

AVOCA SITES

Site 6 Archdale Water Reserve

This site is of uncertain environmental stability at present but is visibly salt affected along the Avoca River margins. It is also located within the Natte Yallock Targeted Salinity Project Area

Site Description

Archdale Water Reserve now managed by Parks Victoria previously had been licensed for grazing (N Stimson pers. Com. 1998). The site is adjacent to the Avoca River on an alluvial plain at an altitude of 200 metres. The area to the west rises to Palaeozoic sediments. The riparian vegetation is linked to adjacent *E. leucoxylon* (Yellow Gum) open woodland giving it potentially high habitat values. This has been reduced to a moderate value with weed invasion of the understorey layer and riparian zone and grazing in the adjacent Yellow Gum woodland (Davies 2003).

Vegetation Description and Composition

This riverside reserve is dominated by *E. camaldulensis* (Red Gum) floodplain riparian woodland EVC, transitioning into grassy woodland dominated by *E. leucoxylon* (Yellow Gum) on the higher ground (DSE 2003).

The understorey consists of species from the Poaceae (grasses), Cyperaceae (sedges) and *Juncus* (rushes) families. Some areas now have 50 percent introduced species, mainly from the Poaceae (grass) family. There are two salt indicator species being *Juncus acutus* (Spiny Rush) and *Lolium* sp. (Rye grass).

There appears to be minimal change in the vegetation survey results since monitoring began, beyond the recent loss of *Triglochin procera* (Water ribbons) and several species from the Asteraceae family, due to the continued dry conditions (appendices 8.2 & 8.3) (Davies 2003).

Tree Health

Crown densities were generally quite sparse with many trees containing dead branches and branchlets. The three trees that had leaf samples taken displayed moderate degrees of insect attack from psyllid bugs (lerps) and leaf skeletoniser caterpillars.

Leaf chloride concentrations ranged from 0.16-0.27 percent. These were quite low and are in response to dry conditions and a drop in water tables (Collopy 2003).

Most trees have experienced decline in canopy cover and density since 1997. Some trees also contained large amounts of epicormic growth and evidence of insect attack. These results could be due to dry conditions and need to be compared with further data collected in seasons of above average rainfall.

Regeneration in quadrat A is not occurring possibly due to the large amounts of *Phalaris* and *Juncus acutus* (Spiny Rush) smothering this quadrat. Slight regeneration of River Red Gums was recorded along the river edge in quadrat B (appendix 8.4).

Birds

Bird species seen at the time of vegetation and tree health surveys were:-

Brown Treecreeper, Galah, Magpie, Rainbow Bee-eater, Red-rumped Parrot, Red Wattlebird, Superb Fairy-wren, Welcome Swallow, White-plumed Honeyeater, Black duck, Noisy Miner and Willie Wagtail. Many of these species are commonly found in Red Gum and wooded farmland habitat. Only one waterbird species (Black Duck) was recorded due to the Avoca River being dry.

Groundwater and salinity

The three bores near the site are highly responsive to seasonal rainfall events and have risen slightly in 2003 due to higher rainfall received than during the second half of 2002.

They have also demonstrated a strong interaction with the level of water in the Avoca River, suggesting that site experiences localised recharge in response to river volumes. Groundwater levels ranged from 3.2-3.8 metres below natural surface (appendix 8.5).

Water Quality and Macroinvertebrates

These tests do not apply to this remnant vegetation site.

Site Threats

- Weed invasion particularly *Juncus acutus* (Spiny Rush) and Rabbits
- Pooling of water in Avoca River and flood debris on quadrat
- Possible bank erosion
- Rising groundwater and salinity levels
- Possibility of sheep being driven through the Reserve

(Davies 2003)

Surrounding Landuse

Surrounding landuse was a combination of cropping and pasture activities. The paddocks containing crops were getting close to harvesting at the time of the tree health surveys.



Figure 11. Archdale Reserve with the Avoca River in the background

Site 7 Dalyenong Flora Reserve

Dalyenong Flora Reserve is a site of uncertain environmental stability at present, given the current available data.

Site Description

Dalyenong Flora and Fauna Reserve is still gazetted as a State Forest Timber Reserve (N. Stimson pers. com. 1998). The site is at an altitude between 210 to 220 metres, on a westerly aspect. The area consists of gentle ridges on Palaeozoic sediments. The reserve is of moderate to high habitat value due to the range and age of tree species, fallen timber and large size of the area (Davies 2003).

Vegetation Description and Composition

This large reserve is floristically diverse with low rises grassy woodland / alluvial terrace herb rich woodland and heathy woodland EVCs and complexes represented (DSE 2003). *E. leucoxyton* (Yellow Gum), *E. microcarpa* (Grey Box) and some *Allocasuarina luehmannii* (Buloke) is found on the higher ground, with *E. camaldulensis* (Red Gum) in the drainage lines. *Calytrix tetragona* (Common Fringe-myrtle), *Acacia acinacea* (Gold-dust Wattle) and *Acacia pycnantha* (Golden Wattle) dominate the understorey layer.

The total number of species and level of abundance of many Poaceae (grass) species has been reduced by about ten percent when compared with the 2001 survey. This is due to continued dry conditions. The site has a moderate percentage of introduced to native species approx 30:70 however this figure has increased at the site since 1997. Weed invasion has mostly been from pasture weed species, a reflection of the surrounding agricultural land use and previous grazing history (appendices 8.2 & 8.3) (Davies 2003).

Tree Health

Most trees at the site have remained stable or have improved in health since monitoring began. There is little epicormic growth present on trees or evidence of insect attack. The understorey layer is well established and there were many small insectivorous birds recorded which would assist in keeping trees healthy by keeping insect populations under control.

The single tree that could be sampled for leaf chloride recorded only 0.1%, which could be a reflection of dry seasonal conditions and drop in water table depth (Collopy 2003). Slight to moderate rates of understorey regeneration is occurring at both quadrats, however no tree regeneration was evident (appendix 8.4).

Groundwater and salinity

There are three bores near the site, the deeper one at around six metres below natural surface in 2002-2003 has shown a downward trend in response to dry conditions. The other two shallower bores are located due west of the site near a saline discharge area. Groundwater level trends have remained flat to slightly downward in response to dry conditions, however remain high (approximately three metres) and contain very saline groundwater. The threat of rising saline groundwater in years of average or above average rainfall is of concern to the ecological health of this site (appendix 8.5).

Water Quality and Macroinvertebrates

These tests do not apply to this remnant vegetation site.

Birds

Bird species seen at the time of vegetation and tree health surveys were:-

Brown Treecreeper, Galah, Kookaburra, Magpie, Rainbow Bee-eater, Red-rumped Parrot, Superb Fairy-wren, Sulphur-crested Cockatoo, Welcome Swallow, White-plumed Honeyeater, White-winged Chough, Willie Wagtail, Yellow-plumed Honeyeater, Eastern Rosella, Corella, Australian Raven, Red Wattlebird and Noisy Miner. Many of these species are commonly found in open woodland and wooded farmland habitat.

Site threats

- Weed and rabbit invasion (extensive burrowing activities around tree 1291 in quadrat A where soils are quite sandy, adjacent to the floodplain and highly attractive to rabbits)
 - Driving of sheep and vehicles across some of the site
 - High groundwater and salinity levels
- (Davies 2003).

Surrounding Landuse

Adjacent landuse was a mixture of cropping and pasture.



Figure 12. Common Fringe Myrtle is the dominant understorey species around Quadrat A

Site 8 Porcupine Road Bushland Reserve

The Porcupine Road Bushland Reserve site appears environmentally stable at present.

Site Description

The Reserve is a Conservation of an Area of Natural Interest, commonly referred to as a Bushland Reserve. In the past it was gazetted as a Gravel and Camp Reserve (N Stimson pers. com. 1998). The area is at an altitude of 250 to 260 metres with an easterly aspect. It consists of gentle ridges on Palaeozoic sediments just above an alluvial plain with some Tertiary sediments adjacent. The area is of moderate habitat value due to low numbers of introduced plant species, range of habitat trees, but small size of the reserve (Davies 2003).

Vegetation Description and Composition

The EVC represented at the site is grassy woodland and contains *E. melliodora* (Yellow Box), *E. macrorhyncha* (Red Stringybark) and *E. blakelyi* (Hill Red Gum) with a diverse herbaceous layer, containing more than fifty native species (DSE 2003).

The site has a low proportion of introduced species in the herbaceous layer (<20 percent of species present), comprising of mainly pasture weeds. There appears to be minimal change in the vegetation survey results when compared with previous vegetation data. However, the level of abundance has decreased and the amount of leaf litter has increased. Both of these changes can be attributed to the continued dry conditions.

In 2000, several orchid species had been identified to species level. Previous identification was only to genus level. The endangered *Pimelea williamsonii* (Williamson's Rice-flower), which is also listed as nationally rare occurs at this site.

Two salt indicator species were recorded being *Lolium* sp. (Rye Grass) and *Polypogon monspeliensis* (Annual Beard Grass). It is unlikely that these species are indicating saline conditions due to the site's elevated position in the landscape and deep water table readings recorded from a bore nearby. Their presence is more likely a reflection of the surrounding agricultural landuse (grazing). The only way to determine whether dryland salinity is affecting the area would be to perform soil salinity tests (appendices 8.2 & 8.3) (Davies 2003).

Tree Health

Trees at this site are reasonably healthy and have remained so since monitoring commenced in 1997. The only observation of note is the canopy density on some trees has diminished due to dry conditions. Leaf chloride concentrations from the four trees that could be reached with pole pruners ranged from 0.18-0.44 percent. Extensive regeneration of the shrub and understorey layer was recorded at both vegetation quadrats (appendix 8.4).

Birds

Bird species seen at the time of vegetation and tree health surveys were:- Grey Shrike Thrush, Magpie, Mistletoe Bird, Red-rumped Parrot, Red Wattlebird, Rufous Whistler, Striated Pardalote, Superb Fairy-wren, Tree Martin, White-browed

Woodswallow, White-plumed Honeyeater, Willie Wagtail, Restless Flycatcher, Eastern Rosella, White winged Chough and Cockatoos.

Groundwater and salinity

One bore near the site responds to seasonal rainfall conditions but has generally continued to record a downward trend in water table levels due to dry conditions. The average depth in 2002-2003 was 13 metres (appendix 8.5).

Water Quality and Macroinvertebrates

These tests do not apply to this remnant vegetation site.

Site Threats

- Grazing by rabbits and kangaroos
- Extensive rabbit activity (many warrens were seen in the Reserve)
- Weed invasion from adjacent farmland
- Dumping of garden rubbish

(Davies 2003).

Surrounding Landuse

Adjacent activities were grazing and pasture. The drought has caused the need for stock to be hand fed as many sheep ran toward the Author's vehicle on arrival at the site.



Figure 13. Porcupine Reserve contains a diverse mixture of tree and understorey species

Site 9 Lake Lalbert

The site is in a stable environmental condition

Site Description

Lake Lalbert (Wildlife Reserve managed by Parks Victoria) is a deep freshwater marsh fed by floodwaters from the Avoca River via Lalbert Creek generally every two to three years. It is at an altitude of 90 metres and is on a riverine plain of gentle relief. The plain is the result of deposition of sediments from the hill country over millions of years. The wetland is of high habitat value, due to the diverse range of habitats available and large size of the area (Davies 2003).

Vegetation Description and Composition

This site contains a vegetation survey quadrat on the edge of the lakebed, which is dominated by *E. camaldulensis* (Red Gum) and *Eragrostis infecunda* (Cane Grass). The other quadrat is located on the Lalbert creek inlet and contains *E. largiflorens* (Black Box), *Muehlenbeckia florulenta* (Tangled Lignum) and various Chenopod (saltbush) species.

Eryngium plantagineum (Long Eryngium) listed as vulnerable under the FFG (1988) Act is still present, although level of cover has decreased in 2002 from plentiful to sparse on the Braun-Blanquet scale. The introduced species *Cuscuta campestris* (Golden Dodder) has increased in abundance since 1999 at the lake, but not within the vegetation quadrats. Leaf litter appears to have again increased at both quadrats. Continued dry conditions have favoured native species and caused a large decrease in the number and cover abundance of introduced species at the site, particularly from the Poaceae (grasses) and Asteraceae Families.

There are a number of Chenopod (saltbush) species at the site including three salt indicator species. They are *Atriplex semibaccata* (Berry saltbush), *Enchylaena tomentosa* (Ruby saltbush) and *Lolium* sp. (Rye grass). It is questionable whether the presence of these species is an indication of saline conditions for they commonly occur in arid environments. The only way to know for certain whether the lake contains high soil salt concentrations is to perform soil tests.

There had been a steady increase in species present with the number of introduced species continually increasing in previous surveys. However, continued dry conditions have caused a significant drop of 50 percent in the ratio of introduced plants to native plants during 2002 (appendices 8.2 & 8.3) (Davies 2003).

Tree Health

All trees have experienced declining health since 1997, with one tree dying in 2002. Low canopy densities, extensive epicormic growth and dead branches are contributing to the decline. Dry seasonal conditions are the main reason for poor tree health because the area has not been inundated in several years.

The four trees that could be sampled for leaf chloride recorded concentrations ranged from 0.17-0.44 percent. No regeneration was recorded at either vegetation quadrat and is unlikely to until adequate rainfall is received in the area (appendix 8.4).

Birds

Bird species seen at the time of vegetation and tree health surveys were:- Galah, Magpie, Red-rumped Parrot, Red-capped Robin, Superb Fairy-wren, Sulphur-crested Cockatoo, Welcome Swallow, White-plumed Honeyeater, Willie Wagtail, Yellow-plumed Honeyeater, Brown Tree creeper (nest with two chicks at quadrat A), Australian Raven and Eastern Rosella. These species are typically found in wooded habitat and farmland.

Groundwater and Salinity

Bore 60043 was only constructed in 1998, therefore has very little record. It does reveal however, the watertable in the vicinity of the lake is quite deep, and has remained at 22.3 metres. Although some isolated areas of salinisation do exist in the general area, these are believed to be the result of localised groundwater perching and do not reflect the regional groundwater process.

Other limited information from the vicinity (eg. Bore 233 at Ruby Bridge at Towaninny) has indicated that the regional watertable level is at depths of about 20 to 25 metres. The watertable trends in the area appear to be flat at present. Interpretation of the salinity levels of groundwater is difficult at this early stage. However previous salinity readings are extremely high (>20,000 EC). At a depth of 20 to 25 metres it is not likely to have a local effect (appendix 8.5) (Davies 2003).

Water quality

Lake Lalbert has been dry since 1998 and only seven months of water quality data has been collected. Limited interpretation of the results has shown that seasonal variations and depth of the lake strongly influenced all readings. Reduction in water through evaporation increased temperature, conductivity, turbidity and pH readings. Phosphorus and nitrogen concentrations also increased as the water volume decreased. None of these results are of concern unless high concentrations are recorded when the lake is full again.

The single macroinvertebrate survey completed in spring 1997 revealed very high biological diversity in the populations present, suggesting a high level of ecological health. Of the 124 wetlands recorded in the Avoca catchment, Lake Lalbert has the highest plant species diversity and is considered environmentally significant (Avoca Dryland Community Working group 1992) (appendices 8.6 & 8.7).

Site threats

- Possible increase to flooding frequency even though it is dry at present
- Localised salinity from perched water tables
- Weed invasion, particularly *Cuscuta campestris* (Golden Dodder)
- Vehicle tracks through the vegetation survey area

(Davies 2003).

Surrounding Landuse

Adjacent activities were a mixture of dryland cropping but were mostly barren paddocks. The effects of drought are highly visible in this part of north central Victoria and many paddocks had not been sown this year.



Figure 14. A very dry Lake Lalbert in spring 2003



Figure 15. Black Box chenopod woodland along Lalbert Creek

Site 10 Repper Swamp

Repper Swamp is a site of uncertain environmental stability and is located within the Targeted Salinity Project Area

Site Description

The area is freehold and currently grazed with cropping adjacent to the sites. The site is on a drainage line, 500 metres west of the Avoca River, at an altitude of 100 metres and is part of an alluvial plain sloping slightly to the northeast. The area has high habitat value due to extensive open woodland dominated by a range of sizes of *E. largiflorens* (Black Box) and *E. camaldulensis* (Red Gum) and the close proximity of the Avoca River (Davies 2003).

Vegetation Description and Composition

This ephemeral wetland is dominated by large Black Box and Red Gum trees. The understorey consists of species predominantly from the Cyperaceae (sedge) and Juncaceae (rush) families.

In both quadrats the total number of plant species present has been reduced by 25 percent since the previous survey of 2001. Their level of cover abundance had also decreased, the amount of leaf litter has increased and all of these results can be attributed to the continued dry conditions.

There are now four salt indicator species present being *Critesion marinum* (Sea barley grass), *Chloris truncata* (Windmill grass), *Atriplex semibaccata* (Berry saltbush) and *Lolium spp.* (Rye Grass). Only Sea barley grass and Rye grass were recorded in 1997. It is unlikely that salinity is the reason for the increase in salt indicator species, for Windmill grass and Berry Saltbush are commonly found in arid environments and may now be present due to continued dry conditions and from the decrease in competition from introduced species. The only way to be certain is to perform soil salinity tests (Davies 2003) (appendices 8.2 & 8.3).

Tree Health

The six Black Box trees have remained stable or recorded an increase in health since 1997. The two Red Gum trees however have suffered declining health since 1997, most likely due to the prolonged period without inundation. They cannot withstand long periods of drought as well as Black Box trees can. The Red Gums contained many dead branches; extensive epicormic growth and severe leaf damage by psyllid bugs (lerps) and leaf skeletoniser caterpillars, indicating severe stress (appendix 8.4).

All eight trees were within reach to be sampled for leaf chloride analysis and displayed mixed results. The four Red Gum trees recorded concentrations ranging from 0.05-0.35 percent and the Black Box trees 0.33-0.64 percent. The reason Box trees usually record higher leaf chloride concentrations is they accumulate salt in their leaves whereas Red Gum trees have an exclusion mechanism to cope with high salinity levels. If soil salinity levels were excessive in a particular area, the Red Gum trees will shed leaves and branches to survive (Collopy 2003).

No regeneration was recorded at either quadrat due to dry conditions and possible grazing by stock (appendix 10.4).

Birds

Bird species present at the time of the vegetation and tree health surveys were:- Galah, Kookaburra, Magpie, Red-rumped Parrot, Sulphur-crested Cockatoo, Welcome Swallow, White-plumed Honeyeater, Willie Wagtail, Eastern Rosella, Corella, Australian Raven, Noisy Miner, Striated Pardalote, Black Faced Cuckoo Shrike and an unidentified Raptor species. All of these bird species are common to wooded farmland habitat and the swamp also contains hollow bearing trees that provide habitat for many species.

Groundwater and salinity

The one bore in the area 400 metres north of the Avoca River was dry in spring 2002; therefore the water table is at least 17 metres below natural surface (depth of the bore drilling) (appendix 8.5).

Water Quality and Macroinvertebrates

Although this site is a swamp, it is rarely inundated and is assessed as a remnant vegetation site.

Site Threats

- Stock grazing (site still needs to be fenced)
- Weed invasion
- Long term groundwater and salinity levels are unknown
- Poor health of aging trees and no regeneration

(Davies 2003).

Surrounding Land use

Cereal cropping was the predominant activity in the area with some sheep grazing. Crops were getting close to harvesting at the time of the tree health surveys.



Figure 16. Repper Swamp contains trees of mixed age classes and fallen timber, providing valuable habitat for many fauna species