natural environment contributes. Consumptive and productive uses of the natural environment are not usually considered, as these are often incompatible with nature conservation.

3. Critical Components and Processes of the Ecology of Muggon Lake

The objective of the Muggon Wetlands RCR is to compile information relevant to the ecology of the wetlands' ecosystems. By doing so, it is possible to identify the critical components and drivers of the wetlands. These components and processes determine the sites' ecological character and are the variables that should be assessed in any ongoing monitoring.

Climate and geomorphology are the most important drivers of wetland ecosystems. Between them, these factors determine the position of a wetland in the landscape and the type and hydrological regime of that wetland. In turn, a wetland's position, type and hydrology exert a strong influence on its biota and biochemical properties and processes.

A summary of Muggon Wetlands' critical ecosystem components follows, along with a detailed description of the results of the IAI RCM 2008 survey and of any previous studies conducted on these wetlands.

3.1. Geology and Soils

Muggon is dominated geologically by the Darling Fault, which runs in a north to south direction, almost parallel to the western boundary of the lease. It is this fault that has influenced the southern flow of this section of the Murchison River drainage system.

Muggon consists primarily of gently undulating to almost flat sandplains with its major feature being the salt pans, ephemeral swamps and numerous claypans and drainage channels dissecting the station from north to south. To the east, the lease consists of primarily unconsolidated aeolian and residual sands, covering approximately 65% of the area. The major drainage system dissecting Muggon lease from north to south is dominated by playa-dune terrain which is saline in parts (Minema *et al.* 2000).

3.2. Hydrology

Muggon Lake lies within a paleochannel that forms part of the zone of ancient drainage. It does not appear that the system flows, even in very wet conditions. The lake is surface water fed, with a number of short, irregular drainage lines entering from the eastern side. Muggon Claypan is entirely fed by overland flow and direct precipitation following periods of heavy rain.

3.3. Water Quality

Muggon Lake was slightly subsaline when sampled but would have been fresh in the recent past. It could be expected to be much more saline at lower water levels but this is natural, rather than secondary salinity. Nutrient and chlorophyll concentrations were low.

Muggon Claypan showed high turbidity (1,400 NTU) which is typical of claypans. The high colour measurement (700 TCU) is probably inflated due to the high turbidity interfering with the colour

analysis. Nutrient concentrations are frequently also elevated in claypans, as is the case here for phosphorus. This occurs because nutrients bind to the clay particles which, in turbid systems, are suspended in the water column. This means that nutrients that are usually stored in the substrate are in the water column. However, in this instance, a high chlorophyll concentration was also detected which suggests a large total nutrient load.

Table 1 – Water chemistry parameters for Muggon Lake and Muggon Claypan as sampled in August 2008.

	Muggon Lake	Muggon Claypan
pH	9.84	8.16
Alkalinity (mg/L)	30	35
TDS (g/L)	3.3	0.08
Turbidity (NTU)	1.8	1,400
Colour (TCU)	3	700
Total nitrogen (ug/L)	360	1,500
Total phosphorus (ug/L)	5	780
Total soluble nitrogen (ug/L)	210	1,100
Total soluble phosphorus (ug/L)	5	640
Chlorophyll (ug/L)	2	19.5
Na (mg/L)	612	16.3
Mg (mg/L)	57.4	3.9
Ca (mg/L)	444	0.8
K (mg/L)	41.1	6.3
Cl (mg/L)	1,120	7
SO₄ (mg/L)	1,150	1.2
HCO₃ (mg/L)	0.5	43
CO₃ (mg/L)	18	0.5

3.4. Benthic Plants

The aquatic plant, *Ruppia polycarpa*, was abundant in the lake adjacent to transect RCM020-R3.

3.5. Littoral Vegetation

Three vegetation transects were established on the margins of Muggon Lake (RCM 020-R1 to R3) and one transect was established at Muggon Claypan (RCM020b-R1). The details of these transects are summarised in Table 2.

Table 2 – Site attributes of the Muggon Lake and Muggon Claypan vegetation transects.

Transect		RCM020-R1	RCM020-R2	RCM020-R3	RCM020b-R1		
Datum		WGS84	WGS84	WGS84	WGS84		
Zone		50	50	50	50		
Easting		348767	348633	348570	352808		
Northing		7047327	7047298	7047350	7052469		
Length (m)		50	30	30	30		
Bearing		50	40	30	110		
Wetland state		Full	Full	Full	Drying		
Soil state (%)		Dry	100	100	0	100	
		Waterlogged	0	0	100	0	
		Inundated	0	0	0	0	
Substrate (%)		Observed	Bare	20	5	15	20
			Rock	0	0	0	0
			Cryptogam	0	0	0	0
			Litter	5	0	0	5
			Trash	0	0	5	5
			Logs	0	0	0	0
		Expected	Bare				20
			Rock				0
			Cryptogam				0
			Litter				5
			Trash				5
			Logs				0
Time since last fire		no evidence	no evidence	fire unlikely	no evidence		
Community condition		Natural/Impacted	Natural	Natural	Natural		
Upper Stratum		Cover (%)	20.43	-	-	-	
		Height (m)	4	-	-	-	
Mid Stratum		Cover (%)	14.98	-	-	35.53	
		Height (m)	<1	-	-	<1	
Ground Cover		Cover (%)	36.52	77.07	88.04	41.67	
		Height (m)	<0.5	<0.3	<0.3	<0.3	

Transect RCM020-R1

Transect RCM020-R1 was established approximately 200 m from the water's edge at the southern end of Muggon Lake (Figure 4). The sandy soil surface was dry at the time of survey. Vegetation was dominated by *Melaleuca lateriflora* subsp. *acutifolia*, *M. stereophloia*, *Acacia sclerosperma* subsp. *sclerosperma* very tall open shrubland (20.4% cover, 4 m tall) over *Salsola australis*, *Ptilotus obovatus* subsp. *obovatus*, *Solanum lasiophyllum* mid to high open shrubland (15% cover, <1 m tall) over *Euphorbia tannensis* subsp. *eremophila*, *Lawrencia glomerata*, *Tetragonia diptera* mid to high herbs and grasses (36.5% cover, <0.5 m tall). Table 3 provides a complete list of taxa recorded along the transect RCM020-R1.

There were no weed species recorded along this transect. Whilst all the species recorded along this transect were natives, community composition and structure has been influenced by pastoral history and current grazing by feral goats. The overall vegetation condition was considered 'natural/impacted' (Table 11 in Appendix 1).



Figure 4 – Muggon Lake vegetation transect RCM020-R1.

Table 3 – Plant taxa recorded along Muggon Lake transect RCM020-R1 (in order of stratum then dominance).

Genus	Species	Height (m)	Stratum ¹	Form
<i>Melaleuca</i>	<i>lateriflora</i> subsp. <i>acutifolia</i>	3.5	U1	Shrub
<i>Melaleuca</i>	<i>stereophloia</i>	3.5	U1	Shrub
<i>Acacia</i>	<i>sclerosperma</i> subsp. <i>sclerosperma</i>	2.5	U1	Shrub
<i>Acacia</i>	<i>tetragonophylla</i>	2.5	U1	Shrub
<i>Senna</i>	sp. Austin (A. Strid 20210)	3	U1	Shrub
<i>Salsola</i>	<i>australis</i>	0.6	M1	Chenopod
<i>Ptilotus</i>	<i>obovatus</i> var. <i>obovatus</i>	0.6	M1	Shrub
<i>Solanum</i>	<i>lasiophyllum</i>	0.7	M1	Shrub
<i>Senna</i>	<i>artemisioides</i> subsp. <i>petiolaris</i>	1	M1	Shrub
<i>Chenopodium</i>	<i>gaudichaudianum</i>	1.5	M1	Chenopod
<i>Sida</i>	<i>calyxhymenia</i>	1.5	M1	Shrub
<i>Senna</i>	sp. Meekatharra (E. Bailey 1-26)	1.5	M1	Shrub
<i>Solanum</i>	<i>orbiculatum</i> subsp. <i>orbiculatum</i>	0.6	M1	Shrub
<i>Eremophila</i>	<i>longifolia</i>	1	M1	Shrub
<i>Maireana</i>	<i>lanosa</i>	0.5	M1	Chenopod
<i>Scaevola</i>	<i>spinescens</i>	0.5	M1	Shrub
<i>Euphorbia</i>	<i>tannensis</i> subsp. <i>eremophila</i>	0.6	G1	Forb
<i>Lawrenzia</i>	<i>glomerata</i>	0.4	G1	Forb
<i>Tetragonia</i>	<i>diptera</i>	0.2	G1	Forb
<i>Angianthus</i>	<i>milnei</i>	0.3	G1	Forb
<i>Eragrostis</i>	<i>dielsii</i>	0.1	G1	Grass
<i>Atriplex</i>	? <i>semibaccata</i>	0.2	G1	Chenopod
<i>Austrostipa</i>	<i>nitida</i>	0.5	G1	Grass
<i>Tecticornia</i>	<i>indica</i> subsp. <i>bidens</i>	0.3	G1	Chenopod

Genus	Species	Height (m)	Stratum ¹	Form
<i>Zygophyllum</i>	<i>billardieri</i>	0.2	G1	Forb
<i>Calandrinia</i>	? <i>polyandra</i>	0.1	G1	Forb
<i>Euphorbia</i>	<i>myrtoides</i>	0.05	G1	Forb
<i>Abutilon</i>	<i>oxycarpum</i>	0.2	G1	Shrub
<i>Enchylaena</i>	<i>tomentosa</i> var. <i>tomentosa</i>	0.4	G1	Chenopod
<i>Calandrinia</i>	? <i>remota</i>	0.1	G1	Forb
<i>Paractaenum</i>	<i>novae-hollandiae</i>	0.3	G1	Grass
<i>Zygophyllum</i>	<i>iodocarpum</i>	0.2	G1	Forb
<i>Frankenia</i>	? <i>pauciflora</i>	0.3	G1	Shrub
<i>Nicotiana</i>	<i>occidentalis</i> subsp. <i>obliqua</i>	0.3	G1	Forb

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).

? Limited confidence in identification.

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

U1+ ^*Melaleuca lateriflora* subsp. *acutifolia*, *Melaleuca stereophloia*, *Acacia sclerosperma* subsp. *sclerosperma*, *Acacia tetragonophylla*, *Senna* sp. Austin (A. Strid 20210)\shrub\4\i; M1 ^*Salsola australis*, *Ptilotus obovatus* var. *obovatus*, *Solanum lasiophyllum*, *Senna artemisioides* subsp. *petiolaris*, *Chenopodium gaudichaudianum*\shrub, chenopod shrub\2\i; G1 ^*Euphorbia tannensis* subsp. *eremophila*, *Lawrencia glomerata*, *Tetragonia diptera*, *Angianthus milnei*, *Eragrostis dielsii*\forb, tussock grass\1\i.

Transect RCM020-R2

Transect RCM020-R2 was established approximately 100 m from the water's edge at the southern end of Muggon Lake (Figure 5). The soil was wet beneath the surface. The vegetation was dominated by *Tecticornia undulata*, *Frankenia pauciflora* low open shrubland over *Neosciadium glochidiatum*, *Swainsona cornuta*, *Eragrostis dielsii* low herbs and grasses. Table 4 provides a complete list of taxa recorded along the transect R2.

No weeds were recorded along this transect. The community condition was considered 'natural' (Table 11 in Appendix 1) despite the area's history of grazing.



Figure 5 – Muggon Lake vegetation transect RCM020-R2.

Table 4 – Plant taxa recorded along Muggon Lake transect RCM020-R2 (in order of stratum then dominance).

Genus	Species	Height (m)	Stratum ¹	Form
<i>Tecticornia</i>	<i>undulata</i>	0.3	G1	Chenopod
<i>Frankenia</i>	? <i>pauciflora</i>	0.2	G1	Shrub
<i>Neosciadium</i>	<i>glochidiatum</i>	0.1	G2	Forb
<i>Swainsona</i>	<i>cornuta</i>	0.2	G2	Forb
<i>Eragrostis</i>	<i>dielsii</i>	0.1	G2	Grass
<i>Lawrenzia</i>	<i>glomerata</i>	0.4	G2	Forb
<i>Lotus</i>	<i>cruentus</i>	0.1	G2	Forb
<i>Angianthus</i>	<i>milnei</i>	0.3	G2	Forb
<i>Erodium</i>	<i>cygnorum</i>	0.4	G2	Forb

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).

? Limited confidence in identification.

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

G1+ ^*Tecticornia undulata*, *Frankenia ?pauciflora* ^samphire shrub, shrub\1\; G2 ^*Neosciadium glochidiatum*, *Swainsona cornuta*, *Eragrostis dielsii* ^forb, grass\1\c.

Transect RCM020-R3

Transect RCM020-R3 was established approximately 20 m from water's edge at the southern end of Muggon Lake (Figure 6). The soil was waterlogged at the time of survey. Vegetation was dominated by *Tecticornia undulata* low sparse chenopod shrubland over low *Mimulus repens*, *Neosciadium glochidiatum* and *Goodenia occidentalis* herbs.

The overall community condition was considered 'natural' (Table 11 in Appendix 1), with no weeds recorded and no evidence of recent disturbance.

Mimulus repens is a species of conservation significance, currently listed as 'Priority Three' (Atkins 2008). This species was abundant along transect RCM020-R3. Table 5 provides a complete list of taxa recorded along the transect RCM020-R3.



Figure 6 – Muggon Lake vegetation transect RCM020-R3.

Table 5 – Plant taxa recorded along Muggon Lake transect RCM020-R3 (in order of stratum then dominance).

Genus	Species	Height (m)	Stratum ¹	Form
<i>Tecticornia</i>	<i>undulata</i>	0.3	G1	Chenopod
<i>Mimulus</i>	<i>repens</i> (P3)	0.1	G2	Forb
<i>Neosciadium</i>	<i>glochidiatum</i>	0.1	G2	Forb
<i>Goodenia</i>	? <i>occidentalis</i>	0.05	G2	Forb

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).
 ? Limited confidence in identification.

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

G1+ ^*Tecticornia undulata*\1r; G2 ^*Mimulus repens*, *Neosciadium glochidiatum*, *Goodenia ?occidentalis*\1c.

Muggon Claypan transect RCM020-R1

A single vegetation transect was established adjacent to the water's edge (within 10 m) on the southern margin of Muggon Claypan (Figure 7). The soil was damp at the surface and waterlogged beneath. The vegetation was dominated by *Melaleuca stereophloia*, *Senna* sp. Meekatharra (E. Bailey 1-26), *Senna artemisioides* subsp. *petiolaris* mid to high open shrubland (35.5% cover, <1 m tall) over a mixture of low open herbs, sedges and grasses (41.7% cover, <0.3 m tall). Table 6 provides a complete list of taxa recorded along the transect RCM020b-R1.

The shrubs comprising the dominant stratum were all young plants compared with surrounding vegetation. This vegetation zone was clearly impacted by intermittent flooding. Three species of weeds were recorded along the transect. Despite some grazing pressure from feral goats and rabbits, the overall community condition was considered 'natural' (Table 11 in Appendix 1).



Figure 7 – Muggon Claypan vegetation transect RCM020b-R1.

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

M1+ ^*Melaleuca stereophloia*, *Senna* sp. Meekatharra (E. Bailey 1-26), *Senna artemisioides* subsp. *petiolaris*\^shrub\2i; G1 ^*Myriocephalus oldfieldii*, *Drosera indica*, *Isolepis congrua*, *Lythrum wilsonii*, *Brachyscome iberidifolia*\^forb, sedge\1d.

Table 6 – Plant taxa recorded along Muggon Claypan transect RCM020-R1 (in order of stratum then dominance).

Genus	Species	Height (m)	Stratum¹	Form
<i>Melaleuca</i>	<i>stereophloia</i>	0.8	M1	Shrub
<i>Senna</i>	sp. Meekatharra (E. Bailey 1-26)	1.5	M1	Shrub
<i>Senna</i>	<i>artemisioides</i> subsp. <i>petiolaris</i>	1.5	M1	Shrub
<i>Senna</i>	<i>artemisioides</i> ?subsp. <i>sturtii</i>	1	M1	Shrub
<i>Myriocephalus</i>	<i>oldfieldii</i>	0.3	G1	Forb
<i>Drosera</i>	<i>indica</i>	0.1	G1	Forb
<i>Isolepis</i>	<i>congrua</i>	0.1	G1	Sedge
<i>Lythrum</i>	<i>wilsonii</i>	0.2	G1	Forb
<i>Brachyscome</i>	<i>iberidifolia</i>	0.3	G1	Forb
<i>Schoenus</i>	<i>humilis</i>	0.1	G1	Sedge
<i>Centipeda</i>	<i>crateriformis</i> subsp. <i>crateriformis</i>	0.1	G1	Forb
<i>Gnephosis</i>	<i>tenuissima</i>	0.1	G1	Forb
<i>Elacholoma</i>	<i>hornii</i>	0.01	G1	Forb
<i>Peplidium</i>	<i>aethocheilum</i>	0.01	G1	Forb
<i>Calandrinia</i>	<i>ptycosperma</i>	0.05	G1	Forb
<i>Cyperus</i>	<i>rigidellus</i>	0.05	G1	Sedge
* <i>Helichrysum</i>	<i>luteoalbum</i>	0.8	G1	Forb
<i>Alternanthera</i>	<i>angustifolia</i>	0.2	G1	Vine
* <i>Cuscuta</i>	<i>epithymum</i>	0.2	G1	Vine
<i>Paractaenum</i>	<i>novae-hollandiae</i>	0.4	G1	Grass
<i>Goodenia</i>	<i>berardiana</i>	0.5	G1	Forb
<i>Haloragis</i>	<i>odontocarpa</i>	0.8	G1	Forb
* <i>Sonchus</i>	<i>oleraceus</i>	1.5	G1	Forb
<i>Wahlenbergia</i>	<i>tumidifructa</i>	0.5	G1	Forb
<i>Bergia</i>	<i>trimera</i>	0.05	G1	Forb

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.

? Limited confidence in identification.

3.6. Aquatic Invertebrates

A total of twenty-two macroinvertebrate species belonging to twelve families were recorded at Muggon Lake by the IAI RCM survey. Muggon Lake was slightly subsaline when sampled and this is reflected in this relatively low species richness. Macroinvertebrate richness is about what would be expected of this salinity. Such salinities are also typified by presence of species that are tolerant of moderate salinities (e.g. the damselfly *Austrolestes annulosus* and the chironomid *Procladius paludicola*) plus species that are tolerant of only very mildly saline water (e.g. the conchostracan *Caenestheriella Packard* and the beetle *Sternopriscus multimaculatus*). Species richness and composition can be expected to vary greatly in wetlands, such as Muggon Lake, which vary between fresh and moderate salinity over time. The species present are all common in the region (Table 7).

Table 7 – Aquatic invertebrate taxa identified from Muggon Lake in August 2008.

Class	Order	Family	Lowest ID
Crustacea	Conchostraca	Cyzicidae	<i>Caenestheriella packardi</i>
Insecta	Coleoptera	Halipilidae	<i>Halipilus fuscatus</i>
		Dytiscidae	<i>Hydroglyphus leai</i>
			<i>Sternopriscus multimaculatus</i>
			<i>Necterosoma</i> sp.
			<i>Megaporus howitti</i>
Hydrophilidae	<i>Enochrus elongatus</i>		
	Diptera	Ceratopogonidae	<i>Ceratopogonidae</i>
		Chironomidae	<i>Procladius paludicola</i>
			<i>Larsia albiceps</i>
			<i>Tanytarsus fuscithorax/semibarbitarsus</i>
			<i>Dicotendipes</i> CA1 (type 3) = K4?
			<i>Polypedilum nubifer</i>
			<i>Cryptochironomus griseidorsum</i>
	Hemiptera	Corixidae	<i>Agraptocorixa</i> sp.
			<i>Micronecta gracilis</i>
		Notonectidae	<i>Anisops stali</i>
	Odonata	Coenagrionidae	<i>Austroagrion watsoni</i>
		Lestidae	<i>Austrolestes annulosus</i>
		Libellulidae	<i>Diplacodes bipunctata</i>
			<i>Orthetrum caledonicum</i>
	Trichoptera	Leptoceridae	<i>Oecetis</i> sp.

Twenty macroinvertebrate species belonging to eleven families were recorded at Muggon Claypan. The low number of species collected is typical of turbid claypans. Some of the species present are typical of claypans, including the beetle *Eretes australis*, the fairy shrimp *Branchinella simplex* and clam shrimp *Caenestheriella packardi*. Others are widespread freshwater species (Table 8).

Table 8 – Aquatic invertebrate taxa identified from Muggon Claypan in August 2008.

Order	Family	Lowest ID
Anostraca	Thamnocephalidae	<i>Branchinella simplex</i>
Conchostraca	Cyzicidae	<i>Caenestheriella packardi</i>
Coleoptera	Dytiscidae	<i>Antiporus gilberti</i>
		<i>Sternopriscus multimaculatus</i>
		<i>Eretes australis</i>
Diptera	Ceratopogonidae	Ceratopogonidae
	Chironomidae	<i>Procladius paludicola</i>
		<i>Procladius paludicola</i> P1 (no U-claws)
		<i>Comptosmittia</i> sp. P1 (PSW)
		<i>Cladotanytarsus</i> aff. K4 (PSW)
		<i>Dicrotendipes</i> CA1 (type 3) = K4?
<i>Cryptochironomus griseidorsum</i>		
Hemiptera	Corixidae	<i>Agraptocorixa parvipunctata</i>
		<i>Micronecta gracilis</i>
	Notonectidae	<i>Anisops stali</i>
Odonata	Lestidae	<i>Austrolestes aridus</i>
	Libellulidae	<i>Diplacodes bipunctata</i>
		<i>Orthetrum caledonicum</i>
Trichoptera	Ecnomidae	<i>Ecnomus pansus/turgidus</i>
	Leptoceridae	<i>Oecetis</i> sp.

3.7. Fish

There are no records of fish in the Muggon wetlands and none were observed during the IAI RCM survey.

3.8. Waterbirds

There are no previous records of waterbirds at the Muggon wetlands, probably due to a lack of survey effort. Nearby Wooleen Lake (85 km southeast) and Breberle Lake (50 km northeast) are both DIWA nominated, in part due to their importance to waterbirds. It is likely that, when full, Muggon Lake would also regularly support significant numbers of waterbirds. Indeed, the IAI RCM observed several hundred birds on the lake (Table 9).

Table 9 – Birds counted on Muggon Lake by the IAI RCM project.

Common Name	Latin Name	Number of Birds
Black Swan	<i>Cygnus atratus</i>	261
Black-winged Stilt	<i>Himantopus himantopus</i>	>118
Grey Teal	<i>Anas gracilis</i>	8
Australian Shelduck	<i>Tadorna tadornoides</i>	12
Hoary-headed Grebe	<i>Poliiocephalus poliocephalus</i>	21
Swamp Harrier	<i>Circus approximans</i>	2
Eurasian Coot	<i>Fulica atra</i>	2
Red-capped Plover	<i>Charadrius ruficapillus</i>	8

Two black-fronted dotterel were also present at Muggon Claypan at the time of the IAI RCM survey. The claypan is too small to provide much habitat for waterbirds.

3.9. Terrestrial Vertebrates

Six species of mammal and thirty-one species of reptile have been recorded in the general vicinity of the Muggon wetlands. The importance of the wetlands to these taxa is not known.



Figure 8 – An emu keeps a close eye on the flora survey at Muggon Lake.

4. Threats to the Ecology of the Muggon Lakes

Threats to the ecology of the Muggon wetlands are described in Table 10. Muggon appears to be recovering well following destocking and the condition of both wetlands was assessed as being only slightly impacted. One ongoing management concern is the presence of a sizable population of feral goats. The impact of goats was evident on all of the IAI RCM vegetation transects.

Erosion is also a problem on Muggon and may lead to infilling of the wetlands with transported sediments. The loss of shrubs and perennial grasses that hold the soil surface together has led to the loss of top soil. This, in turn, prevents the establishment of new plants and impedes the soil's ability to retain water. Various measures are being taken on the property to break this cycle and prevent further erosion, particularly in flood events when much of the damage is done.

Fire has a significant impact on the ecological process of this area and, for this reason, prescribed fuel reduction burning may not provide the most ecologically sound method of fire control or protection for the conservation and property values on the lease. The maintenance of strategic fire access tracks is important in assisting with the management and control of wildfire (Minema *et al.* 2000).

The most important driver of both systems, climate, cannot be influenced at a local level. The threat posed by climate change is best addressed by ensuring that ecosystems are robust and not stressed due to other, manageable, threats.

Table 10 – Threat assessment for the Muggon wetlands.

An estimate is provided of the perceived likelihood of goal failure resulting from the impacts of each identified threat category.

Goal: to maintain the geomorphology, hydrology and ecology of Muggon Lake and Muggon Claypan, thus ensuring they retain or improve the richness and diversity of flora and fauna taxa that utilise the area as habitat.

Threat category	Management issue	Probability that threat will cause goal failure with:		Assumptions underlying initial probability assessment and explanatory notes
		Existing management	Extra management	
Altered biogeochemical processes	Hydrological processes, particularly salinity	0.0	0.0	There is no evidence of alteration to the hydrology of the area, nor does there appear to be any likelihood of any alteration in the foreseeable future.
	Carbon cycle and climate change	0.05	0.05	The direction and magnitude of climatic changes in the Murchison are unclear. Across Western Australia, the prediction is for less total rainfall, delivered via more extreme events, and an increase in temperature. This may cause these intermittent wetlands to fill less often. There may be an increased risk of sedimentation due to extreme rainfall events causing widespread erosion. Fires may also become more intense.
Impacts of introduced plants and animals	Environmental weeds	0.01	0.0	Surprisingly, given the property's history of use as a pastoral enterprise, few weed species were found during the IAI RCM survey. Many environmental weeds are having detrimental impacts across the region, so ongoing vigilance is recommended.
	Herbivory, wallowing and trampling by introduced species	0.1	0.05	Impacts from goats were observed on all of the vegetation transects, in varying intensities. Goats are an environmental problem across the Murchison, particularly in areas where freshwater is available.
Impacts of problem native species	Overgrazing by native species	0.0	0.0	No impacts evident.
Impacts of disease	Plant pathogens	0.0	0.0	No impacts evident.
Detrimental regimes of physical disturbance events	Fire regimes	0.05	0.01	Inappropriate fire regimes cause a number of deleterious impacts, including increased soil erosion and the loss of fire-sensitive species and associated fauna. The removal of stock from the property may lead to an increase in fuel load, particularly grasses. This increases the risk of fire.
	Drought	0.01	0.01	The wetlands on Muggon are highly ephemeral and well adapted to prolonged periods of aridity.

Threat category	Management issue	Probability that threat will cause goal failure with:		Assumptions underlying initial probability assessment and explanatory notes
		Existing management	Extra management	
	Flood	0.1	0.02	Flooding may cause plant deaths due to prolonged inundation. A more serious potential impact is infilling of the wetlands due to fluvial deposition of sediments. There is some evidence that erosion on Muggon is above natural rates and steps are being taken to address this.
Impacts of pollution	Herbicide, pesticide or fertiliser use and direct impacts	0.0	0.0	Pastoralism usually does not make use of such chemical and, at present, no intensive agriculture or broadscale cropping is practiced in the catchment.
Impacts of competing land uses	Recreation management	0.01	0.0	Recreational usage of Muggon is infrequent and low impact.
	Nutrient enrichment of water body	0.0	0.0	No impacts appear likely due to the lack of nutrient inputs.
	Urban and industrial development	0.0	0.0	Muggon is an inappropriate site for any urban or industrial development due to its isolation.
	Consumptive uses	0.0	0.0	Any consumptive use of Muggon by local Aboriginal people is most probably sustainable in the long term due to the small number of people involved.
	Illegal activities	0.0	0.0	No evidence of any threat.
	Mines and quarries	?	?	Mineral exploration has occurred on Muggon, but the results of this are unknown.
Insufficient ecological resources to maintain viable populations	Habitat, genetic exchange	0.01	0.01	Muggon is well connected to extensive areas of natural or near-natural environment.

5. Knowledge Gaps and Recommendations for Future Monitoring

Relatively little is known of the ecology of the Muggon wetlands. The information that has been collected on the property relates mainly to terrestrial ecosystems. Almost every aspect of the ecology of the property's wetlands is a knowledge gap. These include the hydrology of the systems and the fauna taxa that utilise them. Of particular interest may be usage of the larger lakes on Muggon by waterbirds. These have the potential to support large populations of birds, including migratory species.

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Appendix 1

Table 11 – Overall Vegetation Community Condition Rating as adapted from Thackway and Lesslie (2005). Shading indicates the condition of the Muggon wetlands.

Overall Community Condition Rating					
	← 0	1	2	3	4 →
Community Condition Class	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

Appendix 2

Plant specimens submitted to the Western Australian Herbarium:

Calandrinia ?polyandra (RCM020-R1-29)

Elacholoma hornii (RCM020b-R1-13)

Lotus cruentus (RCM020-R2-04)

Melaleuca stereophloia (RCM020-R1-05)

Mimulus repens (RCM020-R3-01)

Neosciadium glochidiatum (RCM020-R2-02)

Swainsona cornuta (RCM020-R2-03)

Zygophyllum billardierei (RCM020-R1-25)

Table 12 – Herbarium Records for the Muggon wetlands.

Search Coordinates: NW corner 26.5043°S, 115.4299° E; SE corner 26.7711°S, 115.5406°E

Family	Species	Alien	Cons. Status
Adiantaceae	<i>Cheilanthes lasiophylla</i>		
Amaranthaceae	<i>Alternanthera denticulata</i>		
Amaranthaceae	<i>Ptilotus beardii</i>		P3
Amaranthaceae	<i>Ptilotus chamaecladus</i>		
Amaranthaceae	<i>Ptilotus gaudichaudii</i> var. <i>gaudichaudii</i>		
Apiaceae	<i>Neosciadium glochidiatum</i>		
Apiaceae	<i>Trachymene ceratocarpa</i>		
Asteraceae	<i>Actinobole drummondianum</i>		
Asteraceae	<i>Actinobole uliginosum</i>		
Asteraceae	<i>Angianthus microcephalus</i>		P3
Asteraceae	<i>Angianthus milnei</i>		
Asteraceae	<i>Calotis hispidula</i>		
Asteraceae	<i>Calotis multicaulis</i>		
Asteraceae	<i>Erymophyllum ramosum</i> subsp. <i>ramosum</i>		
Asteraceae	<i>Gnephosis eriocephala</i>		
Asteraceae	<i>Gnephosis</i> sp. Pt Quobba (P.G. Wilson 12622)		
Asteraceae	<i>Gnephosis tenuissima</i>		
Asteraceae	<i>Myriocephalus walcottii</i>		
Asteraceae	<i>Pluchea dunlopii</i>		
Asteraceae	<i>Podotheca gnaphalioides</i>		
Asteraceae	<i>Pogonolepis stricta</i>		
Asteraceae	<i>Rhodanthe humboldtiana</i>		
Asteraceae	<i>Senecio pinnatifolius</i>		
Asteraceae	<i>Trichanthodium skirrophorum</i>		
Asteraceae	<i>Urospermum picroides</i>	Y	
Brassicaceae	<i>Brassica tournefortii</i>	Y	
Brassicaceae	<i>Lepidium phlebopetalum</i>		
Caesalpiniaceae	<i>Senna ? petiolaris</i>		
Caesalpiniaceae	<i>Senna artemisioides</i> subsp. <i>petiolaris</i>		

Family	Species	Alien	Cons. Status
Caesalpiniaceae	<i>Senna artemisioides</i> subsp. <i>x sturtii</i>		
Caesalpiniaceae	<i>Senna glutinosa</i> subsp. <i>chatelainiana</i>		
Caesalpiniaceae	<i>Senna</i> sp.		
Caesalpiniaceae	<i>Senna</i> sp. Austin (A. Strid 20210)		
Caesalpiniaceae	<i>Senna</i> sp. Billabong (J.D. Alonzo 721)		
Caesalpiniaceae	<i>Senna</i> sp. Meekatharra (E. Bailey 1-26)		
Campanulaceae	<i>Wahlenbergia tumidifruca</i>		
Caryophyllaceae	<i>Spergula pentandra</i>	Y	
Casuarinaceae	<i>Casuarina obesa</i>		
Chenopodiaceae	<i>Atriplex amnicola</i>		
Chenopodiaceae	<i>Atriplex bunburyana</i> .		
Chenopodiaceae	<i>Atriplex cephalantha</i>		
Chenopodiaceae	<i>Atriplex semilunaris</i>		
Chenopodiaceae	<i>Atriplex vesicaria</i>		
Chenopodiaceae	<i>Chenopodium curvispicatum</i>		
Chenopodiaceae	<i>Maireana amoena</i>		
Chenopodiaceae	<i>Maireana atkinsiana</i>		
Chenopodiaceae	<i>Maireana carnososa</i>		
Chenopodiaceae	<i>Maireana convexa</i>		
Chenopodiaceae	<i>Maireana lanosa</i>		
Chenopodiaceae	<i>Maireana pyramidata</i>		
Chenopodiaceae	<i>Maireana tomentosa</i> subsp. <i>tomentosa</i>		
Chenopodiaceae	<i>Rhagodia drummondii</i>		
Chenopodiaceae	<i>Rhagodia latifolia</i>		
Chenopodiaceae	<i>Salsola australis</i>		
Chenopodiaceae	<i>Sclerolaena cuneata</i>		
Chenopodiaceae	<i>Sclerolaena recurvicauspis</i>		
Chenopodiaceae	<i>Sclerolaena tridens</i>		
Chenopodiaceae	<i>Tecticornia doleiformis</i>		
Chenopodiaceae	<i>Tecticornia halocnemoides</i>		
Chenopodiaceae	<i>Tecticornia indica</i> subsp. <i>bidens</i>		
Chenopodiaceae	<i>Tecticornia undulata</i>		
Lamiaceae	<i>Pityrodia paniculata</i>		
Colchicaceae	<i>Wurmbea</i> sp.		
Convolvulaceae	<i>Convolvulus angustissimus</i> subsp. <i>angustissimus</i>		
Convolvulaceae	<i>Duperreya sericea</i>		
Cyperaceae	<i>Cyperus rigidellus</i>		
Cyperaceae	<i>Eleocharis pallens</i>		
Cyperaceae	<i>Isolepis congrua</i>		
Droseraceae	<i>Drosera indica</i>		
Elatinaceae	<i>Bergia auriculata</i>		P2
Elatinaceae	<i>Bergia perennis</i> subsp. <i>exigua</i>		

Family	Species	Alien	Cons. Status
Euphorbiaceae	<i>Euphorbia myrtoides</i>		
Euphorbiaceae	<i>Euphorbia</i> sp.		
Frankeniaceae	<i>Frankenia</i> ? <i>cordata</i>		
Frankeniaceae	<i>Frankenia</i> ? <i>fecunda</i>		
Frankeniaceae	<i>Frankenia</i> aff. <i>laxiflora</i>		
Frankeniaceae	<i>Frankenia laxiflora</i>		
Frankeniaceae	<i>Frankenia pauciflora</i>		
Frankeniaceae	<i>Frankenia setosa</i>		
Goodeniaceae	<i>Goodenia neogoodenia</i>		P4
Goodeniaceae	<i>Goodenia occidentalis</i>		
Gyrostemonaceae	<i>Gyrostemon ramulosus</i>		
Juncaceae	<i>Juncus bufonius</i>	Y	
Lamiaceae	<i>Dicrastylis linearifolia</i>		P3
Lamiaceae	<i>Prostanthera tysoniana</i>		P3
Lamiaceae	<i>Prostanthera wilkieana</i>		
Loranthaceae	<i>Amyema gibberula</i> var. <i>gibberula</i>		
Loranthaceae	<i>Amyema hilliana</i>		
Loranthaceae	<i>Lysiana casuarinae</i>		
Malvaceae	<i>Abutilon</i> ? sp. Quobba (H. Demarz 3858)		
Malvaceae	<i>Abutilon geranioides</i>		
Malvaceae	<i>Abutilon otocarpum</i>		
Malvaceae	<i>Abutilon oxycarpum</i>		
Malvaceae	<i>Lawrencia densiflora</i>		
Malvaceae	<i>Lawrencia glomerata</i>		
Malvaceae	<i>Sida kingii</i>		
Marsileaceae	<i>Marsilea costulifera</i>		
Marsileaceae	<i>Marsilea hirsuta</i>		
Mimosaceae	<i>Acacia wiseana</i>		
Myoporaceae	<i>Eremophila clarkei</i>		
Myoporaceae	<i>Eremophila laanii</i>		
Myoporaceae	<i>Eremophila maitlandii</i>		
Myoporaceae	<i>Eremophila strongylophylla</i>		
Myoporaceae	<i>Eremophila youngii</i> subsp. <i>youngii</i>		
Myrtaceae	<i>Eucalyptus mannensis</i> subsp. <i>vespertine</i>		
Myrtaceae	<i>Eucalyptus oldfieldii</i>		
Myrtaceae	<i>Melaleuca</i> ? <i>interioris</i>		
Myrtaceae	<i>Melaleuca lateriflora</i> subsp. <i>acutifolia</i>		
Myrtaceae	<i>Melaleuca stereophloia</i>		
Papilionaceae	<i>Chorizema racemosum</i>		
Papilionaceae	<i>Lotus cruentus</i>		
Papilionaceae	<i>Swainsona affinis</i>		
Papilionaceae	<i>Swainsona cornuta</i>		

Family	Species	Alien	Cons. Status
Papilionaceae	<i>Swainsona pterostylis</i>		
Papilionaceae	<i>Swainsona</i> sp.		
Papilionaceae	<i>Trigonella suavissima</i>		
Plantaginaceae	<i>Plantago drummondii</i>		
Poaceae	<i>Aristida contorta</i>		
Poaceae	<i>Eragrostis dielsii</i>		
Poaceae	<i>Eragrostis setifolia</i>		
Poaceae	<i>Eragrostis tenellula</i>		
Poaceae	<i>Eriachne flaccida</i>		
Poaceae	<i>Lachnagrostis filiformis</i>		
Poaceae	<i>Monachather paradoxus</i>		
Poaceae	<i>Paractaenum novae-hollandiae</i>		
Poaceae	<i>Rostraria pumila</i>	Y	
Poaceae	<i>Triodia basedowii</i>		
Polygonaceae	<i>Muehlenbeckia florulenta</i>		
Portulacaceae	<i>Calandrinia pumila</i>		
Portulacaceae	<i>Calandrinia remota</i>		
Proteaceae	<i>Grevillea stenostachya</i>		P3
Proteaceae	<i>Hakea preissii</i>		
Santalaceae	<i>Exocarpos</i> sp.		
Santalaceae	<i>Santalum lanceolatum</i>		
Scrophulariaceae	<i>Glossostigma drummondii</i>		
Scrophulariaceae	<i>Mimulus repens</i>		P3
Scrophulariaceae	<i>Peplidium muelleri</i>		
Scrophulariaceae	<i>Peplidium</i> sp.		
Scrophulariaceae	<i>Stemodia florulenta</i>		
Solanaceae	<i>Lycium australe</i>		
Solanaceae	<i>Nicotiana occidentalis</i>		
Surianaceae	<i>Stylobasium spathulatum</i>		
Zygophyllaceae	<i>Zygophyllum</i> sp.		