



EXECUTIVE SUMMARY



ES.1 SUMMARY

Reach Environs

The condition of the reach environs across the Herbert River catchment showed consistent ratings of good to very good for the majority of the subcatchments (Map 3).

However, the subcatchment of Trebonne Creek had 71% of stream length rated as poor to very poor and none of the stream length rated as very good. To a lesser extent, the Marine and Coastal Streams subcatchments

had greater proportions of their stream length rated as poor or very poor.

These poorer ratings were associated with higher concentrations of sugarcane production in the adjacent land use. Ratings improved as percentage of grazing land use increased. South Upland Streams and North Upland Streams subcatchments attained higher ratings due to their steepness and remoteness and unsuitability for major cropping land uses.

However, the upper part of the Herbert River catchment, Upper Herbert River, Dry Catchment Streams and Wet Catchment Streams subcatchments had high proportions of grazing as the dominant land use and relatively low levels of cleared country, and had ratings of good to very good for in excess of 75% of their stream lengths.

Across the whole of the Herbert River catchment the single most common land use recorded was grazing, with most of it taking place on virgin forest lands. As would be expected with the prevalence of grazing, this activity was identified as the most common local disturbance factor of the reach environs. Even with this extensive occurrence of this disturbance factor the ratings within the grazing dominated land use areas were better than those areas which have been cleared and subjected to intensive agriculture.

Bank Stability

Stability of the stream banks across the catchment was generally good, with most banks being stable to very stable (Map 4). Two of the subcatchments, Marine and Lower

Herbert River, were not as stable. The Marine subcatchment had 64% of the stream length unstable to very unstable, with none of the stream length rated as very stable. The Lower Herbert subcatchment was not as badly rated, with 32% of stream length rated unstable to very unstable and none of the stream length rated very stable.

Recording of the processes occurring within the streams showed erosion was the most extensive process present along the stream banks with, 80% of stream length showing this as the dominant process. Erosion was most commonly found at bends, irregularly along the stream and around obstructions for both the upper and lower banks but with higher levels of erosion recorded all along the upper banks as well. The remaining 20% of sites showed aggradation as the process taking place along the banks and was recorded at bends and obstructions.

The degree to which these processes were occurring showed that the mean length of stream bank, within a survey reach that was undergoing these processes, was approximately 32% for erosion and 27% for aggradation.

Bed and Bar Stability

Condition ratings for the stream beds across the catchment did not exhibit a particular trend one way or the other, although there was slightly more stream length rated unstable or very unstable than that rated stable and very stable (Map 5). On a subcatchment basis, South Upland Streams, North Upland Streams and Wet Catchment Streams had the most stable streams while the most unstable streams were in the subcatchments of Lower Herbert River and Dry Catchment Streams.

Contrary to the stream banks, the dominant process recorded within the stream beds was aggradation (Map 5), with 68% of the stream length aggrading. This manifested itself in the form of bars within the stream, which occupied a mean of 33% of the bed area where they occurred.

Factors considered to be contributing to this instability were mostly agriculture or grazing, bank erosion, mining, stream channellisation works, sand extraction and entrapment of sediment.

Channel Diversity

Channel habitat diversity throughout the catchment has been rated as very low for 61% of the stream length (Map 6). One subsection in the South Upland Streams subcatchment was rated as having very high channel habitat diversity; however, across the whole catchment this shows as 0.2% of stream length. Better channel habitat diversity ratings were obtained for those streams in the steeper parts of the catchment in the subcatchments of Coastal Streams, South Upland Streams and North Upland Streams.

The most commonly occurring habitat type recorded in the catchment was the pool habitat, followed by run habitat and riffle habitat.

The significance of this low channel habitat diversity rating within the catchment is not simple to interpret without further understanding of the morphology of the stream system. The analysis of data collected during the survey is based on the concept that the more habitat types recorded, within a surveyed reach, the better the rating. Because of factors at play in the formation of the streams within this catchment and the size of pool habitat encountered during the survey, only two or three habitat types from a potential of eight types were recorded at survey sites, which produced the low diversity ratings. This does not imply that any particular problem exists within the streams but indicates that the stream habitat types in the surveyed stream reaches are not diverse.

Riparian Vegetation

Riparian vegetation across the catchment was generally poor or very poor (Map 7), although there were areas within the study area which were good to very good. This poor classification is attributed to the narrowness of the remaining vegetation along the streams and the level of exotic plant species present within this area. The mean width of the riparian vegetation across the catchment was 19 m, which ranged from a mean of 11 m in the Dry Catchment Stream subcatchment to more than 40 m in the South Upland Stream subcatchment.

Because of the lack of access into many areas of this catchment, generally those areas with



Casuarina Species: Return Creek (#50)

dense forest and steeper slopes (Map 7), some areas with better riparian vegetation may not have been assessed.

Eucalypt species dominated communities were most numerous recorded in the catchment at more than 50% of the survey sites, followed by *Casuarina*, rainforest communities, *Melaleuca*, *Callistemon* and *Acacia* species. Canopy cover was dominated by trees 10 to 30 m high and trees less than 10 m high, with understorey mostly woody shrubs. Ground cover was significantly grasses, rushes and herbs. Exotic species were recorded at 65% of survey sites, mainly as grasses, herbs and shrubs. The exotic species most recorded were *Lantana*, para grass and rubber vine.

Estuary areas were dominated by mangrove species in the riparian vegetation.

Aquatic Vegetation

Ratings for aquatic vegetation across the catchment indicated very poor condition of vegetation at the time of survey (Map 8). This

outcome is due to the nature of streams in the study area, which were dry over substantial areas of the catchment during the time of survey. The low rating is also due to the situation that where vegetation was recorded it tended to provide only a low percentage of stream bed cover.

At sites where aquatic vegetation was recorded, the most commonly recorded growth type were emergent species, comprising rushes and sedges, and the exotic species of para grass. Para grass showed its particular invasive characteristics in The Millstream upstream of The Millstream National Park just outside Ravenshoe, in the Wet Catchment Streams subcatchment, and in drains and streams around Ingham in the Trebonne Creek subcatchment. Submerged species and floating species were also recorded with native species of both forms common, while the exotic water hyacinth was a common floating species recorded.



Para Grass Intrusion: The Millstream (#26)

Aquatic Habitat

Throughout the catchment the condition of the aquatic habitat was generally moderate to poor (Map 9). There were no sections of the stream which had very good ratings. The subcatchments which had the better condition ratings were Trebonne Creek, Coastal Streams, North Upland Streams and Upper Herbert River.

Large, deep waterholes, terrestrial leaves and twigs, individual logs and individual branches were the most commonly recorded instream aquatic habitat types identified within the catchment, while canopy cover from the stream banks was recorded at 75% of sites and vegetation overhang at 62% of sites.

Passage of aquatic organisms was not likely to be achieved at the time of survey. However, at water mark this potential restriction was significantly reduced, although, even at this flow level, there were 69% of sites worse than moderately restricted in potential movement. Features which restricted movement tended to be natural features like waterfalls, rapids and logs as well as artificial features like weirs, fords and bridges.

Scenic, Recreation and Conservation Value

The scenic and recreation values of this catchment were considered to be high. The most commonly recorded recreation opportunity was described as settings in modified rural landscape at 61% of sites, with 19% of sites in semi-natural settings and 4% in pristine/natural settings.

Subcatchments with the highest rating for these values were the Upper Herbert River, South Upland Streams and North Upland Streams. Recreation activities most recorded within the catchment were shore fishing, swimming and barbecuing. It was considered that these activities, along with nature appreciation, birdwatching and bushwalking, had the greatest potential for further activities.

Potential conservation value of the streams of the catchment was assessed with 33% of the stream length considered to have good to very good value for conservation (Map 11). Streams within the South Upland Streams and North Upland Streams subcatchments exhibited the highest potential for conservation.

ES.2 OUTCOMES

Ten important outcomes of the survey of the Herbert River and Major Tributaries are presented below.

- Stream banks throughout the catchment were mostly stable, with exceptions to this condition being recorded in the lower Herbert River and Herbert River Estuary, which were generally more unstable due to erosion.
- The beds of the streams of the catchment showed a range of stabilities, with subcatchments in upper parts of the

catchment, South Upland Streams, North Upland Streams and Wet Catchment Streams being the most stable. Unstable stream beds were shown to be in the higher order streams; Marine, Lower Herbert River and Upper Herbert River subcatchments, or in drier parts of the catchment; Dry Catchment Streams. Instability of these streams was attributed to aggradation of material in the stream beds.

- The geomorphology of the catchment means that there are significant natural barriers to movement of fish and other aquatic organisms within the river system. These are in the form of waterfalls (Blencoe Falls, Wallaman Falls, Millstream Falls or Herbert River Falls) and significant rapids along the upper Herbert River. However, within these isolated river sections there are also artificial barriers in the form of stream crossings, weirs and road bridges which disrupt local movement of species within these streams.
- Ecological systems of the stream reach environs have been more degraded in subcatchments where the major land use is intensive agriculture. The condition of these environs improved with the diminishing presence of sugarcane production, dairying or horticulture and the increase of grazing on native forests, with the best results achieved in steeper areas where access for agriculture is not suitable.
- Riparian vegetation was generally found to be in poor condition, with the width of the zone, a mean of 19 m, and the level of exotic species, at 65% of survey sites, contributing to this result. The width of this zone has generally resulted from clearing of vegetation for agricultural purposes being carried out too close to the stream banks. The most frequently recorded exotic plant species were *Lantana*, rubber vine and para grass.
- Para grass has spread from the riparian zone to the streams and caused significant choking of watercourses, particularly in the Wet Catchment Streams, Trebonne Creek and Coastal Streams subcatchments. This has degraded the natural stream processes through exclusion of light from the stream, excluding the native aquatic species,

disruption to instream habitat and impeding flow. The presence of para grass has also reduced the physical beauty of The Millstream Falls with large clumps of the grass draped over the falls, thus reducing the appeal of the natural environment.

- Stream channel habitat showed low diversity of types for any given stream section, with habitat types dominated by waterholes, runs and riffles.
- Instream aquatic habitat was moderate to poor, representing a lack of features in the streams to provide habitat for aquatic organisms.
- Cover from the stream banks over the streams was good, dominated by canopy species, with areas of good overhanging cover provided by *Callistemon* species.
- The whole catchment was considered to be of good recreation and scenic value, with such features as Wallaman Falls, Herbert River Gorge, Wet Tropics World Heritage Area, waterholes along the upper and lower Herbert River and Blunder and Cameron Creeks, fishing and heritage features. Much of the stream length had significant conservation value.

ES.3 CONCLUSIONS

Introduced pasture grasses have significantly impacted on instream and riparian values of the streams of the catchment. Measures to remove these species from waterways and for the prevention of their escape from their intended use areas, should be developed.

Riparian vegetation and reach environs should be managed to ensure further degradation of these areas does not occur and that those that are degraded are rehabilitated to a more functional condition.

Stability of the stream bed and banks should be maintained and measures examined to stabilise areas under threat.

Appropriate guidelines should be developed for the construction of instream structures to allow passage of fish and other aquatic organisms past such structures.