Basins, Catchments and Receiving Waters of the Black Ross Water Quality Improvement Plan Area

Appendix D

Wetland Reports Extracts

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Leichhardt Creek

Location
Leichhardt Creek drains a small coastal catchment north of Townsville. The site is immediately upstream of the Bruce Highway crossing approximately 35 kilometres north of Townsville, 3.5 kilometres upstream of the creek mouth. The creek catchment drains the Paluma Range, which includes State and National Park forest, comprised rain forest vegetation.
Land Use
The lower coastal plains are leasehold with grazing the predominant landuse. The current property has run cattle and horses since 1975.
Local Creek Geomorphology
The creek appeared to flow for most of the year. The catchment is comparatively small and the creek course is relatively 'straight to sea', which means that it has a quick response to any rainfall occurring on the coastal side of Paluma Range. The creek bed in the vicinity of the monitoring site consists of inter-connected small pools running through distinct rocky channels comprised of an unusual type of bedrock.
Vegetation
The riparian vegetation is overhanging *Melaleuca* sp., with some *Casuarina* sp., which adds a considerable amount of leaf litter to the pools that persist during the baseflow conditions. The riparian zone was generally intact with only minimal visible disturbances by stock or pigs. There was a lack of appreciable aquatic macrophyte growth throughout the survey period, presumably as a result of the high degree of shading by the overhanging riparian vegetation.

Source: Water Quality in the Townsville/Burdekin Dry Tropics Region (ACTFR Report 2002).

Bohle River

Vegetation
In the freshwater sections, weed invasion, particularly rubber vine and chinee apple, but also aquatic weeds such as *Pistia stratiodes* (pistia) and *Eichhornia crassipes* (water hyacinth), has degraded the aquatic habitat.
Wetlands
The size and nature of the wetland complex insulates it from many of the incremental impacts, which can significantly degrade urban wetlands; however, the encroachment of land subdivision along Rowes Bay, together with the continued degradation of its ecological values, should be of some concern. The most significant problem is *Urochloa mutica* (paragrass), which is widespread, and few pockets of native emergent macrophytes occur in the freshwater parts of the wetland. Without such intervention, the long-term accumulation of paragrass is likely to exhaust native macrophyte seedbanks, making the possibility of rehabilitation more unlikely.
Issues for Management
Rubbish is extensive, soil erosion is prevalent, riparian vegetation has been cleared, and pollutants from upstream (e.g. a sewerage treatment plant) is resulting in the eutrophication of the river. A large wet season flush will improve the waterway, but ongoing pollution and degradation by weeds and erosion (riverbank, sheet and rill) will continue. In the tidal reaches, stormwater from industrial developments, the clearing of riparian zones, illegal boat access points, fishing pressures, weed invasion and soil erosion have similarly resulted in the degradation of the river.

Source: Wetlands of the Townsville Area (ACTFR Report 1996)

Ross Creek

Location

Ross Creek is situated in the city of Townsville and stretches for a length of about 5km from Ross River through the central business district to Cleveland Bay.

Land Use

The major land use influences on the character of the Ross Creek from Lowths Bridge upstream are the series of land fill dumps from Dean Street Park to Bicentennial Park, the construction of the Queens Road levee which cut off tidal flow from the Ross River, and the building of the Boundary Street and Queens Road causeways. Areas that were formally used as dump sites are now well grassed and several parkland areas have been planted out, although the majority of these areas remain as open spaces with little or no aesthetic value. Apart from the Civic Theatre, and the small Model Engineers Fun Park, there have been no constructions built in close proximity to the creek since the early 1960s.

The Ross Creek area is dominated by four major land uses, namely the Townsville Port and associated industries, the Central Business District, the north and south Bank Rail Yards, and the Residential Areas.

Local River Geomorphology

Today, the creek is a tidal estuary which receives freshwater flow only during the wet season (generally November to March). However, the monsoon may fail, so a "good" wet season is expected only intermittently. During such wet seasons the high volume of stormwater runoff may result in Ross Creek exhibiting a "salt-wedge" type of estuary, in which the freshwater output rides over the saltwater.

Vegetation:

A survey of all the vegetation of the Ross Creek environment was undertaken [and] eight species of mangrove, four salt-marsh species, three main exotic grasses, and three dominant woody weeds were identified. No species of macro-algae were noted although undescribed micro algae are evident along most of the creek margins and the Lakes Development. Fouling algae such as *Ceramium spp.* and *Padina spp.* have been observed on the waterline of floating pontoons in the harbour.

Non-estuarine vegetation:
As Ross Creek was originally in the middle of a large mangrove tidal flat there was very little non-estuarine vegetation. However, with the extensive land reclamation around the creek, many exotic species of vegetation have been introduced.

Grasses are predominant, especially Guinea Grass (*Panicum maximum*), Rhodes Grass (*Chloris gayana*) and Red Natal Grass (*Melinis repens*). Most of the grassed areas are on old landfill sites which are largely kept mown.

Woody weeds are found scattered around the creek margins and have established strongly in unkempt grass areas and along the mangrove perimeters. Of particular concern are the legumes *Leucaena leucocephala*, *Parkinsonia aculata* and *Macroptilium lathyroides* (Phasey Bean).

Other trees that are found around the creek are principally a result of deliberate planting such as in established parks, streets and large open grass areas. These include a variety of exotic species such as *Terminalia* spp., Rain Tree, *Albizia* spp., mango and native eucalypts, melaleucas, she-oaks and fig trees.

Estuarine Vegetation:
Mangroves are by far the dominant type of vegetation found around Ross Creek. Salt marsh vegetation has colonised the tidal flats behind mangrove stands or in areas where the mangroves have not established. The dominant species is the Saltwater Couch (*Sporobolus virginicus*) with *Sued australis* (Seablight), *Halosarcia* spp. (Samphire), *Sarcocornia australis* (Chicken Claws) and *Sesuvium portulacastrum* (Sea Purslane).

Pollution:
The present character, form and constitution and constitution of Ross Creek are greatly affected by land reclamation, waste disposal and pollution. The intense industrial activity around the middle and outer reaches of the creek, discharges from the central business district and wider suburbia, continuous boating use around the inner city, and the filling of estuarine inlets, tidal flats and mangrove stands with industrial and domestic waste, make Ross Creek a sad example of neglect and indifferent exploitation of is ecological, aesthetic and recreational function and potential. Ross Creek is heavily influenced by climatic, tidal and urban inputs (including industrial and harbour activity – dredging and vessel movement) which affect the water quality and ecology of the system. Stormwater runoff often carries contaminants such as sewerage, animal wastes, oils, household litter, chemical residues, vegetative matter and soils. These pollutants are mainly carried through the stormwater pipes but some may flow directly overland into the creek during heavy storms. As Townsville experiences significant rains only during the summer months, pollutants which have collected in gully traps or drains over the dry months are mostly flushed into the creek in major single events. There is direct discharge into the creek via stormwater or special purpose pipes on a continuous basis from the major industries such as the rail yards and the harbour. Ross Creek is greatly affected by pollution, which can be linked to a number of urban and commercial factors. Its catchment drains residential and commercial land and the original morphology of the creek has been altered by land reclamation to satisfy town planning needs.

Source: Ross Creek Scoping Study (Browne, Broome and Faithful 1994)

Stuart Creek

Location:
Stuart Creek lies within cleared grazing land with the upper parts of the catchment draining Mt Stuart (Stoney Creek) and the Sisters Mountains. The sampling site was positioned approximately 7 kilometres from the creek mouth, within the Heleena Downs cattle property 8 kilometres SSE of Townsville off the Bruce Highway.
Land Use:
Despite the surrounding land being cleared, riparian vegetation is reasonably good in several areas upstream of the Bruce Highway Bridge. The upper parts of the Stuart Creek and Stoney Creek catchments comprise dry open woodlands, but after their confluence, flow through urban and industrial estates before reaching Heleena Downs.
Vegetation:
Despite the potential for water quality disturbance, the creek supports a significant aquatic macrophyte assemblage, which gives rise to its aesthetic appeal and environmental value. The macrophytic diversity supports *Azolla* sp., *Nymphaea* spp., *Otellia* sp., *Potamogeton* sp., *Egeria* sp., *Salvinia* sp., *Aponogeton* sp., *Ceratophylum* sp., *Nymphoides* sp. and *Hydrilla* sp., and over the course of the study numerous fish species ranging up to 60cm were observed.

Source: Water Quality in the Townsville/Burdekin Dry Tropics Region (ACTFR Report 2002)

Stuart Creek

Fish habitat:
High quality fish habitats were distributed throughout the stream. Other features of note often associated with the lagoons were well vegetated margins with overhanging riparian canopy, bank undercuts formed by dense stream bank root masses, rocky substrates and undercuts, diverse macrophyte beds, and shallow riffles, the latter unlikely to be persistent in all but the wettest years. Migratory or catadromous fish species were conspicuous by their absence re-enforcing the assessment that the defunct road crossing D/S of the Q-Rail crossing is in fact an effective fish passage barrier.

Vegetation:
Where present riparian vegetation had a diverse representation of rainforest species, structural complexity and maturity of individual trees in some stands. Several areas also retained good representative examples of native riparian grasses including kangaroo and black spear grass. The observed diversity of submerged macrophytes was high (>8 species). No exotic floating or submerged macrophyte species were observed although the exotic emergent umbrella sedge was recorded. The diversity of macrophytes reflects the generally high water clarity and natural hydrology retained by these sections of Stuart Creek. Infestation of the elevated levees by Guinea grass and the lower stream bank by Para Grass is a major impediment to the recovery of the riparian ecosystem in degraded areas of the stream. In some areas light grazing by horses appears to be limiting the hot fire hazard associated with exotic grass fuel loads. An apparently low frequency of burning also appears responsible for successful recruitment of riparian species through the exotic grass dominated understorey in some stream margins which is subsequently serving to reduce grass dominance by shading. However for more open riparian areas the exotic grass infestation appears intractable without intervention and the risk of hot fire impacts to the remnant riparian vegetation is high. Several species of woody weed were noted. Chinee Apple, Elbizia and Mango were most prevalent. Other species noted included Tamarind, Parkinsonia, Prickly Acacia, Lantana, Castor Oil Bush, Grewia and Rubber vine
Riparian and Levee Clearing:
Past vegetation clearing practices in most of the surveyed stream reaches has resulted in the loss of adjoining woodland assemblages and in many instances has also involved some limited clearing of bank side trees within the riparian forest assemblages. This clearing is historical and subject to exotic grass and woody weed infestation levels recovery of the riparian vegetation was observed to have at least partially occurred at many sites. Away from the immediate riparian zone a combination of exotic grass infestation and past hot fire regimes appears to have prevented the re-establishment of ecotonal woodland assemblages.
Water quality:
By and large the water quality observed appeared to be good in terms of low turbidity, temperature regime and dissolved oxygen status as indicated by riparian shading, abundant fish life and good water clarity. However, the high availability of nutrient appeared to be an issue in the uppermost sections of the *Upstream Reaches* where abundant algal scums occurred within several pools downstream of the Roseneath rural residential area. The causes of this apparent abundance of instream nutrient could not be ascertained but possible sources include unsewered residential development, adjoining agricultural run off or possibly mineral nutrient inputs sourced from upstream quarrying operations. Affected smaller pools appeared highly eutrophic.

Source: Assessment of Values, Condition and Strategic Management Options for lower Stuart Creek Reaches (Stuart Prison – Bruce Highway) (2006)

Alligator Creek

Land Use
Burgeoning rural-residential development on the seaward side of the Muntalunga Range, exotic species (chinee apple, para grass, rubber vine), and agricultural development on the Alligator Creek floodplain are placing at risk this important area.
Water Quality
With a significant proportion of its headwaters contained within Bowling Green Bay National Park, the water quality of the stream generally appears good above the Alligator Creek subdivision. However, a significant proportion of the creek is also fed by a tributary which passes through grazing lands, and there is a need to monitor water quality in the stream throughout the year. This is particularly important as the creek is heavily utilised for recreation (e.g. swimming) both within the National Park and downstream. The riparian vegetation is generally intact above the subdivision, but it rapidly degrades downstream. This decrease in stream habitat quality is mostly the result of clearing riparian zones, farming the levees, and the invasion of weeds.
Vegetation
The coastal area between Muntalunga Range and Alligator Creek is not well documented and there is insufficient information about the habitat value of the wetland complex. The area is composed of mangrove, samphire and saltmarsh species and is much more developed than neighbouring areas. In general, there is a more intact continuum between the intertidal zone and the terrestrial lowlands, and through the Muntalunga Range, a link to upland areas also exists.
The slower movement of water in the lower reaches of Alligator Creek has caused the build up aquatic macrophytes in some areas during dry seasons, and this has probably been enhanced by nutrient rich runoff from adjacent fertilised croplands. This level of macrophyte growth is likely to cause oxygen depletion in the stream and the seasonal loss of fish habitat. Large lagoons impounded by a weir on the creek downstream of the highway are generally in good condition, with remnant riparian forest for much of the stream length. However, the (current) minor occurrence of water hyacinth, salvinia (*Salvinia molesta*) and pistia in the deepwater lagoons above the weir, should be of some concern.

Source: Wetlands of the Townsville Area (ACTFR Report 1996)

Cocoa Creek

Land Use
A mosaic of mangrove, saltmarsh and lowland habitat stretches from the Ross River past Cocoa Creek and is the most significant in the greater Townsville region, outside of conservation reserves. Historically, it has been the subject of considerable development pressure (e.g. shipping port, clearing and grazing, abattoir, aquaculture, dredge spoil dump, sand mine, rubbish tip, sewerage treatment and disposal, and more recently, land subdivision). It is also the designated area for the proposed zinc refinery and, possibly, a power generation plant.
Geomorphological Significance
The importance of this northern section of the southbank coast (i.e. Ross River to Muntalunga Range) for commercial and recreational fisheries, habitat for migratory birds, and local ibis, egrets and flying foxes, has been documented in many previous reports. However, the geomorphological significance of this relatively narrow and stunted strip of mangrove and saltmarsh has seldom been mentioned. It is regarded as crucial to stabilising the coast and preventing saltwater intrusion (G.Blackman, pers.comm.), and impacts which may reduce its capacity to buffer tidal movements place at risk infrastructure and valuable grazing lands. The nature of these impacts may be as subtle as progressive mangrove defoliation from airborne pollutants or the increased erosive force of sea currents due to breakwater construction. It is recommended that the TCC further investigate the geomorphological significance of this coastline.

Source: Wetlands of the Townsville Area (ACTFR Report 1996)

Cape Cleveland

Land Use
The western side of Cape Cleveland contains few freshwater wetlands. There are several intermittent streams, which flow toward Cleveland Bay and one small palustrine wetland behind dune ridges at the far end of Long Beach. The small swamp was dry at the time of sampling and there was extensive damage to the aquatic vegetation by both fire and feral pigs; however, some stands of *Phragmites australis* did remain and it appeared that groundwater was close to the surface. Given the long period of drought, this wetland would appear to be at least semi-permanent, and its relative isolation has meant that the surrounding vegetation has mostly remained intact.
Flora and Fauna
This region contains a variety of wetland types, including large estuarine systems, expansive saltmarsh and samphire communities, freshwater swamps and several intermittent riverine streams.
The estuarine wetlands which fringe the northern and southern coasts of the cape, and extend up the Haughton River and its tributaries (e.g. Burrumbush Ck, Doughboy Ck) support commercial and recreational fisheries and provide habitat for a variety of migratory birds, regionally significant populations of egrets, ibis, spoonbills and other waterfowl, and also saltwater crocodiles. The extensive saltmarsh and samphire communities which are associated with these waterways form part of a coastal complex which is largely intact and there are few immediate pressures on the integrity of these landforms. However, the freshwater wetlands which occur leeward to the intertidal zones, and are possibly of greater regional importance, are likely to come under considerably more pressure over time (particularly from land subdivision).
The principal land holding in the area ("Eden" of the Chapman family) is a large grazing property, which extends from the Cape Cleveland road to almost the township of Cungulla. However, the natural values of the holding have become progressively more degraded through grazing, pasture establishment and repeated fires. This has affected many of the freshwater wetlands on the property, as exotic species dominate and there is little recruitment of native riparian species. However, two of the important functions of these swamps are that they provide valuable habitat for waterfowl and fish (e.g. barramundi). Experience of many degraded Burdekin wetlands suggests that (under the correct management) these functions can still be supported by the wetlands.

Source: Wetlands of the Townsville Area (ACTFR Report 1996)

Magnetic Island

Flora and Fauna
The Picnic Bay-West Point intertidal and lowland mosaic contains valuable mangroves and saltmarsh, which provide the connectivity from the coast to the upland areas, and in turn support important migratory bird and fishery habitats. However, the construction of the coast road has caused changes to tidal hydrodynamics, and resulted in the death of some *Melaleuca* stands. This extent of tree death does not warrant rehabilitation in itself, but any proposal to seal and upgrade this road should ensure that no further damage to these habitats occurs, and if possible areas, which have previously been affected, are restored. It is also recommended that the TCC consult the Department of Natural Resources and seek the reservation of this coastal zone as a Wetland Reserve.
Hydrology
Magnetic Island also contains a significant number of intermittent streams, which can often be disregarded by development proposals or planning controls. These seasonal creeks (e.g. Gustav Creek) and drainage lines not only produce more heterogenous vegetation assemblages and hence greater habitat diversity, but they are also important conduits of stormflows. Seasonal rainfall often forms ephemeral off-stream wetlands through overbank streamflow, and alterations to creek hydrology (e.g. for flood mitigation) can significantly reduce their viability.

Source: Wetlands of the Townsville Area (ACTFR Report 1996)