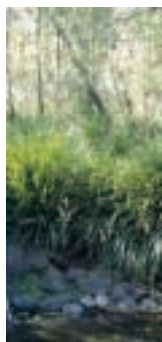





## EXECUTIVE SUMMARY

### ES.1 SUMMARY

#### Reach Environs

The condition of the reach environs varied widely across the Bremer River catchment (Map 3). The highest ratings were recorded within the Bremer River and Western Creek/Franklin Vale Creek subcatchments, both of which received predominantly moderate to very good condition ratings. The remaining three subcatchments, Purga Creek, Bundamba Creek, and Warrill Creek/Lake Moogerah, all displayed reach environs in predominantly poor to very poor condition. Purga Creek received good to very good condition ratings for half of the surveyed stream lengths and very poor to poor condition ratings for the other half. The Warrill Creek/Lake Moogerah subcatchment had the majority of stream lengths in moderate to very poor condition whilst the Bundamba Creek subcatchment received the lowest reach environs ratings with 82% of stream lengths rated in poor to very poor condition. The generally poor ratings for this attribute reflect the extent of clearing of vegetation along streams within this catchment for both cropping and grazing.

Similarly, subjective assessments of disturbance within the reach environs rated 92% of sites as being moderately to very highly disturbed. The most commonly identified cause of disturbance was grazing activity, with built structures such as roads, bridges, culverts, fords and ramps also being identified at a large proportion of sites.

The most extensive land use recorded adjacent to sites in the catchment was grazing of beef cattle on native pastures (mostly in areas cleared of native timber).

#### Bank Stability

Bank stability throughout the catchment was generally high (Map 4). The majority of stream lengths in all subcatchments received stable to very stable condition ratings, with the exception of the Bremer River subcatchment. No stream lengths were rated in very unstable condition.

Despite the high stability ratings for banks within the catchment, erosion processes (including slumping) were recorded as the dominant process operating along banks in 79% of subsections. Erosion was most commonly found in irregular locations, along the entire reach length, or on bends in both lower and upper banks. Aggradation processes were dominant in the remaining 21% of subsections and were generally found on bends, at obstacles, or all along reach lengths in lower banks, and mostly at obstacles in upper banks.

Whilst in some cases the occurrence of these processes is consistent with the natural morphology of the streams affected, the occurrence of erosion and slumping in irregular locations and of aggradation all along reach lengths would tend to suggest unnatural damage and disturbance. The most commonly documented bank disturbance factors at sites were damage from grazing activity, flow and wave action, runoff and vegetation removal.



• Moderate bank stability: Bremer River (#47)



*Very stable bed: Western Creek (#64)*

Subjective assessments of potential for further degradation (through assessments of instability and susceptibility to erosion) were generally low to minimal throughout the catchment. However, a significant percentage (>20%) of subsections within the Bremer River and Warrill Creek/Lake Moogerah subcatchments was recorded with moderate to high instability. Additionally, the Bremer River, Warrill Creek/Lake Moogerah and Purga Creek subcatchments were identified with moderate to high susceptibility to erosion.

### Bed and Bar Stability

Condition ratings for bed and bar stability indicated the majority of stream lengths as moderately to very stable (Map 5). The Western Creek/Franklin Vale Creek and Bundamba Creek subcatchments were identified as having the most stable bed and bar features whilst the Bremer River and Warrill Creek/Lake Moogerah subcatchments were rated as the least stable.

Stream bed erosion was the most commonly recorded process operating over stream lengths within this catchment. Aggradation processes were also recorded in a small percentage of stream lengths although the extent of aggradation was generally low as was reflected by the relatively limited occurrence of bar features throughout the study area. The exception was the Purga Creek subcatchment in which 40% of stream lengths were identified with aggrading beds.

Bank erosion and grazing activities were identified as the major factors contributing to the disturbance of beds. Fallen trees and rock outcrops were recorded as the major factors maintaining bed stability although these factors were identified within only a small percentage of stream lengths.

A wide range of both sediment types and levels of organic matter was recorded in stream beds within the catchment. Bar sediments were generally angular or subangular and disc-shaped, and were generally packed but not armoured. These characteristics suggest that bars would not be highly mobile except during high flow periods.



### Channel Diversity

Channel diversity throughout the catchment was mostly low to very low (Map 6). The Bremer River and Western Creek/Franklin Vale Creek subcatchments displayed the highest channel diversity ratings with some stream lengths receiving moderate to good diversity assessments. Pool habitat was the most commonly identified channel habitat type throughout the catchment, followed by runs and then riffles.

Low channel diversity may be related to natural attributes such as topography, geology and weathering, or to artificial processes such as channelisation and accelerated rates of erosion and aggradation. Whilst erosion was identified as a factor influencing bed stability in many stream lengths, a clear relationship between these processes and channel diversity within the same stream lengths was not evident.

The significance of the generally low channel diversity is difficult to determine without knowledge of the pre-disturbance extent of diversity. It is possible that this catchment has naturally poor channel diversity and supports a fauna and flora assemblage adapted to such low diversity. Further study in this area would be required to determine the extent of divergence of the current levels of channel diversity from natural levels and any effects on instream organisms.

### Riparian Vegetation

The riparian vegetation throughout the catchment was generally in poor to very poor condition (Map 7). These ratings can generally be attributed to the loss of riparian vegetation through clearing and encroachment of weed species into riparian zones. The Warrill Creek/Lake Moogerah subcatchment received the highest ratings for riparian vegetation condition whilst the Western Creek/Franklin Vale Creek subcatchment recorded the poorest ratings. Generally, those areas with riparian vegetation in good condition had wider riparian zones and fewer weed species than those in poor condition and included a variety of vegetation structural levels and associated ground covers.

Open and sparsely treed grassland communities (of both introduced and native grasses) and eucalypt-dominated communities were the most commonly identified vegetation types recorded adjacent to survey sites within the catchment. Remnant vegetation commonly contained *Eucalyptus* spp., *Callistemon* spp., cypress pine, *Casuarina* spp. and *Lomandra* spp., with *Melaleuca* spp. also often recorded. As would be expected in this catchment, grasses, medium-sized and small trees, small shrubs and herbs and forbs were the dominant structural types of vegetation recorded. However, at many sites grazing activity, clearing of riparian vegetation and the invasion of exotic species have resulted in significant changes to natural vegetation community structures. Along river banks this has particular importance, as weed grasses and herbs are often shallow-rooted and provide little protection against bank erosion.

The proportion of weed species in riparian zones varied considerably between subcatchments. The highest proportions of exotics were recorded within the Bundamba Creek and Bremer River subcatchments whilst the lowest were found in the Purga Creek subcatchment. The extent of occurrence of weed species was generally associated with the presence of grazing and cropping activities or other forms of disturbance. Weed species identified during the survey included lantana, para grass, willow and groundsel bush (see Appendix 2 for a list of scientific names).

#### Aquatic Vegetation

Condition ratings for aquatic vegetation within the catchment indicated very low to low abundance at the time of survey (refer Map 8). These results most likely reflect the dry conditions over the region throughout the survey period and the high turbidity of streams that carried water. As a result condition ratings show very poor aquatic vegetation within this catchment. The Bundamba Creek subcatchment recorded the highest levels of aquatic vegetation within the Bremer catchment whilst the Purga Creek subcatchment recorded the lowest levels.



Moderate aquatic habitat: Ebenezer Creek (#81)

Aquatic vegetation types that were recorded within the five subcatchments have been listed in the individual subcatchment reports in Chapter 4. Further studies would be required to determine the factors influencing the distribution and abundance of these species in the Bremer River catchment. These factors may include the availability of propagules, appropriate water quality and suitability of flow regimes.

### Aquatic Habitat

The condition of aquatic habitat throughout the catchment was generally moderate to good with the exception of the Purga Creek subcatchment which was rated as poor to very poor (Map 9). The Western Creek/Franklin Vale Creek subcatchment received the highest aquatic habitat ratings with most stream lengths rated in good to very good condition. Subjective assessments of overall habitat value for aquatic life for the entire catchment rated the majority of stream lengths (64%) as having good to high value. On an individual subcatchment basis the Western Creek/Franklin Vale Creek subcatchment was subjectively assessed as demonstrating the highest overall value for aquatic life while the Bundamba Creek and Purga Creek subcatchments were considered to show the poorest overall value.

Leaf and twig cover, individual logs, individual branches, tree roots, permanent pool habitat (>1 m deep) and branch piles (<50% dense) were the most commonly recorded instream habitat attributes. Overhanging stream cover was predominantly provided through bank vegetation canopy cover. The fact that aquatic habitat in this catchment is provided predominantly by vegetative debris emphasises the importance of riparian zones to aquatic organisms.

Passage for aquatic organisms was generally restricted during the survey, mostly reflecting the dry conditions which had prevailed for the four years prior to the survey. Assessments of passage at the water mark indicated restrictions remained over 57% of stream lengths due to the presence of low features such as log or branch piles, or low-built structures such as fords, weirs or culverts. In most cases, water levels of one to two-thirds of bank full were required to overcome these restrictions. The exceptions are the regulated sections of the Warrill Creek/Lake Moogerah subcatchment which under most circumstances form permanent barriers to upstream passage. These results suggest that moderate flows in streams are important for maintenance of aquatic organism communities and emphasise the importance of fish ladders on weir structures.

### Scenic, Recreational and Conservation Values

Condition ratings indicated that the majority of stream lengths in the Bremer catchment displayed moderate to good scenic and recreational values (Map 10). Most sites were valued on the basis of their scenic rural setting or inherent natural beauty. The Western Creek/Franklin Vale Creek and Warrill Creek/Lake Moogerah subcatchments displayed the highest scenic and recreational values in this catchment.

The majority of sites within the catchment were described as 'undeveloped rural' (recreational settings in modified rural landscapes). Other recreational opportunity types identified included 'developed rural', 'roaded-natural', 'undeveloped urban', and 'developed urban'. No sites within the catchment were classed as 'near-pristine' or 'semi-natural' (see Appendix 1, Data sheet 11 for a description of the recreational opportunity criteria).

The major recreational activities recorded as being currently undertaken at sites included shore-based fishing and barbecues and picnics. Potential activities identified included swimming, bird watching, horse riding, photography, and dog exercising.

Subjective evaluations of conservation merit within the catchment identified 10% of stream lengths as displaying very high qualities in at least one of the three assessment criteria (i.e. aquatic habitat, riparian habitat and suitability as a wildlife corridor; see Appendix 1 - Data sheet 11). It is suggested that stream lengths receiving very high conservation merit assessments may be worthy of some form of protective management.

### Overall Condition

The overall condition of most stream lengths was 'moderate' (Map 11). The Bundamba Creek and Purga Creek subcatchments received the poorest overall condition ratings whilst the Western Creek/Franklin Vale Creek subcatchment received the highest overall ratings.



*Good overall condition: Warrill Creek (#82)*

## ES.2 OUTCOMES

The Bremer River catchment State of the Rivers survey, carried out in mid-1995, produced eight major findings:

- There was widespread degradation of the riparian zone, resulting from clearing of natural vegetation, from the invasion of exotic species and from generally high disturbance levels in the reach environs.
- The aquatic habitats were in generally moderate to good condition despite the generally low diversity of channel habitat types available.
- There were relatively stable banks throughout the catchment, displaying minimal to low susceptibility to the dominant process of erosion at the time of the survey.
- There were relatively stable beds and bars throughout the catchment with erosion identified as the dominant natural process operating over the majority of stream lengths surveyed.
- Generally 'moderate scenic' values were recorded in the majority of stream lengths with several sites assessed as possessing recreational potential.
- A number of sites were identified as having significant conservation value either as remnant riparian or aquatic habitat, or as wildlife 'corridors' providing direct ecological benefits to local ecosystems.
- Most stream lengths surveyed within the catchment were described as being in 'moderate' overall condition with the exception of the more developed areas of the Warrill Valley which were mostly in poor overall condition.
- Grazing and clearing activities were identified as the most common detrimental influences impacting upon stream and riparian attributes.