North Central Catchment Management Authority

Basin 6 – Campaspe

Management Unit 1 – Campaspe Plains

Stream – Campaspe River (6/1)

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NORTH CENTRAL
Catchment Management Authority

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In 1836, Major Thomas Mitchell, the Surveyor-General of the Colony of New South Wales had passed through the Campaspe Plains in his exploration of the river systems. He located and named the river Campaspe. Later the same year, Alexander Mollison described the Campaspe Plains as:

"extensive, firm, grassy and lightly skirted by light timber" (Randell, 1980)

The Campaspe River within the Campaspe Plains Management Unit is a permanent alluvial river flowing 110km from Barnadown to the Murray River at Echuca.

The upper reaches (to the township of Rochester) flow northwesterly through the grazing and cropping districts of Goornong and Elmore. North of Elmore (8km), the river is impounded in the Campaspe Weir before continuing to Rochester, which forms the center of the Campaspe Irrigation District.

The lower reaches continue flowing in a northerly direction. Downstream of Rochester the WWMC is siphoned under the Campaspe River carrying water from the Goulburn catchment. Beyond the Irrigation District, the river meanders across broadacre dryland farming country, terminating at the Murray River confluence at Echuca.

1 History and Heritage

In 1839, overlanders Joseph Hawdon and Charles Bonney described the lower reaches of the Campaspe River, near the Murray River confluence as:

"a very deep creek with deep stretches of water in it" (Priestly, 1965)

Hawdon recorded:

"We proceeded two miles further up the creek, where we had to cut away the bank with pick-axes before we could get the drays over, and even then were obliged to unload and carry up the goods by hand" (Coulson, 1979)

Along the high banks of the Campaspe, near Avonmore, the remains of the stone hearths of the early shepherds' huts could still be found in the 1960's. Near each hut was an acre of clear ground enclosed by a brush fence (Shaw, 1966).

The Campaspe River was a line of approach to the plains country of the north. By 1840 many farmers came north, mainly from the early-established Kyneton district and took up blocks. These early blocks were those near the river, but the later arrivals had to be content with land further away (resulting in the need to frequently cart water long distances during the dry season) (Thomas, 1979).

Despite the struggles through drought and flood by the early European settlers, the towns of Elmore, Rochester and Echuca were born and encouraged to grow with the construction of the railway to Echuca in 1864.

Naturally, the flow regime of the Campaspe River would have been highly variable with generally high flows during winter to spring and low or zero flows during late summer and autumn (McGuckin & Doeg, 2000).

The emerging communities battled authority to achieve their dream of assured water supplies through irrigation. In 1882, the Campaspe Weir (2700ML) was completed 12km south of Rochester to supply the water needs for local irrigators via channels.

The reconstruction of the Waranga Swamp into the Waranga Basin in 1902 marked the beginning of large-scale irrigation water from the Goulburn River. At the Campaspe Siphon, 2km to the north of Rochester, the Western Waranga Main Channel (WWMC) (capacity 2,800 ML/day) crosses the Campaspe River carrying irrigation water to northern Victoria irrigation regions (McGuckin & Doeg, 2000).

As the Campaspe River has a strong and well-documented history, Heritage Victoria has identified two historical sites of significance.

Sites relevant to the Campaspe River listed under the Heritage Inventory are:

- Fergusons Bridge, Goornong
- Former Elmore Water Tower

2 Streamform

2.1 Alluvial Plain

The entire reach of the Campaspe River within the Campaspe Plains MU, meanders across a level alluvial plain. From Forest Creek to Riverlea (midway between Rochester and Echuca) the floodplain is generally less than one kilometer wide, but broadens out to widths of more than 2km downstream to Echuca (CMPS&F Environmental, 1994).

Meander development and migration are occurring, causing some bank erosion. Meander cutoffs also occur: comparisons of recent aerial photographs with historic maps suggest that a small number of cutoffs have occurred since European settlement, and floodplain scars provide evidence of other cutoffs which occurred prior to European settlement. Further cutoffs can be expected in the future (CMPS&F Environmental, 1994).

Islands are a feature of the Campaspe River in the Campaspe Plain. Historical maps show extensive lengths of divided channel suggesting that islands are a natural feature. Comparisons of recent aerial photographs with historical maps suggest that there are fewer islands in the present channel than there were at the time of European settlement (CMPS&F Environmental, 1994).

In the upper reaches during the 1850's, it is stated that:

"Mr John Robbins…soon had "the island", four acres of his purchase which was surrounded by the Campaspe, producing vegetables which he carted to the diggings, together with butter, duck eggs and occasionally meat from some of the wild cattle he was able to capture" (Shaw, 1966)

It was speculated that one of the first uses of irrigation in the area occurred in 1855, where vegetables were in production downstream of the Avonmore Bridge.

"A beam pump, driven by a steam engine, lifted the water from a 30ft hole in the (Campaspe) river, to where a bank had been built along the river bank to the nearby billabong. Here the water was flumed across the billabong to the 30 acres of rich river flat" (Shaw, 1966).

Much of the land along the Campaspe River was used for grazing and smaller farmers began to grow fruit, vegetables and grain crops as well as dairy and poultry produce. Plantings of exotic species occurred throughout the MU.

"To protect the apples from our hot winds, James surrounded the two acres of orchard with hedges of hawthorn, osage oranges, blackberries and almonds." (Shaw, 1966)

Downstream, at Burnewang the fine timber attracted Jeffrey Bros., millers from Kyneton since 1844, and they bought the "right of station" at Burnewang in 1853 (Shaw, 1966). Long straight props were carted to Bendigo, where box props were in demand for the mines.

The selectors, and those attempting to hasten their arrival in the area, spoke proudly of the richness of the soil.

"From about Goornong, and through the Runnymede and Rochester country, the land, almost without exception, is admirably adapted for farming. The soil is of uniform character for miles together, of great depth, and of excellent quality" (Thomas, 1979).

There was a change of emphasis in the type of agriculture that was to be carried on in the district. Crops, suitable for the smaller holdings, were in the main, destined to replace the large sheep runs.

In the 1880's an irrigation trust established a diversion weir on the Campaspe River south of Rochester together with 75 km of distributary channels. Modifications to the Campaspe Weir were carried out in 1951 and 1964.

The Campaspe River was the life-line of the town of Rochester, through droughts and floods. Being the town water supply, water quality was an important issue. During the floods of 1874, as the river level fell locals pulled the bodies of dogs, cats and other animals from the Campaspe at Rochester. In 1915 the first swimming carnival was held in a deep hole in the Campaspe River. In September 1938, Rochester protested strongly against the pollution in the Campaspe from the Kyneton sewerage farm (Thomas, 1979).

In the depression years, wood was cut and carted from the banks of the Campaspe, which was then sold. In Echuca, the unemployed went to work de-snagging the river. During this period, interest in the Eppalock scheme still ran high in Rochester despite work being suspended. It was the uncertainty of not knowing whether there would be flood or drought that caused the farmer much worry.

At the end of the war tomatoes began to be grown in the Rochester district under contract to Heinz Pty. Ltd. Tomatoes had been grown at the turn of the century but only along the riverbanks. Irrigation allowed tomatoes to be grown further from the river.

Echuca was initially a stopover town where travellers crossed the Murray River. It became a thriving river port second only to Melbourne in the volume of imports coming over its wharves.

Mr Chas Hutton of "Campaspe Plains" Station had written in 1838:

> *"There has not been even a shower of rain for nine months….the lower Campaspe would not keep half-a –dozen goats"* (Shaw, 1966)

In 1854, it was stated:

> *"…a generous border of good soil ran down the western boundary edging the Campaspe, and here the river red-gums or flooded gum flourished in company with box trees and the finely-drawn wild cherry. Among the trees were two or three sandhills, where the deep unburnished tones of a group of Murray pines stood out in sombre contrast to the grey-green of the gums"* (Priestley, 1965)

In 1858 the Campaspe Bridge was built and became an important feature of the town. With the town growing quickly, brick makers were greatly in demand, and there were two clay areas suitable for their work. One was on the Campaspe banks where a small gully ran into the river.

In July 1870, the floodgates of the Coliban Reservoir on the headwaters of the Campaspe were opened without warning to release pressure on a weak part of the dam. Confined within the steep narrow walls of the Campaspe, twenty-five feet of water came down at a roaring pace, and caught Echuca unawares.

In the 1870's, grazing, wheat and oats where the main forms of farming around Echuca. Although the Chinese did much of the vegetable growing on leaseholds, Europeans were among the most successful cultivators of fruit and vines.

Stock sale yards were built in 1875 near the Campaspe bridge at Echuca. At one end was a buggy wash, drained by earthenware pipes into the Campaspe.

It was partly in the hope of encouraging the market gardens along the Campaspe that the council decided in 1886 to build a dam to conserve the Campaspe water. Money was raised to build a wooden weir only about half a mile from the junction of the river with the Murray. Behind this barrier, the water banked up for about nine miles, and kept the reaches near the town permanently filled even during the summer months. Additionally, it was hoped to keep the riverbed scoured of the sewage, which was formerly exposed, on the bottom during the dry season, forming a potential breeding ground of disease. Unfortunately, during the floods of the following year, a racing current scoured its way around the edge of the weir, and carried away part of the woodwork. The engineer was forced to resign and the townspeople were firmly opposed to spending more money to repair the damage. One summer's experience had in fact had them doubting whether a large body of heavily polluted water was not a worse health menace than rubbish lying at the bottom of a ditch (Priestly, 1965).

The Riverbank Stability Study (2000) identified several areas of bank erosion along the lower 10km of the Campaspe River through Echuca. It was found that the natural meander process is exacerbated at particular sites where riparian vegetation is depleted. Scour was particularly evident on the lower banks with many exposed tree roots. Some of the bars and benches appear to be the product of sand deposition around large woody debris (NCCMA, 2000).

Between Ogilvie Avenue and the Echuca-Cohuna Road at Echuca, the proximity of houses, streets, the golf course, bike and footpaths all provide ample access to the river. Continuous access has reduced the riparian vegetation cover and has reduced bank resistance to the various erosion processes working through the reach (NCCMA, 2000).

Many buildings on the township side of the river appear very close to a major bank slumps. While a comparison of historical and current aerial photography indicates that some areas have remained stationary for over 55 years, other sites have been filled and contained with River Red Gum piles and sheeting by the Campaspe Shire. Downstream of the Echuca-Cohuna Road, seepage from drains in the verge of the banks has promoted mass failure (NCCMA, 2000).

Stream assessments through this reach, revealed the following streamform characteristics:

- moderate to high sinuosity with poorly developed or absent riffles;
- streambed composed of sand with an extensive covering of silt; and,
- minor erosion.

3 Riparian Ecosystems

The riparian vegetation along the Campaspe River can be divided into three pre 1750 Ecological Vegetation Classes:

- Floodplains Riparian Woodland (from Barnadown to Victoria Park, Echuca)
- Riverine Grassy Woodland/Riverine Sedgy Forest Mosaic (enclosed within Victoria Park, Echuca)
- Wetland Formation (near Mt Pleasant Creek/Campaspe River confluence)

Assessments reveal 65% of the Campaspe River riparian vegetation is currently in good condition, 32% in marginal condition and only 3% is in a poor condition.

There are eight reserves and parks located along this section of the Campaspe River, totalling some 10km of stream bank. They include Englishes Bridge Reserve, Avonmore Bridge Reserve, Runnymede Highway Park, Aysons Reserve, Rochester West Streamside Reserve, Northern Highway Highway Park and Victoria Park. Parks Victoria manages these areas.

3.1 Upper Reaches (Barnadown to Rochester)

Riparian widths are generally between 10m to 40m on each bank. The overstorey consists of River Red Gum with some Yellow Box, Grey Box and Buloke on top of the banks. Exotic (peppercorn, willow) species occur in isolation at various places along the upper reaches. The understorey includes native Blackwood and River Bottlebrush. Both native and exotic grasses constitute the ground layer. There is evidence of both native and exotic regeneration along most of the upper reaches.

3.2 Lower Reaches (Rochester to Murray River confluence)

Riparian widths are generally about 40m on each bank. The overstorey consists almost entirely of native River Red Gum with Black Box appearing on top of the banks at Echuca. Where the Campaspe River flows through Rochester and Echuca, exotic (willow, Olive, Date Palm, Desert Ash) species share the overstorey canopy. The understorey is generally absent except for low numbers of River Bottlebrush, Blackwood, Lightwood and lignum. Leafless Ballart is particularly evident along the banks at Echuca. The ground layer is a mix of native (e.g. Kangaroo Grass) and exotic species. Exotic regeneration (e.g. Desert Ash and garden escapes) is primarily occurring within the townships, whereas native regeneration is occurring throughout.

4 Aquatic Ecosystems

Some stream clearing works before 1975 occurred in the Campaspe River between Barnadown and the Mt Pleasant Creek confluence (DWR 1989, McGuckin 2000). Despite this, the Campaspe River within the Campaspe Plains MU has moderate instream habitat cover.

An obvious feature of the Campaspe River through Echuca is the complete lack of instream vegetation, such as Common Reed or Water Ribbons. Some de-snagging has occurred around Radcliffe Street, Echuca (NCCMA, 2000).

Recent stream assessments (13 sites) revealed the following aquatic attributes.

Types and Quantity of Cover present in the Campaspe River

Type of Cover	No of Sites with Cover Type
overhanging vegetation	9
shallows	9
undercut banks	9
deep pools	9
root wads	9
large woody debris	8
reed beds	6
rootmats	1

Macroinvertebrate assessments indicate that most of the common taxa are characteristic of still or slow flowing waters, such as filter-feeding taxa, which commonly occur in larger rivers downstream of impoundments.

Aquatic wildlife recorded along the Campaspe River includes Platypus, Water Rats and Common Long-necked Tortoises (Atlas of Victorian Wildlife, 2000).

As this section of the Campaspe River connects to the Murray River it is possibly the most important waterway of the entire Campaspe catchment for fish passage. However, the movement of threatened native species in the Campaspe River, downstream of Lake Eppalock, is severely restricted by instream barriers.

Twelve native fish species and 6 introduced fish species have been recorded, or are expected to have occurred in this section of the Campaspe River. Natural populations of Trout Cod, Murray Rainbowfish, Mountain Galaxias, Macquarie Perch and Murray Cod have not been recorded since prior to the 1970's (Victorian Aquatic Fauna Database, DNRE, 1999). Two additional species, the Freshwater Catfish and the Unspeckled Hardyhead, which have distributions that should include this length of the Campaspe River, have never been recorded despite extensive fish surveys.

The loss of these native fish species, the majority of which have a threatened fish status at National or State level, is more pronounced in this section of the Campaspe River than in any other Management Unit of the Campaspe catchment, and possibly in any other region in Victoria (McGuckin & Doeg, 2000).

The only existing natural populations of threatened native fish species includes Silver and Golden Perch which have been recently recorded in the lower reaches of the Campaspe River at Echuca (McGuckin, 2000) and the Flat-headed Galaxias which is known only from one record captured in 1997.

The following table details the fish species (native and exotic) occurring in the Campaspe River.

Fish Species Occurring in the Campaspe River within MU1

Native	Exotic
• Silver Perch • Flat-headed Galaxias • Midgeley's Gudgeon • Murray Cod • Western Carp Gudgeon • Trout Cod • Golden Perch • Bony Bream • Flat-headed Gudgeon • Murray Rainbowfish • Mountain Galaxias • Australian Smelt	• Goldfish • Carp • Mosquitofish • Oriental Weatherloach • Redfin • Tench

Ten fish barriers exist in the river, namely:

- stream gauging station – English Bridge, Goornong;
- ford – Ellis Road, Goornong;
- ford – downstream of Ferguson Bridge;
- stream gauging station – downstream of Midland Hwy, Elmore;
- gated dam/weir – Campaspe Weir;
- gated dam/weir – Waranga Western Channel Siphon, Rochester;
- stream gauging station – upstream of Ogilvie Avenue, Echuca; and,
- three additional stream gauging stations (Bennett & McGuckin, 1999).

5 Hydrology

Before regulatory structures were built, the general flow regime of the Campaspe River was highly variable and seasonal with generally high flows during winter to spring and low or non-existent flows during late summer and autumn (McGuckin & Doeg, 2000).

Following investigations dating back to the 1890's, construction of Lake Eppalock commenced in 1930 to regulate the wildly fluctuating flow of the Campaspe River. Construction ceased in 1933 due to economic depression when the dam had a capacity of only 1500 megalitres (ML) compared with its planned 75,000ML capacity (McGuinness, 1998).

After three inquiries by the Parliamentary Public Works Committee in 1935, 1949 and 1959, the dam was enlarged by the State Rivers and Water Supply Commission (SR&WSC) between 1960 and 1963,

to its present capacity of 312,000 ML. Lake Eppalock was formed by the construction of a 45m earth and rockfill dam wall on the Campaspe River a short distance downstream of its confluence with the Coliban River (McGuinness, 1998). Water is released through a free-standing wet tower that discharges from seven offtakes from 4m to 30.5m below FSL. Annual stratification has been observed (Ryan et.al., 2001).

There appears to be adequate evidence to suggest that Lake Eppalock is releasing cold water that is impacting on the downstream thermal regime. The infrastructure appears to be capable of augmenting such impacts, however there may be additional operational constraints preventing releases from higher in the water column. The Status of Cold Water Releases for Victorian Dams (Ryan et.al., 2001) assigned Lake Eppalock a maximum priority dam for additional research and monitoring action.

The major regulatory structures on the Campaspe River downstream of Lake Eppalock is the Campaspe Weir (2700ML), 12km south of Rochester; the Campaspe Siphon, 2km to the north of Rochester; and the Echuca Weir at Echuca.

The Campaspe Weir is used to supply the water needs of irrigators in the Campaspe and Rochester Irrigation Districts. Water released downstream into the Campaspe River past the Weir is used to supply diverters between the Weir and the Western Waranga Main Channel (WWMC), and to provide an average of 15ML/day to flow past the Campaspe Siphon for downstream diverters (Campaspe West Salinity Implementation Group, 1992). If necessary water released to the Campaspe River from the Campaspe Weir is used to top up the WWMC.

At the Campaspe Siphon, the WWMC (capacity 2,800ML/day) crosses the Campaspe River, and carries irrigation water from the Goulburn catchment to northern Victoria irrigation regions.

6 Water Quality

Major water quality issues within the Campaspe River are high levels of salinity, particularly occurring as saline pools where saline groundwater intercepts the bed and banks of the river, low levels of dissolved oxygen and elevated levels of nutrients. The lower Campaspe River is ranked as medium-high risk for algal blooms based on the impacts of water use (e.g. urban supply, irrigation, recreation) and by nutrient concentration and susceptibility to blooms (NCCMA, 2002).

The Echuca sewage treatment plant currently contributes over one tonne of the total sewage phosphorus load to catchment waterways (13 tonnes). The Murray Goulburn factory at Rochester does not contribute a significant nutrient load from a catchment perspective, but may be locally important. Any impact on total phosphorous levels from urban stormwater from Rochester and Echuca may be masked by the much larger impacts of irrigation drainage water however they are still an important/significant point source (NCCMA, 2002).

Elevated nutrient concentrations are a feature of irrigation drains in the lower catchment and instances of extremely high nutrient concentrations have been reported which have subsequently been linked to unauthorized drain discharges. Irrigation drainage therefore is likely to be responsible for the instances of elevated phosphorus at several sites in the lower catchment (NCCMA, 2002).

7 Principle Waterway Values

Principal Values	Justification	Value Type: Environmental	Value Type: Social	Value Type: Economic
Scenic Landscape	A valued natural feature through the Elmore, Rochester and Echuca townships		■	
Riparian Overstorey	Generally wide, continuous tree cover along entire reach	■		
Instream Habitat Diversity	Moderately diverse instream habitat opportunities along the entire 110km reach	■		
Aquatic Diversity	Significant diversity of native and exotic aquatic species	■		
Wildlife Corridor	Forms a significant habitat corridor across otherwise cleared agricultural landscape	■		
Significant Fauna	For many aquatic and terrestrial species, including the endangered Murray Cod, Silver Perch, Golden Perch, Regent Honeyeater, Great Egret and Bush-stone Curlew	■		
Riparian Understorey	Variety of native species occur, including the endangered Small Scurf-pea, Dwarf Amaranth and Western Rat-tail Grass	■		
Recreation	Popular areas for swimming, fishing, boating, walking, bird-watching, etc occur along the river in and beyond the township reaches		■	■
Water Supply	River provides water for stock, domestic and irrigation purposes		■	■
Shelter	Trees along river provides shade and shelter for livestock	■	■	■

8 Major Waterway Threats

Major Threats	Justification
Stock Access	Remnant riparian vegetation is under threat by grazing
Bank Instability	Bank instability threatens remnant riparian vegetation. Localised slumping and erosion of bank toe reported in Echuca.
Stream Flow Regime	The temperature and lack of flows released threatens the habitat of native fish, the natural regeneration of riparian vegetation and recreation opportunities.
Weed Invasion	Primarily through major towns, however minor infestations occur throughout.
Human Access	Deleterious jmpact on the condition of riparian and verge vegetation at Rochester and Echuca
Desnagging	Reduced aquatic habitat opportunities around Radcliffe Street, Echuca
Urbanisation	Proximity of developments to river through Echuca
Industry	Potential for spills from Murray Goulburn Inc at Rochester
Algal Blooms	Elevated levels of nutrients contribute to a medium-high risk of algal blooms
Irrigation Drainage Water	Input of elevated phosphorous levels along lower reaches
Saline seepage	Extremely high EC levels recorded in bottom of saline pools at Echuca

Low dissolved oxygen levels	Provides poor conditions for aquatic species
Waste Water Treatment Plant	Discharge is a high threat to water quality at Echuca
Urban Stormwater	Threatens water quality downstream of townships
Diffuse Nutrient Inputs	Generally high threat of nutrients and sediment entering river from surrounding land surface runoff, downstream of Rochester
Bank Erosion	High threat of bank erosion upstream of Fergusons Bridge, east of Goornong