

CAMPASPE SITES

Site 17 Black Eagle Water Reserve

The Site appears to be in a stable environmental condition

Site Description

This site was a historic water reserve and is now an area reserved for public recreation. The site is at an altitude of 285 metres, adjacent to Axe Creek and subject to periodic flooding. It is in a low-lying area and surrounded by sedimentary hills. The Axe Creek subcatchment contributes one of the highest salt loads to the Campaspe River, which then has downstream effects on the Murray River.

Vegetation Description and Composition

This riparian woodland is dominated by an *E. camaldulensis* (Red Gum) overstorey with scattered *Acacia mearnsii* (Black Wattles) and an understorey of Sedges, Rushes, native and introduced grasses. The EVC mosaic represented is creekline grassy woodland / alluvial terraces herb rich woodland and is endangered in the Goldfields Bioregion (DSE 2003).

The native understorey is being replaced by introduced species. Now more than 60 percent of the total species are introduced compared with 50 percent of the total species in 1997.

The continued dry conditions may have led to the increase in abundance of introduced grasses and a decrease in level of abundance of *Cirsium vulgare* (Spear Thistle). In 2001 the invasive grass *Phalaris* sp. was observed within the Quadrat. This plant has the potential to dominate the herb layer of the site if left unchecked.

In addition to the 600 planting's by the Axe Creek Landcare Group and the City of Greater Bendigo at the site in 1998, seven nest boxes have been located within the quadrat and many more are nearby (appendices 8.2 & 8.3) (Davies 2003).

Tree Health

The four *E. camaldulensis* (Red Gum) trees that are monitored at the site have experienced some decline in health since 1996 due to reduced canopy densities and high level of epicormic growth.

They also appear to be suffering moderate amounts of insect attack from psyllid bugs (lerps). The health scores are still indicating fairly reasonable tree health and are of no concern at the moment. Leaf chloride concentrations ranged from 0.15-0.34 percent. These concentrations were lower than those recorded in 2001 and the decrease is a response to dry seasonal conditions and a drop in the water table (Collopy 2003). No regeneration of the tree or understorey layer was recorded at the site (appendix 8.4).

Birds

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

Black-faced Cuckoo-shrike, Crested Pigeon, Crimson Rosella, Grey Shrike-thrush, Crested Shrike-tit, Magpie, Spotted Pardalote, Striated Pardalote, Superb Fairy-wren, White-plumed Honeyeater, Corella, Galah, Australian Raven, Little Raven,

Australian Magpie, Red Wattlebird, Willie Wagtail and Yellow Rumped Thornbill.

The large number of bird species present could be due to the weed removal and understorey planting's performed by the Axe Creek Landcare Group some years ago. Many of these trees and shrubs are quite large now and provide valuable shelter and habitat.

Groundwater and Salinity

Two bores are located at the site and the groundwater levels respond strongly to local seasonal and climatic variation. Since monitoring commenced in 1996, water tables have fallen to around four metres below natural surface in response to the dry seasonal conditions. Previous electrical conductivity readings have recorded highly saline groundwater and pose a threat to the site if water tables were to rise when wet conditions return (appendix 10.5).

Water Quality and Macroinvertebrates

These tests do not apply to this remnant vegetation site.

Site Threats

- Continued weed invasion and spread of Phalaris sp.
 - Grazing by rabbits
 - Trampling by people from adjacent picnic facility and people checking nest boxes
 - Erosion of adjacent bank only several metres from the Quadrat
- (Davies 2003).

Surrounding Land use

Surrounding landuse was grazing on annual and perennial pastures.



Figure 24. Black Eagle Reserve. The nesting box in the tree and the Black Wattle in the foreground were established by the Axe Creek Landcare group in 1998

Site 18 Pilchers Bridge Flora and Fauna Reserve

The Site appears to be in a stable environmental condition

Site Description

Pilchers Bridge is at an elevation of 310 metres and is now reserved for conservation as a Flora and Fauna Reserve. The entire area was clear felled in the 1930s and the vegetation has been heavily modified by previous clearing and gold exploration activities. The site has moderate habitat value due to its large size and minimal weed invasion. The area could benefit from some ecological thinning to increase the habitat value of the site. A reduction in the number of stems per hectare would open the site up to let more sunlight through and to allow some of the trees to develop larger diameters.

Vegetation Description and Composition

This intact forest site is dominated by *E. tricarpa* (Red Ironbark), *E. macrorhyncha* (Red Stringybark), *E. polyanthemos* (Red Box), *E. microcarpa* (Grey Box) and *E. leucoxylon* (Yellow Gum). The EVC is heathy dry forest, listed as depleted in the Goldfields Bioregion (DSE 2003). The understorey contains a range of Wattles, Heaths, Peas and native grasses. Many Wattle seedlings are still present and have been identified as *Acacia acinacea* (Gold-dust Wattle).

Compared to previous results, the 2002 survey recorded four less species and the total level of abundance of all species was reduced. The reasons for the changes were the prolonged dry conditions and grazing by kangaroos. No introduced or salt indicator species have ever been recorded at this site. There appears to be more leaf litter than the previous five years of vegetation surveys caused by dry conditions (appendices 8.2 & 8.3) (Davies 2003).

Tree Health

Tree health is fairly low; all four trees monitored have very small crown sizes and are very spindly. Canopy densities are also quite low because of the drought but mainly due to the reserve containing too many stems per hectare. Elevated tree density is a common problem in nearly all forest remnants near major population centres, because of previous clearing activities and the subsequent coppice regrowth.

The tree benchmark size for trees within the heathy dry forest EVC is 60 centimetres at diameter breast height (130cm above ground). Most trees in the Reserve would be less than half of this benchmark size. Intense competition for nutrients, water and light is contributing to poor growth, which is affecting tree health and growth development.

The one tree that could be reached for leaf analysis recorded slight damage from insects and a leaf chloride concentration of 0.32 percent. This reading was similar to that recorded in 2001. Moderate regeneration was recorded in the understorey layer but no tree regeneration was recorded (appendix 8.4).

Birds

Bird species present at the time of the vegetation and tree health surveys were :- Brown Treecreeper, Brown-headed Honeyeater, Buff Rumped Thornbill, Eastern Rosella, Fuscous Honeyeater, Galah, Kookaburra, Magpie, Mistletoe Bird, Noisy Miner, Red Wattlebird, Spotted Pardalote, Superb Fairy-wren, White-plumed Honeyeater, White-winged Chough and Yellow-tufted Honeyeater. The large size of the Reserve provides valuable shelter and habitat for many bird species.

Groundwater and Salinity

A bore was installed in the reserve in 2001 to a depth of 17 metres and has remained dry, since installation (appendix 8.5).

Water Quality and Macroinvertebrates

These tests do not apply to this remnant vegetation site.

Site Threats

- Heavy grazing by wallabies and kangaroos (Davies 2003).

Surrounding Landuse

Surrounding landuse is rural living (small farms) including grazing of annual and perennial pastures.



Figure 25. Tree health and size at Pilchers Bridge is diminished by intense competition caused by too many stems per hectare

Site 19 Yankee Creek

The Site appears to be in environmental decline from weed invasion

Site Description

This site is located adjacent to the Midland Highway on a narrow alluvial plain from the Yankee Creek and is at an elevation of 168 metres. The site is inundated on a regular basis and it is likely that the area has a history of light grazing. Previous soil disturbance, small size, close proximity to a highway and railway line and increased nutrient concentrations in the sediments as a consequence of flooding explain why more than half the species at the site are introduced (Diez 1996).

Vegetation Description and Composition

This site contains creekline grassy woodland/alluvial terraces herb rich woodland EVC mosaic, endangered within the Goldfields Bioregion (DSE 2003). Species present include *E. camaldulensis* (River Red Gum) and an understorey of *Carex appressa* (Tall Sedge), the rare *Juncus psammophilus* (Sand Rush) and *Eleocharis acuta* (Common Spike Sedge).

The only salt indicator species *Lolium* sp. (Rye Grass) was recorded. It is questionable whether the presence of this species indicates saline conditions as it is a common weed and no other salt indicator species have ever been recorded at the site.

Substantial clearing under the powerlines by Powercor occurred in 2000. The cutting to ground level of several *E. melliodora* (Yellow Box) outside the quadrat and *E. camaldulensis* (Red Gum) within the quadrat resulted in the site becoming less shaded and therefore drier. During 2001 substantial coppice regrowth had developed on the lopped eucalypts, this has recently been removed. Drier conditions at the site may pose a threat to the health of *Juncus psammophilus* (Sand Rush), the only vrot species present within the site.

Previous surveys have been conducted after substantial rains and flooding of the site. Flood debris deposited during these events remains scattered across the vegetation quadrat. However at the time of the 2002 vegetation survey, the site had been dry for almost two years. There have been minimal changes to the vegetation composition at the site as a result of the dry conditions from the last couple of seasons. Native grasses *Austrodanthonia* sp. (Wallaby Grass) and *Austrostipa* sp. (Spear Grass) were present in the 2002 survey and introduced species now comprise over 60 percent of the species present (appendices 8.2 & 8.3) (Davies 2003).

Tree Health

All four Red Gum trees in 2002 have experienced slight decline in health with reduced canopy densities in response to drought. Crown sizes were also quite small and epicormic growth was quite extensive on many trees at the site. Two of the monitored trees had also suffered extensive leaf damage from psyllid bugs (lerps) and leaf skeletoniser caterpillars. Leaf chloride concentrations ranged from

0.17-0.24 percent. These concentrations were much lower than those recorded in 2001 and the decrease is a response to continued dry conditions and drop in the water table (Collopy 2003). No regeneration of the tree or understorey layer was recorded (appendix 8.4).

Birds

Bird species present at the time of the vegetation and tree health surveys were :- Australian Raven, Black-faced Cuckoo-shrike, Crested Pigeon, Galah, Grey Shrike-thrush, Kookaburra, Magpie, Musk Lorikeet, Red-rumped Parrot, Spotted Pardalote, Striated Pardalote, Welcome Swallow, White-plumed Honeyeater and Willie Wagtail.

Groundwater and salinity

The one bore located on the opposite side of the Midland Highway from the site had shown a downward trend in water table depth until 2003. The water table has risen slightly in response to rainfall events. The average depth below natural surface in 2002-2003 was seven metres. Previous electrical conductivity readings have recorded highly saline groundwater (appendix 8.5).

Water Quality and Macroinvertebrates

These tests do not apply to this remnant vegetation site.

Site Threats

- Removal of overstorey resulting in a drier site and possible reduction or loss of the rare *Juncus psammophilus* Sand Rush from the site
- Weed invasion particularly *Watsonia* sp. and *Phalaris* sp.
- Grazing by rabbits
- St. John's Wort present 50 metres south of the site on the road reserve
- Continued soil disturbance

(Davies 2003).

Surrounding Landuse

Surrounding landuse is the Midland Highway, Bendigo/Echuca Railway line and cropping (canola).



Figure 26. Yankee Creek in 2002 with a canola crop growing in the background

Site 20 Bendigo-Echuca railway road reserve, Goornong

This site appears to be in a stable environmental condition

Site Description

The site is located on the Northern Riverine Plains, comprised of alluvial sediments and is at an altitude of 154 metres. This road reserve has the Bendigo-Echuca railway line and the Midland Highway forming two of its site boundaries. Being a very narrow linear strip, the reserve is vulnerable to weed invasion. However the site was selected for monitoring because it contains the endangered plains grassy woodland EVC, and tree health is likely to show early signs of decline if water tables were to rise significantly in the area (DSE 2003).

Vegetation Description and Composition

The site contains a scattered *E. microcarpa* (Grey Box) overstorey with a native grassland understorey dominated by *Themeda triandra* (Kangaroo grass) and seasonal native herbs.

Up until 2001 there had been a steady annual increase of approximately ten percent in the total number of introduced species present. However during 2002 there has been a huge decrease in the percentage of introduced species, especially from quadrat A. The overall biomass has reduced and clovers, medics and introduced members of the Fabaceae family were not recorded. The level of abundance of Wild Oats has also decreased markedly. All of these results are due to the continued dry conditions.

Native species have started to appear as they can tolerate arid conditions better than many introduced species and now have a chance to recolonise the quadrats due to the reduced level of competition from weeds. The vulnerable *Eryngium plantagineum* (Long Eryngium) and rare *Maireana humillima* (Dwarf Bluebush) are still present at the site (appendices 8.2 & 8.3) (Davies 2003).

Tree Health

The health of the four *E. microcarpa* (Grey Box) trees at this site is good with only a slight decrease recorded in 2002 due to the dry conditions. There was some slight leaf damage caused by insects and leaf chloride concentrations ranged from 0.38-0.52 percent. This was a reduction on 2001 results and was due to dry seasonal conditions and a drop in the regional watertable (Collopy 2003). There was some moderate regeneration of the tree and understorey layer recorded in quadrat A (appendix 8.4).

Birds

Bird species present at the time of the vegetation and tree health surveys were :- Crimson Rosella, Galah, Magpie, Striated Pardalote and White-plumed Honeyeater. Very few birds are ever recorded at this site, as it is very open and

surrounded by cleared paddocks. The weather also was hot and windy at the time of the survey.

Groundwater and Salinity

Two bores are located at the site, one is dry and the other had an average depth to groundwater of 13 metres during 2002-2003 and showed a strong linear rising trend with some response to seasonal weather variation. The average rise has been 10-15 centimetres per year since 1996, regardless of the dry seasonal conditions. If the rising trend continues at this rate, high water tables could adversely affect the area in 30 to 50 years time. Rising groundwater could also have negative implications for low-lying areas further down the catchment (appendix 8.5).

Water Quality and Macroinvertebrates

These tests do not apply to this remnant vegetation site.

Site Threats

- Continued weed invasion from road and rail in particular, *Genista monspessulana* (Cape Broom) and *Echium plantagineum* (Paterson's Curse)
- Grazing by hares
- Dumping of waste and rubbish in particular used vehicle oil
- Disturbance due to road works along highway eg. gravel dumping and turning heavy vehicles

(Davies 2003).

Surrounding Landuse

The Midland Highway and the Bendigo/Echuca railway line border the site on both sides. All paddocks in the area contained cereal crops.



Figure 27. The site contains an excellent example of the endangered Plains Grassy Woodland EVC

Site 21 Runnymede Flora and Fauna Reserve

The site is of uncertain environmental stability

Site Description

This site is now a Flora and Fauna Reserve located on low sedimentary rises and is at an elevation of 205 metres. There had been some timber harvesting at the site in the past, and possibly gravel extraction. It is likely that the reserve was also previously grazed by stock. The area is reserved for conservation to protect flora and also a population of Squirrel Gliders (Diez 1996).

Vegetation Description and Composition

The White Box vegetation community at this site represents the grassy woodland EVC and is listed as endangered at both the State and Federal level by the Flora & Fauna Guarantee (FFG 1988) and the Environment Protection & Biodiversity Conservation (EPBC 1999) Acts (DSE 2003).

The site is dominated by *E. albens* (White Box), *E. microcarpa* (Grey Box) and *Cassinia arcuata* (Drooping Cassinia), and contains an understorey of native species from the Asteraceae, Liliaceae (lily), and Poaceae (grass) Families.

The percentage of introduced species had steadily increased until the most recent survey. Some variations are likely to be due to changes in seasonal conditions and the timing of vegetation surveys.

The 2002 survey revealed a 30 percent reduction in species numbers, mostly from introduced grasses and weeds from the Fabaceae Family. A lower level of cover abundance was also recorded for many species and is a result of dry seasonal conditions and from grazing pressures from kangaroos, rabbits and hares.

The only salt indicator species *Lolium* sp. (Rye Grass) remains present. It is questionable whether this species is indicating saline conditions at this site, because it is a common weed and no other salt tolerant species have ever been recorded (appendices 8.2 & 8.3) (Davies 2003).

Tree Health

The health of the four *E. albens* (White Box) trees is quite low and all have declined significantly in 2002. Many trees at the site contain low canopy densities, large numbers of dead branches and epicormic growth.

The two trees that could be sampled displayed slight insect attack and leaf chloride concentrations ranging from 0.50-0.55 percent. This was a decrease on readings of 2001 caused by continued dry conditions and a drop in the water table (Collopy 2003). Extensive regeneration of *Cassinia arcuata* (Drooping Cassinia) was recorded but there has been no regeneration of the tree layer recorded for several years (appendix 8.4).

Birds

Bird species present at the time of the vegetation and tree health surveys were :- Eastern Rosella, Galah, Grey Butcherbird, Kookaburra, Little Raven, Magpie, Noisy Miner, Welcome Swallow, White-plumed Honeyeater, White-winged Chough and Willie Wagtail. There are many Noisy Miners at the site, an aggressive species that may explain the absence of other small birds at the site.

Groundwater and Salinity

One bore is located at the site and has recorded a large drop in the water table due to the extended dry seasonal conditions. The average groundwater depth recorded in 2002-2003 was 13.8 metres below natural surface. The electrical conductivity reading of the water was >6000EC, very saline water (appendix 8.5).

Water Quality and Macroinvertebrates

These tests do not apply to this remnant vegetation site.

Site Threats

- Gravel dumping
- Grazing by kangaroos, rabbits and hares
- Continued weed invasion

(Davies 2003).

Surrounding Landuse

Surrounding landuse was grazing and many paddocks did not contain very much pasture cover because of overgrazing induced by drought. There is a large saline discharge site due south from the site in a depression that has had some tree and saline pasture planting works completed around its edges.



Figure 28. The understorey layer is dominated by *Cassinia arcuata* (Drooping Cassinia) a coloniser species that thrives on disturbed soils

Site 22 Runnymede Recreation Reserve

The site appears to be in a stable environmental condition

Site Description

This site is located at a popular traveller's rest stop on the Northern Highway close to Elmore with the Campaspe River flowing close by. It is located on the northern riverine plain at an altitude of 132 metres. Ron and Dianne Davies have spotted Platypus feeding adjacent to the vegetation site during the 2001 vegetation survey. Parks Victoria maintains the area and recently removed the septic system toilet block, which had created problems through excessive nutrients in run-off and local weed invasion. Extensive landscaping work has been done in the carpark area and many new trees and shrubs have been established.

Vegetation description and composition

The EVC represented is floodplain riparian woodland listed as endangered in the Riverina Bioregion (DSE 2003). The overstorey contains large mature *E. camaldulensis* (Red Gum) trees with an understorey of Sedges, *Poa labillardierei* (Common Tussock grass) and introduced grass species. During 2000 the site was flooded to a depth of approximately two metres which deposited large amounts of debris across the vegetation quadrat. However the site has remained dry ever since.

The only salt indicator species *Lolium* sp. (Rye Grass) remains present. It is questionable whether this indicates saline conditions at the site for there are no other salt indicator species present and rye grass is a common weed. The level of abundance of *Avena fatua* (Wild Oats) was greatly reduced in 2002, possibly due to the continued dry seasonal conditions.

The level of introduced species has reduced to 50 percent of the total species present. Previous weeds of the Asteraceae Family were not recorded in the 2002 survey. *Juncus psammophilus* (Sand Rush) is still the only vrot species present at the site (appendices 8.2 & 8.3) (Davies 2003).

Tree Health

Tree health recorded at the site is generally quite high, except for one tree that had a reduced canopy density and large number of dead branches. During 2002 many trees at this site have shed their lower branches in response to dry conditions. This has also been a factor in reducing tree health scores.

Leaf damage by insects and leaf chloride analysis could not be assessed because the trees at this site are extremely tall (branches >5m) and samples could not be collected with pole pruners. No regeneration was recorded within the vegetation quadrat (appendix 8.4).

Birds

Bird species present at the time of the vegetation and tree health surveys were :- Australian Wood Duck, Brown Treecreeper, Crested Pigeon, Crimson Rosella, Galah, Kookaburra, Little Raven, Magpie, Masked Lapwing, Musk Lorikeet, Noisy Miner, Peaceful Dove, Clamorous Reed Warbler, Sacred Kingfisher, Spotted Pardalote, Striated Pardalote, Thornbill spp, Welcome Swallow, White-plumed Honeyeater, White-browed Woodswallow, White Winged Chough and Willie Wagtail. The mature age of the Red Gum trees and riparian environment provides habitat and shelter for a large number of bird species.

Groundwater and salinity

The groundwater rises and falls in response to seasonal climatic variation and volume of water in the Campaspe River. The bore has therefore recorded an overall downward trend with the average depth in 2002-2003 being 7.5 metres below natural surface. (appendix 8.5).

Site Threats

- Weed invasion particularly *Phalaris* sp. (Canary grass) and *Oxalis pes-caprae* (Soursob)

(Davies 2003).

Surrounding Landuse

Surrounding land use on the other side of the Campaspe River was a fallow ploughed paddock. On the day of the tree health survey, conditions were hot and windy and large amounts of topsoil were blowing away. Up slope from the site is the car park where many new trees and shrubs have been planted.



Figure 29. The understorey along the Campaspe River is mainly introduced grasses and *Phalaris*

