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

Appendices

November 2009

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USQMP Atlas TCC

TCC USQMP Atlas site descriptions (Atlas/alphabetical order)

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Previously available at http://www.soe-townsville.org/external_inlandwaters/usqmp.html

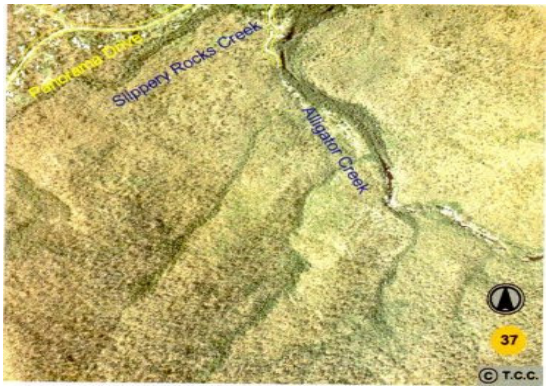
Alligator Creek - above Bruce Highway [37] (Alligator Creek Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridor - major drainage line
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Disturbed Habitat, Transformed and/or Degraded Habitat
- Conservation value: High
- Important wildlife habitat
- Perennial freshwater habitats
- Closest flowing freshwater creek to Townsville
- Best example of rainforest element riparian vegetation and flood plain paperbark

Uses and Issues

- Freshwater fishery
- A catchment care group is currently being formed in Alligator Creek
- National Park camping grounds
- High-level of use for nature-based recreation (upper catchment)
- Floating aquatic weeds (including Pistia, Salvinia & Hyacinth) require a catchment based integrated management approach
- Exotic grass and fire regime management is required for riparian areas, which are currently disturbed in much of the lowland areas
- Altered hydrology from levees, roads etc



1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2

Alligator Creek - below Bruce Highway [38] (Alligator Creek Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridor - Major drainage line
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Disturbed Habitat, Transformed and/or Degraded Habitat
- Important Wildlife habitat
- Perennial freshwater habitats Closest flowing freshwater creek to Townsville
- Best example of rainforest element riparian vegetation and flood plain paperbark forest on Townsville area lowland
- Conservation value: High

Uses and Issues

- Floating aquatic weeds (including Pistia, Salvinia & Hyacinth) require a catchment based integrated management approach
- Exotic grass and fire regime management is required for riparian areas which are currently disturbed in much of the lowland areas
- Sewage disposal

1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2

Anderson Park Lakes – Mundingburra [1] (Lower Ross River Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridor - major drainage line
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Transformed and/or Degraded Habitat
- Conservation value: Currently undefined
- Fish habitat
- Waterbird habitat

Uses and Issues

- Recreational use in urban area - aesthetic value
- Stormwater contamination
- Stormwater drainage and retention area

1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2.

Antill Plains Creek - Lower Catchment [54] (Upper Ross River Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridor
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Disturbed Habitat, Transformed and/or Degraded Habitat
- Conservation value: Very High
- Semi-perennial inland freshwater lagoons within creek channel
- Habitat connectivity linking Anthill Plains with Mt Elliott National Park

Uses and Issues

- Maintenance of high water quality to supply Ross Reservoir
- Nature based recreation
- Grazing and exotic vegetation impacts especially on riparian zone

1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2

Antill Plains Creek - Upper Catchment [55] (Upper Ross River Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridor - major drainage line
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Disturbed Habitat, Transformed and/or Degraded Habitat
- Conservation value: Medium - High
- Habitat connectivity linking Anthill Plains to Mt Elliott National Park

Uses and Issues

- Catchment and Creek are one of the major sources of potable water to the Ross River Reservoir
- Wilderness Recreation
- Grazing and exotic vegetation impacts on riparian zone
- Fire Management

1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2

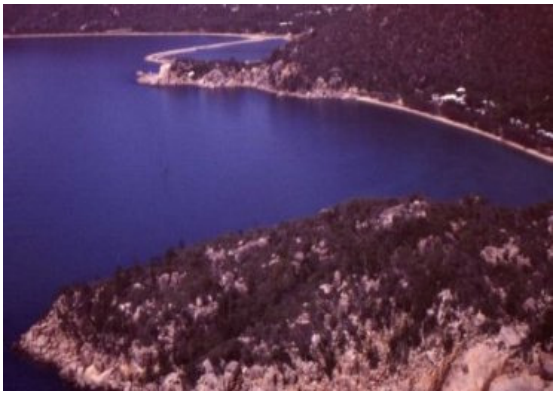
Arcadia [36] (Magnetic Island Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridors - major drainage line
- Heritage Listing and Zoning: Some GBRMP Marine National Park 'B' Natural
- Habitat Quality: Transformed and/or degraded habitat
- Conservation value: Currently unassigned but High in some areas
- Offshore seagrasses and coastal mudflats
- Fringing reefs

Uses and Issues

- Tourism Outdoor recreation
- Popular area for reef walking and snorkelling in Geoffrey Bay
- Impacts on reefs by anchor damage and trampling
- Potential for heavy metal and/or oil spill pollution from vessel operations
- Urbanisation



1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2.

Belgian Gardens Drainage [2] (Lower Ross River Sub Basin)

Site Description

- Wildlife habitat corridor: Currently undefined
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Transformed and/or Degraded Habitat
- Conservation value: Currently undefined

Uses and Issues

- Urban stormwater drainage
- Litter
- Flood mitigation purposes

1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2.

Blakey's Crossing [3] (Bohle River Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridor - major drainage line
- Heritage Listing and Zoning: Part of National Estate registered as Townsville Town Common and Environs by AHC
- Natural Habitat Quality: Transformed and/or Degraded Habitat
- Conservation value: Medium
- Contiguous habitat corridor with Town Common
- Scenic amenity
- Waterfowl habitat and associated flora and fauna
- Fish habitat including juvenile barramundi
- Once a rich wetland site, but now degraded in places

Uses and Issues

- Retention Basin
- Exotic vegetation
- Litter and pollution
- Fire Management
- May require upstream retention basins to improve water quality
- Appropriate control of weeds required
- Potential for grazing

1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2.

Bohle River to Cape Pallarenda Foreshore [40] (Bohle River Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridor - major drainage line
- Contiguous Habitat Corridor
- Heritage Listing and Zoning: GBRMP National Park "A" area near Pallarenda
- Natural Habitat Quality: Natural Habitat and some Disturbed Habitat
- Conservation value: Currently undefined
- Natural Habitat buffer adjoining high value fishery wetlands area
- Contains endangered and vulnerable regional ecosystems
- Last remaining example of Mt Low beach vine thicket
- Connectivity between habitat types including regional connectivity and proximity to Bohle Plains leasehold areas to the south
- Fish, waterbird and estuarine crocodile habitat

Uses and Issues

- Supports commercial and recreational fisheries
- Freehold tenure of beach vine thicket remnant requires agency extension and conservation agreement to ensure retention of representative habitat area
- Fishing pressure

1. RIKES (1990) p10, 35-36. 2. Wetlands of Townsville (1996) Report 96/28 p6-7. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p62 Appendix 2, Figure 1,2 & 5, p11 Section 2. 4. GBRMPA Zoning Information

Bohle River – north of Bruce Highway [4] (Bohle River Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridor - minor drainage line
- Contiguous Habitat Corridor
- Heritage Listing and Zoning: part of National Estate registered as Townsville Common and Environs by AHC
- Declared Fish Habitat Area - Management 'B' under Queensland Fisheries Act
- Natural Habitat Quality: Disturbed Habitat
- Conservation value: Currently undefined
- Wetland complex composed of mangrove estuaries, saltpans, brackish sedgelands and freshwater swamps
- Fish habitat & waterbird habitat
- Estuarine crocodile habitat
- Representation of old plains land system Habitat connectivity south to Hervey's Range

Uses and Issues

- Drainage development and land reclamation
- Loam extraction from riparian zone
- Previous sand extraction
- Commercial and recreational fishing
- Stream bank erosion
- Exotic vegetation

1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2

Bohle River – south of Bruce Highway [5] (Bohle River Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridor - minor drainage line
- Contiguous Habitat Corridors
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Disturbed Habitat
- Conservation value: Low, some areas High
- Public open space and nature based recreation
- Upper catchment has high value wetland or riparian zone

Uses and Issues

- Licensed discharge of sewage effluent
- Urban stormwater drains lack retention basins
- Erosion from catchment activities
- Sand extraction from riparian zone
- Floating aquatic weeds
- Fire Management
- Littering
- Riparian vegetation removal
- Urban and industrial development in catchment

Campus Creek – James Cook University [41] (Lower Ross River Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridor - minor drainage line
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Transformed and/or Degraded Habitat
- Conservation value: Low - Medium

Uses and Issues

- Urban open space
- Nature based recreation
- Site of Townsville City Council habitat rehabilitation by the community

1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2

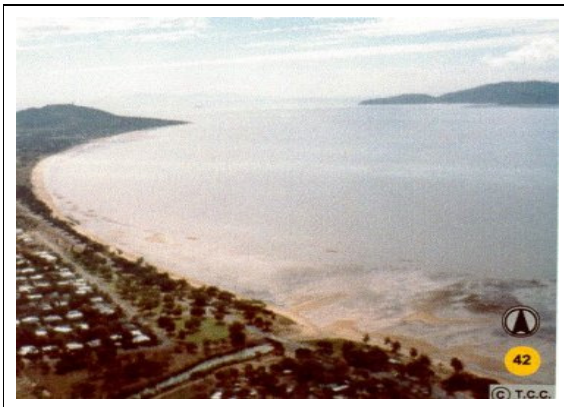
Cape Pallarenda to Kissing Point Foreshore [42] (Lower Ross River Sub Basin)

Site Description

- Heritage Listing and Zoning: Contains GBRMP National Park 'A' area
- Natural Habitat Quality: Currently undefined
- Conservation value: Currently undefined
- Remarkable diversity of marine and terrestrial habitats
- Significant archaeological record
- Extensive intertidal area for wading birds
- Seagrass beds (dugong, fish habitat)
- Remnant native vegetation at Quarantine Station
- Overwintering site for the Danaid butterfly

Uses and Issues

- Extensive recreational use - eg. BBQ's, dog walking
- Recreational fishing
- Environmental buffer against storm surge
- Nursery for marine fish
- Maintain beachfront integrity as buffer for cyclone disturbances
- Up-drift coastal developments impeding sediment supply
- Impacts from recreational use eg. yachts, foot access
- Erosion adjacent to Jezzine Barracks by road activity



1. RIKES (1990) p13, 35-36.Appendic C4. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP. Figures 1,2 and 5 4. GBRMPA Zoning Information

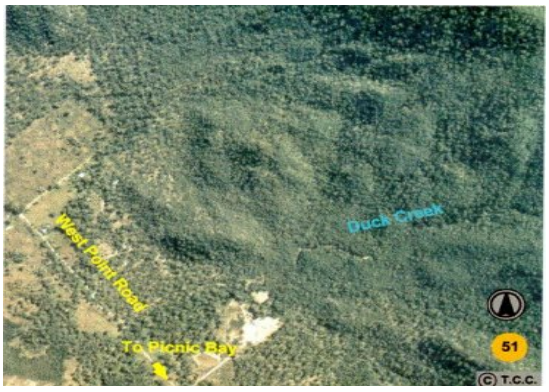
Duck Creek – Magnetic Island [51] (Magnetic Island Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridor - minor drainage line
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Disturbed Habitat
- Conservation value: High

Uses and Issues

- Potential future urban development area



1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2

Endeavour Creek and Gorge Creek – Horseshoe Bay [31] (Magnetic Island Sub Basin)

Site Description

- Wildlife habitat corridor: Contiguous Habitat Corridors
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Disturbed Habitat
- Conservation value: Currently undefined

Uses and Issues

- None listed

1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2.

Freshwater Swamps – Cape Cleveland [9] (Alligator Creek Sub Basin and/or Haughton Basin)

Site Description

- Wildlife habitat corridor
- Heritage Listing and Zoning: Ross River to Alligator Creek Coastal area is under assessment for inclusion to the National Estate register
- Natural Habitat Quality: Natural Habitat
- Conservation value: High Large flying fox, ibis and egret colonies
- Habitat for migratory waterbirds subject to international treaties
- Vulnerable plant and bird species
- Semi-permanent water with vegetation relatively intact
- Regionally largest example of woodland developed an old beach ridge soils
- Part of Townsville - Burdekin wetland aggregation listed in directory of important wetlands in Australia
- Barramundi nursery swamps

Uses and Issues

- Undamaged fire regime
- High density grazing and irrigation
- Exotic vines
- Supports recreational and commercial fisheries
- Urban and industrial expansion

1. RIKES (1990) pp.35-6. 2. Wetlands of Townsville (1996) Report 96/28 p8-9, 37. 3. Townsville - Thuringowa Strategy Plan (1996) – NCDP pp.251-52 Appendix 52, Section 2

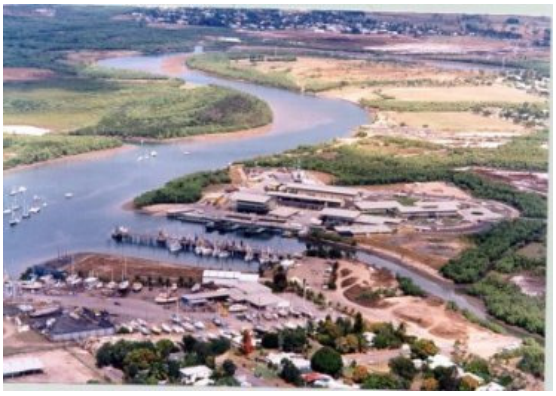
Goondi Creek – South Townsville [10] (Lower Ross River Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridor - major drainage line
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Currently undefined
- Conservation value: Currently undefined
- Mangroves - fish habitat
- Waterbird habitat

Uses and Issues

- Recreational use
- Scenic feature adjacent to urban zone
- 10th Field Supply Battalion development by Australian Defence Force



1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2.

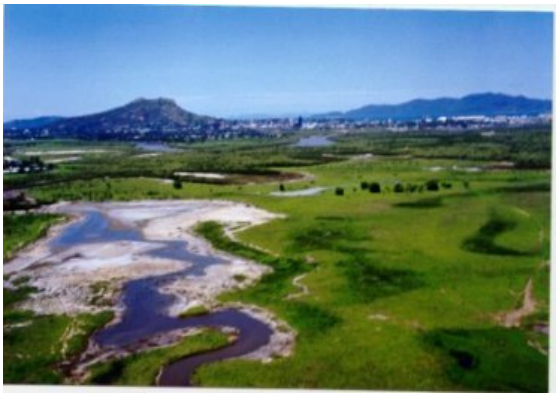
Gordon Creek – Idalia/South Townsville [11] (Lower Ross River Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridors - major drainage line
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Disturbed habitat
- Conservation value: High

Uses and Issues

- Adjacent to development site
- Refinery industry - copper, zinc



1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2.

Gustav Creek – Nelly Bay [32] (Magnetic Island Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridor - minor drainage line
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Transformed and/or Degraded Habitat
- Conservation value: Currently undefined
- Typical of a creek that produces habitat diversity

Uses and Issues

- Important conduit during storm flow
- Subject to septic tank releases
- Urbanisation
- Weeds
- Stormwater

1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2.

Horseshoe Bay Foreshore [33] (Magnetic Island Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridors - major drainage lines
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Some natural habitat, some transformed and/or degraded habitat
- Conservation value: Currently unassigned
- Buffer to National Park
- Representation of vegetation types not protected within Magnetic Island Park
- Scenic amenity

Uses and Issues

- Tourism
- Outdoor and water-based recreation
- Boat mooring
- Urban development
- Area is part of long standing National Park proposal

1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-1

Horseshoe Bay Swamp [34] (Magnetic Island Sub Basin)

Site Description

- Wildlife habitat corridor: Currently undefined
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Natural Habitat, Disturbed Habitat
- Conservation value: High
- Waterfowl and waterbird habitat including rare species
- High densities of swamp hen
- Fish habitat including barramundi nursery
- Largest freshwater habitat on Magnetic Island

Uses and Issues

- Nature based recreation and eco-tourism
- Sewerage effluent (upstream catchment adjoining sewage treatment plant)
- Urban encroachment
- Exotic grass invasion
- Fire regime management
- Paperbark die-back
- Hydrological changes

1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2

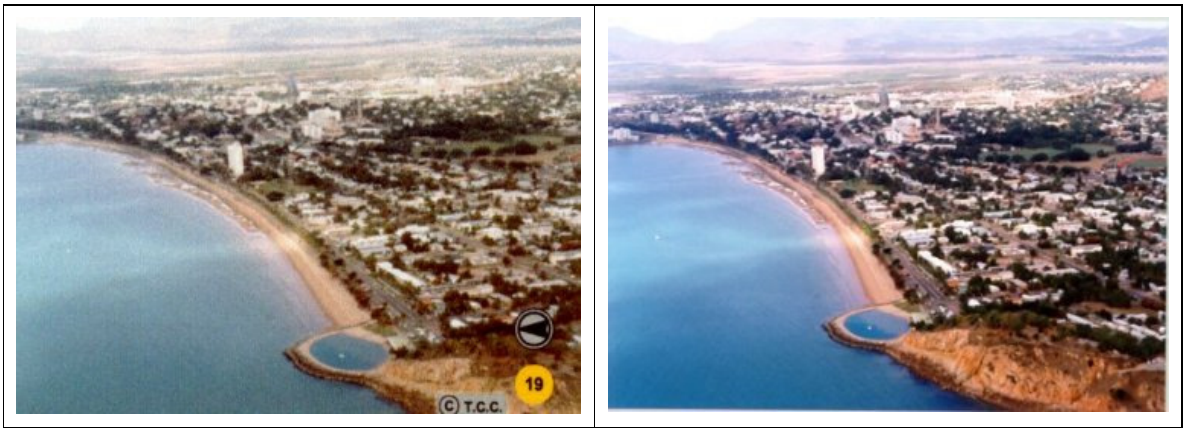
Kissing Point to Ross River – The Strand [19] (Lower Ross River Sub Basin)

Site Description

- Heritage Listing and Zoning: World Heritage below tide
- Natural Habitat Quality: Transformed and/or Degraded Habitat
- Conservation value: Currently undefined
- Dugong protection area
- Seagrass - Small to medium sized beds
- Low diversity, high cover reef offshore (Middle Reef)
- Feeding grounds for dugongs and marine turtles

Uses and Issues

- Very high recreational aesthetic value
- Adjoining tourist and residential development
- Subject to cyclone damage
- Site of future development



1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2.

Idalia Lagoons [12] (Stuart Creek Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridor - minor drainage line
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Transformed and/or Degraded Habitat
- Conservation value: Medium - High
- Permanent freshwater habitat
- Habitat connectivity with Ross River estuary
- Fish habitat including suitability as barramundi nursery swamp
- Waterfowl and waterbird habitat
- Valuable ephemeral habitat in an urban area

Uses and Issues

- Area proposed for major urban development
- Buffers to be retained between residential "Fairfield" and adjacent wetland and riparian areas
- Hydrological connectivity with lower estuary (via channel adjacent Bowen Rd and Bruce Highway) needs to be maintained to retain fish habitat
- Exotic pasture grasses dominate riparian zone
- Cattle grazing and clearing has degraded riparian vegetation
- Pollution

1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2.

Inlet Drains to Lakes [23] (Lower Ross River Sub Basin)

Site Description

- Wildlife habitat corridor: Currently undefined
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Transformed and/or Degraded Habitat
- Conservation value: Currently undefined
- Potential fish habitat
- Potential waterbird habitat

Uses and Issues

- Urban Stormwater drain
- Important in Townsville's flood mitigation scheme
- Litter issues
- Fish nursery / connectivity for migration

1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2.

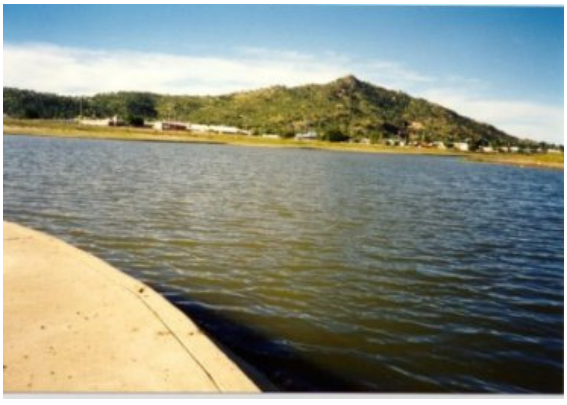
Lakes Development Stage I [21] (Lower Ross River Sub Basin)

Site Description

- Wildlife habitat corridor: Currently undefined
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Transformed and/or Degraded Habitat
- Conservation value: Currently undefined

Uses and Issues

- Important in flood mitigation
- Potential to be important for recreation
- Active management requirements
- Potential to be an important wildlife habitat (permanent water)
- Weeds
- Water quality (in general) and blue-green algae issues
- Recreational fishing



1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2.

Lakes Development Stage II [22] (Lower Ross River Sub Basin)

Site Description

- Wildlife habitat corridor: Currently undefined
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Transformed and/or Degraded Habitat
- Conservation value: Currently undefined

Uses and Issues

- Important in flood mitigation
- Potential to be important for recreation
- Potential to be an important wildlife habitat (permanent water)
- Flat Grade
- Weeds
- Water quality (in general) and bluegreen algae issues

1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2.

Lavarack Creek - Annandale [43] (Lower Ross River Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridor - major drainage line
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Transformed and/or Degraded Habitat
- Conservation value: Currently undefined

Uses and Issues

- Increasing urbanisation

1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2

Louisa Creek - Bohle [14] (Bohle River Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridor - minor drainage line
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Transformed and/or Degraded Habitat
- Conservation Value: Low - Medium
- Fish and waterfowl habitat and associated flora and fauna
- Diverse indigenous aquatic fauna
- Locally rare vegetation eg. Dog's balls (Grewia sp.)
- Good stands of lowland woods including stands of blue gum (Eucalyptus tereticornis)

Uses and Issues

- Urban open space
- Site of Townsville City Council supported community riparian rehabilitation projects
- Exotic vegetation invasion
- Urban and industrial development in catchment
- Site is contiguous with Blakey's Crossing and the Town Common
- Upper catchment for conservation park

1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2.

Magnetic Island – Beaches and Rocky Foreshores [52] (Magnetic Island Sub Basin)

Site Description

- Wildlife habitat corridor: Contiguous Habitat Corridors
- Heritage Listing and Zoning: GBRMP Marine National Park 'B' and General use 'B'
- Natural Habitat Quality: Currently undefined
- Conservation value: Very High
- Baitfish nursery - food for marlin
- Extensive coral growth
- Conservation area in Horseshoe Bay conserving a weeping tea-tree (Melaleuca leucadendra) wetland
- Seagrass beds. Large beds of low to high density adjoins mangrove and reef habitats
- Feeding ground for dugongs and marine turtles

Uses and Issues

- General recreation
- Tourism
- Aquaculture (Oyster Farm)
- Subject to cyclone damage
- Weed invasion
- Grazing
- Fire

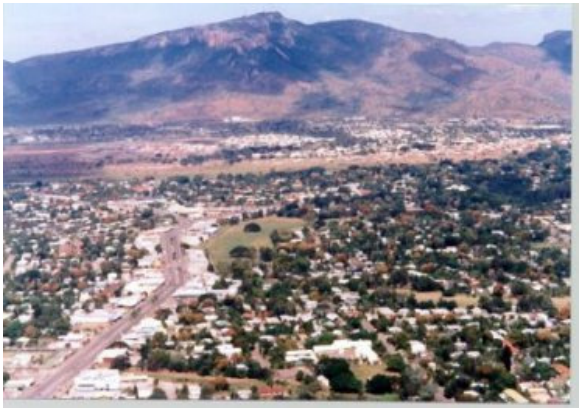
Mindham Creek Drain – Mindham Park [41] (Lower Ross River Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridor - major drainage line
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Transformed and/or Degraded Habitat
- Conservation value: Currently undefined

Uses and Issues

- Major drainage system
- Flat grade
- Designed to detain stormwater in heavy rain
- Urbanisation
- Weeds



1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2.

Mt St John Area – Bohle River [15] (Bohle River Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridor - minor drainage line
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Transformed and/or Degraded Habitat
- Conservation value: High
- Key area for maintenance of Town Common Environmental Park waterfowl and waterbird populations

Uses and Issues

- Ecotourism/education
- Nutrient retention basin
- Grazing
- Weeds
- Artificial wetland for sewage treatment
- Sewage treatment plant

1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2.

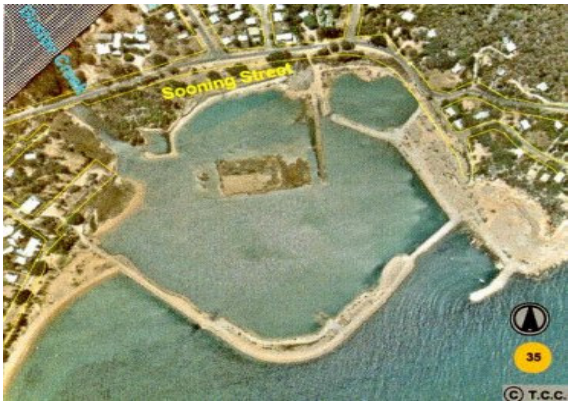
Nelly Bay Foreshore [35] (Magnetic Island Sub Basin)

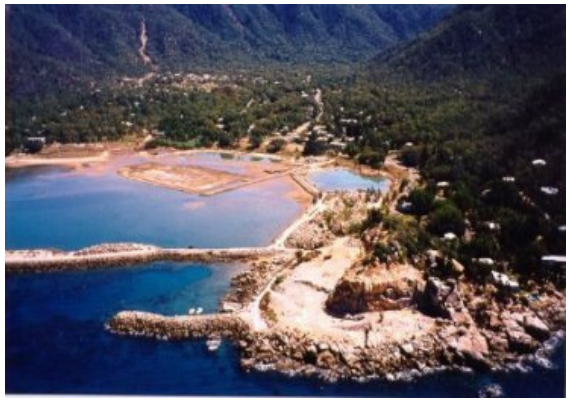
Site Description

- Wildlife habitat corridor: Riparian Corridors - major drainage line
- Heritage Listing and Zoning: currently unassigned
- Natural Habitat Quality: Transformed and/or degraded habitat
- Conservation value: Currently unassigned
- Offshore seagrasses and coastal mudflats
- Fringing reefs

Uses and Issues

- Tourism
- Outdoor recreation
- Sewage treatment plant location
- Buffer to National Park
- Impacts on reefs by anchor damage, trampling and marina development
- Adjacent to shipping channel
- Urbanisation





1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2

One Mile Creek [6] (Lower Ross River Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridor - minor drainage line
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Transformed and/or Degraded Habitat
- Conservation value: Currently undefined

Uses and Issues

- Exotic vegetation invasion
- Abutting low lying residential development
- Eutrophication
- Fire
- Litter
- Periodic closure of mouth

1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2

Pee Wee Creek [16] (Bohle River Sub Basin)

Site Description

- Wildlife habitat corridor: Contiguous Habitat Corridors
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Transformed and/or Degraded Habitat
- Conservation value: Currently undefined
- Corridor from Mt Louisa to Town Common Environmental Park

Uses and Issues

- Major drainage input into Town Common Environmental Park
- Buffers noise from growing industrial area
- Important tributary to Bohle River
- Upstream urban catchment (adjoining industrial catchment)
- Weeds

1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2

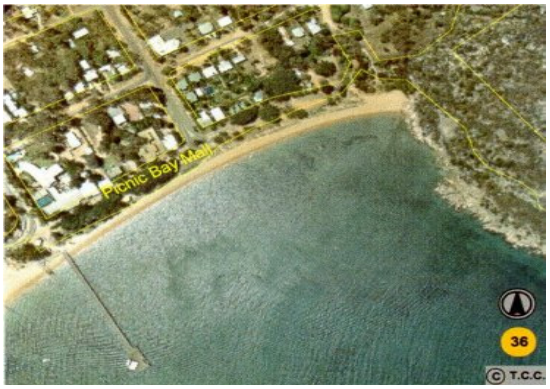
Picnic Bay Foreshore [36] (Magnetic Island Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridors - major drainage line
- Heritage Listing and Zoning: National Park in area
- Natural Habitat Quality: Transformed and/or degraded habitat
- Conservation value: Currently unassigned
- Seagrass beds offshore (dugong and marine turtle feeding, fish habitat)
- Reefs offshore

Uses and Issues

- Tourism
- Outdoor recreation e.g. swimming and snorkelling
- Ferry terminal
- Urban development



1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2

Rocky Springs [45] (Stuart Creek Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridors - major drainage lines
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Some disturbed habitat, some transformed and/or degraded habitat
- Conservation value: Low

Uses and Issues

- Site of potential future urban development

1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2

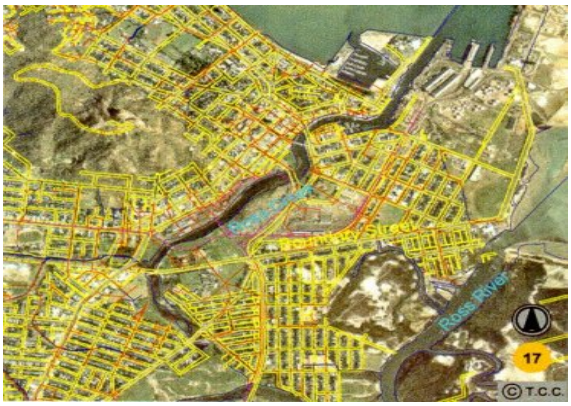
Ross Creek [17] (Lower Ross River Sub Basin)

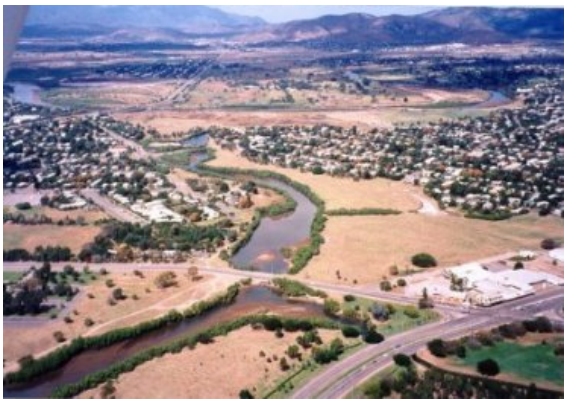
Site Description

- Wildlife habitat corridor: Riparian Corridor - major drainage line
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Transformed and/or Degraded Habitat
- Conservation value: High
- Wetland complex composed of commercial port, rock breakwaters, mangrove estuaries, saltpans and marine grasslands
- Fish habitat supporting important recreational fishery
- Estuarine crocodile habitat

Uses and Issues

- Public open space with high level of recreational use
- Recreational fishing and boating
- Commercial port
- Boat mooring
- Heavy industry in catchment
- Fuel spills
- Stormwater management - High Priority
- TPA are managing various aspects
- Urban catchment Numerous inflow points
- Flat grade
- Weeds





1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2.

Ross River – Aplin's Weir to Rooney's Bridge [28] (Lower Ross River Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridor - major drainage line
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Transformed and/or Degraded Habitat
- Conservation value: High Wildlife habitat
- Waterfowl habitat including rare species

Uses and Issues

- Nature-based recreation
- Recreational fishing
- Horse-swimming (below Aplin's Weir)
- Urban runoff
- Urbanisation
- Riverbank stabilisation
- Noxious weed control

1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2.

Ross River – Black's Weir to Gleeson's Weir [26] (Lower Ross River Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridor - major drainage line
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Transformed and/or Degraded Habitat
- Conservation value: High
- Waterfowl habitat - including rare species

Uses and Issues

- Urban catchment
- Stormwater management required to maintain or improve water quality
- Riparian vegetation heavily infested with exotic grass
- Floating aquatic weeds
- Maintenance of riparian zone buffer required
- Previously cleared riparian areas now landscaped parkland
- Encroaching urban areas require native revegetation to maintain habitat integrity

1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2.

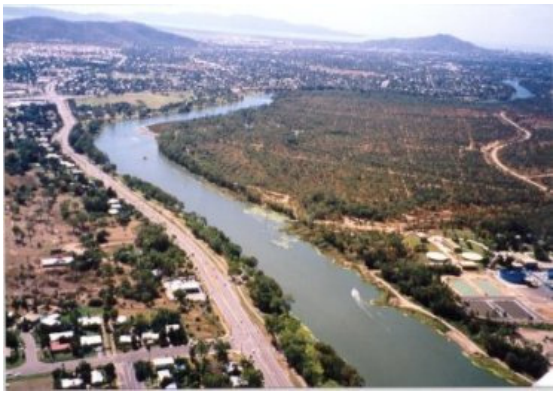
Ross River – Gleeson's Weir to Aplin's Weir [27] (Lower Ross River Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridors - major drainage line
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Transformed and/or degraded habitat
- Conservation value: High
- Feral freshwater crocodile population
- Waterbird habitat
- Fish habitat

Uses and Issues

- Local residents have developed managed areas of the riparian zone
- Urbanisation of southern bank
- Riparian vegetation heavily infested with exotic grass
- Urban catchment
- Stormwater
- Floating aquatic weeds



1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2.

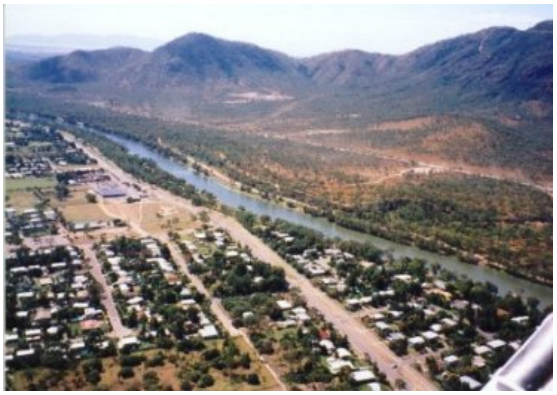
Ross River – Reservoir to Black's Weir [25] (Lower Ross River Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridor - major drainage line
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Transformed and/or Degraded Habitat
- Conservation value: High
- Waterfowl habitat (including rare species)

Uses and Issues

- Nature and water based recreation (e.g. water skiing)
- Commercial eel fishery
- Recreational Barramundi fishery
- Riparian vegetation heavily infested with exotic grass
- Floating aquatic weeds require integrated approach for control
- Potential conflict exists between use for water skiing and sand extraction
- Urban catchment stormwater management required to maintain water quality
- Fishing pressure



1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2.

Ross River – Rooney's Bridge to Mouth [29] (Lower Ross River Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridor - Major drainage line
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Transformed and/or Degraded Habitat
- Conservation value: High
- Wildlife Habitat
- Largest Sacred Ibis colony in northern Queensland
- Flying fox habitat

Uses and Issues

- Boat Mooring
- Recreational fishing
- Aquaculture
- Urban and industrial encroachment, stormwater inputs and other contaminants

1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2.

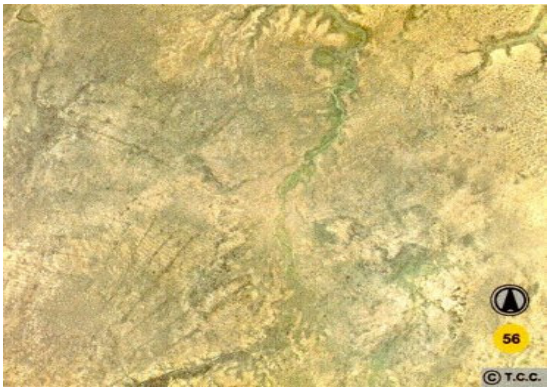
Ross River - catchment above Dam [56] (Upper Ross River Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian corridor
- Heritage Listing and zoning: Currently unassigned
- Conservation value: High

Uses and Issues

- Grazing
- Bank erosion
- Clearing within the catchment
- Water quality for portable supply
- Sand and gravel extraction



1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2

Ross River Reservoir [57] (Upper Ross River Sub Basin)

Site Description

- Wildlife habitat corridor: Currently undefined
- Heritage Listing and Zoning: Artificial wetland of national significance listed in ANCA (1996)
- Natural Habitat Quality: Transformed and/or Degraded Habitat
- Conservation value: High
- Supports major populations of waterfowl and waterbirds and acts as a drought refuge
- The principal habitat of the rare cotton pygmy goose
- Fish habitat
- Riparian vegetation

Uses and Issues

- Potable water supply
- Potential for public open space and outdoor recreation
- Commercial eel fishery
- Development of recreation potential
- Control of aquatic weeds
- Cattle grazing
- Extraction of gravel

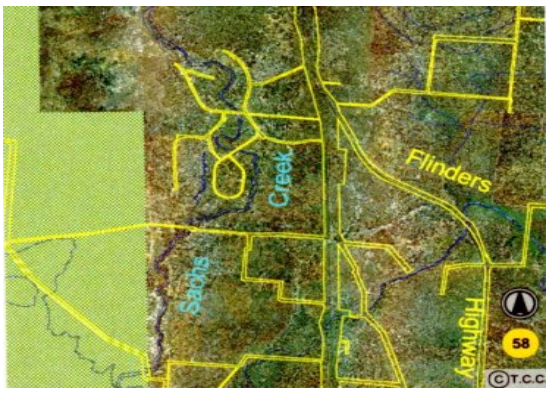
Sach's Creek – Oak Valley [58] (Upper Ross River Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridor - minor drainage line
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Transformed and/or Degraded Habitat
- Conservation value: High
- Permanent lagoons
- Fish and other wildlife habitat

Uses and Issues

- Upper catchment for Ross River Dam
- Agricultural runoff
- Public open space and nature based recreation within an expanding rural residential area



1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2

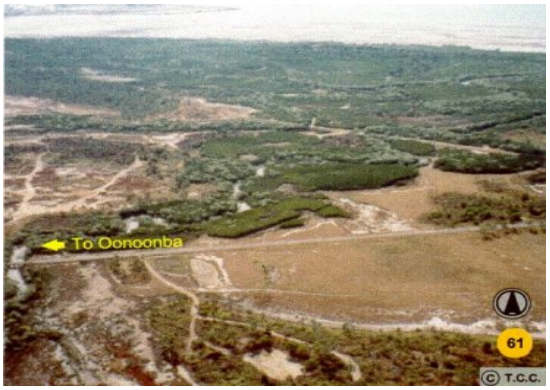
Sandfly Creek [61] (Stuart Creek Sub Basin)

Site Description

- Wildlife habitat corridor: Currently unassigned
- Heritage Listing and Zoning
- Natural Habitat Quality: Some natural habitat
- Conservation value: High

Uses and Issues

- Sewage disposal
- Productive coastal area
- Industrial activities
- Landfill
- Recreational fishing



1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2

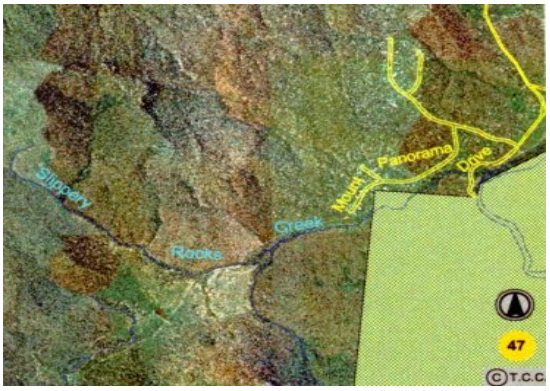
Slippery Rocks Creek – Rocky Springs [47] (Stuart Creek Sub Basin)

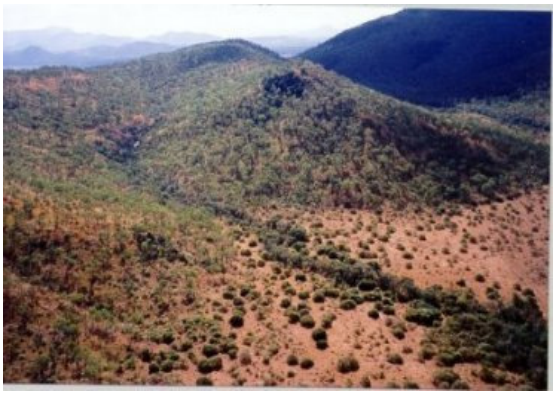
Site Description

- Wildlife habitat corridor: Riparian Corridor - Contiguous Habitat Corridors
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Disturbed Habitat, Transformed and/or Degraded Habitat
- Conservation value: High
- Diverse riparian vegetation
- Wildlife habitat
- Habitat linkage between Mt Elliott National Park and the Three Sisters Mountains

Uses and Issues

- Nature-based recreation
- Weed invasion
- Excessive fire regime
- Grazing
- Urban Development





1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2

Stoney Creek – Roseneath [48] (Stuart Creek Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridor - major drainage line
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Disturbed Habitat, Transformed and/or Degraded Habitat
- Conservation value: Medium - High

Uses and Issues

- Weed infestation
- Quarry
- Ephemeral stream
- Stability of channel and banks

1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2

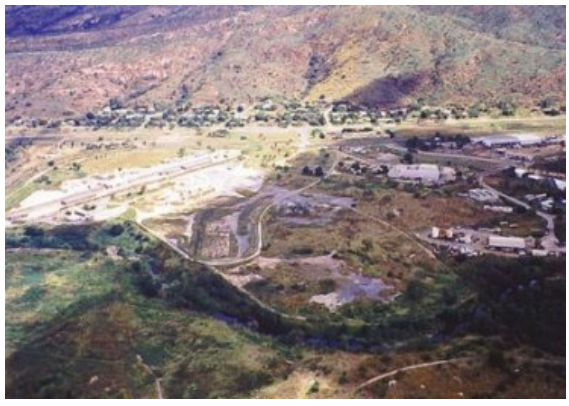
Stuart Creek - Stuart [18] (Stuart Creek Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridor - major drainage line
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Disturbed Habitat, Transformed and/or Degraded Habitat
- Conservation value: Low but Medium to High for lower catchment
- Diverse riparian vegetation
- Permanent freshwater lagoons
- Fish habitat (including barramundi)
- Best example of riparian gallery forest in Townsville area
- Major drainage area into South Bank
- Aesthetic value high

Uses and Issues

- Public open space/nature based recreation/education
- Exotic vegetation invasion including introduced pasture grasses
- Loss of riparian vegetation
- Riparian vegetation rehabilitation
- Mixture of urban light industrial open space development
- Water quality issues
- Industrial activity in catchment
- Urban and domestic activity



1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2.

Three Mile Creek - Pallarenda [49] (Lower Ross River Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridor - minor drainage line
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Disturbed Habitat
- Conservation value: Currently undefined
- Fish and waterbird habitat

Uses and Issues

- Popular recreational fishing area
- Fish nursery
- Connectivity with Town Common

1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2

Townsville Town Common (Bohle River Sub Basin)

Site Description

- Wildlife habitat corridor: Contigous habitat corridors
- Heritage Listing and Zoning: Part of National Estate registered as Townsville Town Common and Environs by AHC
- Natural Habitat Quality: Natural Habitat
- Conservation value: Conservation reserve
- Conservation Park
- Important bird feeding and breeding habitat (subject to Japan Australia and China Australia Migratory Bird Agreements)
- Fish nursery (including Barramundi)
- Diversity of habitat type

Uses and Issues

- Nature-based recreation
- Eco-tourism
- Requires control of exotic weed (rubber vine, noogoora burr, chiney apple, guinea grass, lantana, stinking passionfruit, snake weed, para grass, martinia)
- Introduced fish (Tilapia, Gambusia)
- Industrial catchment, requires water quality control
- Recreational vehicle disturbance
- Feral animals
- Fire

1. RIKES (1990) p35-36, 39 Appendix A11. 2. Wetlands of Townsville (1996) Report 96/28 p21 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p46 Appendix 2, Figure 1,2 & 5.

Vantassel Creek - Pallarenda [20] (Stuart Creek Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridor - minor drainage line
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Transformed and/or Degraded Habitat
- Conservation value: High

Uses and Issues

- Downstream industrial development
- Ephemeral wetland

1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2.

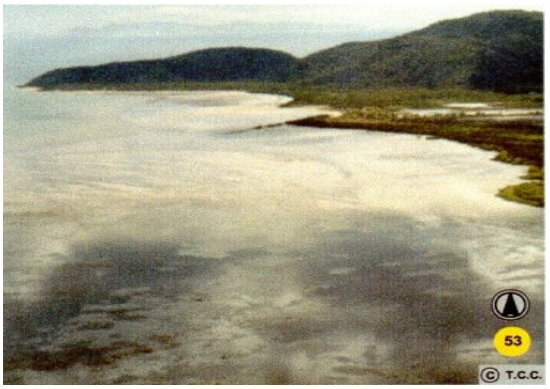
West Point to Cockle Bay Foreshore [53] (Magnetic Island Sub Basin)

Site Description

- Wildlife habitat corridor: Contiguous Habitat Corridors
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Natural Habitat, Transformed and/or Degraded Habitat
- Conservation value: Very High
- Important seagrass beds (dugong, fish habitats)
- Complex mangrove, fringing reefs, sand dunes and salt pans
- Contains aboriginal sites
- Productive fish habitat

Uses and Issues

- Education: Aboriginal sites
- Supports significant bait fishery and fish nursery
- Potential for development of infrastructure associated with ferry reserve within Cockle Bay
- Adequate buffers and waste water controls need to apply to any further rural residential development
- Grazing
- Weeds



1. RIKES (1990) p35-36, 39 Appendix C2. 2. Wetlands of Townsville (1996) Report 96/28 p8 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p63 Appendix 2, Figure 1,2 & 5. 4. ANCA (1996)

Whites Creek Catchment - Nome [50] (Alligator Creek Sub Basin)

Site Description

- Wildlife habitat corridor: Riparian Corridor - minor drainage line
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Transformed and/or Degraded Habitat
- Conservation value: Low - Medium

Uses and Issues

- Public open space and nature based recreation within an expanding rural/residential and urban area
- Invasion of exotic vegetation, e.g. chinee apple
- Rural residential encroachment into riparian zone

1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2

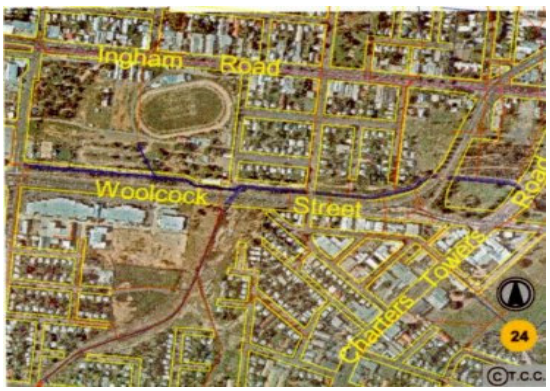
Woolcock Street Channel [24] (Lower Ross River Sub Basin)

Site Description

- Wildlife habitat corridor: Currently undefined
- Heritage Listing and Zoning: Currently unassigned
- Natural Habitat Quality: Transformed and/or Degraded Habitat
- Conservation value: Currently undefined

Uses and Issues

- Urban stormwater drainage
- Secures Lakes base flows & flushing
- Balance flow for Lakes
- Urban catchment
- Weed invasion
- Water quality issues



1. RIKES (1990) p35,36. 2. Wetlands of Townsville (1996) Report 96/28 p9-10, 39. 3. Townsville - Thuringowa Strategy Plan (1996) - NCDP p14 Appendix 2.

Appendix B

OzEstuary

OzEstuaries Profiles

Index of sites:

OzEstuary ID 397 Crystal Creek

Condition assessment

This estuary is in largely unmodified condition.
This initial classification was based on the changes to land use: agriculture.

Process based classification

The way Crystal Creek functions is primarily a result of river energy. It is a wave-dominated delta. This means that the estuary would have low sediment trapping efficiency; naturally low turbidity, salt wedge/ partially mixed circulation and there is a low risk of habitat loss due to sedimentation.

Habitat Condition Index

Crystal Creek was mapped in 2000 and the following facies areas were calculated:
Flood and ebb tidal delta 0.1 sq.km; Mangroves 0.1 sq.km; Saltmarsh/Saltflats 0.1 sq.km.
Total facies area 0.3 sq.km.
The following habitat deviations from expected were identified -1; no fluvial-bayhead delta (Ref 2).
Mangrove coverage 0.378 sq km
Saltmarsh coverage 0.174 sq km

Pressure Component (Overall)

Utilisation Index

1995 BRS data: Crop/pasture & Plantations comprise 36.9579% of the catchment. Native woody vegetation comprises 59.8583% of the catchment (Ref 3).

Commercial fishing

A maximum of 5 boats fished Crystal Creek + Ollera Creek in 1999, for a total catch of 9.04 tonnes. Commercial fishing effort (days fished) by method comprised line (6), net (68), pot (18), trawl (9), not stated (44) (Ref 1).

1. QLD state data, 2. AGSO, 3. Derived from BRS landcover data

Source: ESTUARY ASSESSMENT FRAMEWORK FOR NON-PRISTINE ESTUARIES 2000 (ANRA)

OzEstuary ID 398 Ollera Creek

Condition assessment

This estuary is in largely unmodified condition.

This initial classification was based on the changes to land use: agriculture.

Could be upgraded to near pristine. Has some agriculture and clearing in the catchment and a road. Unmodified coastal plain.

Process based classification

The way Crystal Creek functions is primarily a result of river energy. It is a wave-dominated delta. This means that the estuary would have low sediment trapping efficiency; naturally low turbidity, salt wedge/ partially mixed circulation and there is a low risk of habitat loss due to sedimentation.

Habitat Condition Index

Ollera Creek was mapped in 2000 and the following facies areas were calculated: Intertidal flats 0.1 sq.km; Mangroves 0.4 sq.km; Saltmarsh/Saltflats 0.1 sq.km; Total facies area 0.6 sq.km. The following habitat deviations from expected were identified -2; no fluvial-bayhead delta/no intertidal flats (Ref 2).

Mangrove coverage 0.564 sq km

Saltmarsh coverage 0.182 sq km

Pressure Component (Overall)

Utilisation Index

1995 BRS data: Crop/pasture & Plantations comprise 36.9579% of the catchment. Native woody vegetation comprises 59.8583% of the catchment (Ref 4).

Commercial fishing

A maximum of 5 boats fished Crystal Creek + Ollera Creek in 1999, for a total catch of 9.04 tonnes. Commercial fishing effort (days fished) by method comprised line (6), net (68), pot (18), trawl (9), not stated (44) (Ref 1).

1. QLD state data, 2. AGSO, 3. Expert opinion through state workshop, 4. Derived from BRS landcover data

Source: ESTUARY ASSESSMENT FRAMEWORK FOR NON-PRISTINE ESTUARIES 2000 (ANRA)

OzEstuary ID 399 Rollingstone Creek

Condition assessment

This estuary is in largely unmodified condition.
This initial classification was based on the changes to land use: aquaculture

Habitat Condition Index

Rollingstone Creek was mapped in 2000 and the following facies areas were calculated: Intertidal flats 0.1 sq.km; Mangroves 0.1 sq.km; Total facies area 0.3 sq.km. The following habitat deviations from expected were identified -4; no barrier or back barrier/no fluvial-bayhead delta/no flood and ebb tidal delta/no saltmarsh or saltflats (Ref 2).

Mangrove coverage: 0.549 sq km

Fish Condition Index

In the 1997 RFISH diary program (not a comprehensive geographical survey), ranked recreational catch for Rollingstone Creek included Bream, Grunter, Fingermark, Mangrove Jack (4 species total) (Ref 1).

Pressure Component (Overall)

Utilisation Index

1995 BRS data: Crop/pasture & Plantations comprise 36.9579 % of the catchment. Native woody vegetation comprises 59.8583 % of the catchment (Ref 3).

Recreational Fishing

Total estimated recreational catch (harvest & released) for Rollingstone Creek in 1997 was 8,115 fish (0.01% of Qld total) from 541 trips (0.005% of Qld total). Estimated catch (no.) Bream 3,246, Grunter 2,705, Fingermark 1,623, Mangrove Jack 541 (Ref 1).

Commercial fishing

A maximum of <5 boats fished Rollingstone Creek in 1999.
Commercial fishing effort (days fished) by method comprised
line (0), net (71), pot (7), trawl (4), not stated (15) (Ref 1).

1. QLD state data, 2. AGSO, 3. Derived from BRS landcover data

Source: ESTUARY ASSESSMENT FRAMEWORK FOR NON-PRISTINE ESTUARIES 2000 (ANRA)

OzEstuary ID 400 Leichhardt Creek

Condition assessment

This estuary is in largely unmodified condition.
This initial classification was based on the changes to land use: aquaculture.
Upgraded to near pristine. Original classification based on aquaculture - intact habitat 95% up to Rollingstone.

Source: ESTUARY ASSESSMENT FRAMEWORK FOR NON-PRISTINE ESTUARIES 2000 (ANRA)

OzEstuary ID 401 Sleeper Log Creek

Condition assessment

This estuary is in largely unmodified condition.
This initial classification was based on the changes to land use: urban.

Process based classification

The way Sleeper Log Creek function is primarily a result of river energy. It is a wave- dominated delta. This means that the estuary would have low sediment trapping efficiency; naturally low turbidity, salt wedge/ partially mixed circulation and there is a low risk of habitat loss due to sedimentation.

Habitat Condition Index

Sleeper Log Creek was mapped in 2000 and the following facies areas were calculated: Flood and ebb tidal delta 0.1 sq. km; Intertidal flats 0. 1 sq. km; Mangroves 0.5 sq. km; Saltmarsh/ Saltflats 0.4 sq. km; Total facies area 1.1 sq. km. The following habitat deviations from expected were identified -2; no barrier or back barrier/ no fluvial- bayhead delta (Ref 2).

Mangrove coverage 0.463 sq km
Saltmarsh coverage 0.395sq km

Fish Condition Index

In the 1997 RFISH diary program (not a comprehensive geographical survey), ranked recreational catch for Leichardt Creek + Althaus Creek + Black River + Sleeper Log Creek + Bluewater Creek included Mullet, Whiting, Sardine, Herring (Bait), Mud Crab, Garfish, Flathead, Grunter, Stripey, Coral Cod (14 species total) (Ref 1).

Pressure Component (Overall)

Utilisation Index

1995 BRS data: Crop/ pasture & Plantations comprise 14. 3256 % of the catchment. Native woody vegetation comprises 81. 7408 % of the catchment (Ref 4).

Recreational fishing

Total estimated recreational catch (harvest & released) for Leichardt Creek + Althaus Creek + Black River + Sleeper Log Creek + Bluewater Creek in 1997 was 32, 550 fish (0. 06% of Qld total) from 2,697 trips (0. 03% of Qld total). Estimated catch (top 5 species by no.) Mullet 15, 876, Whiting 6,357, Sardine 6,027, Herring (Bait) 1,470, Mud Crab 735 (Ref 1).

Commercial fishing

A maximum of 8 boats fished Leichardt Creek + Althaus Creek + Black River + Sleeper Log Creek + Bluewater Creek in 1999, for a total catch of 17. 56 tonnes. Commercial fishing effort (days fished) by method comprised line (4), net (130), pot (1), trawl (65), not stated (52) (Ref 1).

Details of References 1. QLD state data, 2. AGSO, 3. Expert opinion through state workshop, 4. Derived from BRS landcover data.

Source: ESTUARY ASSESSMENT FRAMEWORK FOR NON-PRISTINE ESTUARIES 2000 (ANRA)

OzEstuary ID 402 Bluewater Creek

Condition assessment

This estuary is in largely unmodified condition.

This initial classification was based on the changes to land use: urban.

Process based classification

The way Bluewater Creek function is primarily a result of river energy. It is a wave- dominated delta. This means that the estuary would have low sediment trapping efficiency; naturally low turbidity, salt wedge/ partially mixed circulation and there is a low risk of habitat loss due to sedimentation.

Habitat Condition Index

Bluewater Creek was mapped in 2000 and the following facies areas were calculated: Flood and ebb tidal delta 0.7 sq. km; Intertidal flats 0. 1 sq. km; Mangroves 0.2 sq. km; Saltmarsh/ Saltflats 0.1 sq. km; Total facies area 1.0 sq. km. The following habitat deviations from expected were identified -2 / +1; no fluvial- bayhead delta/ contains tidal sand banks (Ref 2).

Mangrove coverage 0.207 sq km

Saltmarsh coverage 0.095 sq km

Fish Condition Index

In the 1997 RFISH diary program (not a comprehensive geographical survey), ranked recreational catch for Leichardt Creek + Althaus Creek + Black River + Sleeper Log Creek + Bluewater Creek included Mullet, Whiting, Sardine, Herring (Bait), Mud Crab, Garfish, Flathead, Grunter, Stripey, Coral Cod (14 species total) (Ref 1).

Pressure Component (Overall)

Utilisation Index

1995 BRS data: Crop/ pasture & Plantations comprise 14. 3256 % of the catchment. Native woody vegetation comprises 81. 7408 % of the catchment (Ref 3).

Recreational fishing

Total estimated recreational catch (harvest & released) for Leichardt Creek + Althaus Creek + Black River + Sleeper Log Creek + Bluewater Creek in 1997 was 32, 550 fish (0. 06% of Qld total) from 2,697 trips (0. 03% of Qld total). Estimated catch (top 5 species by no.) Mullet 15, 876, Whiting 6,357, Sardine 6,027, Herring (Bait) 1,470, Mud Crab 735 1 (Ref 1).

Commercial fishing

A maximum of 8 boats fished Leichardt Creek + Althaus Creek + Black River + Sleeper Log Creek + Bluewater Creek in 1999, for a total catch of 17. 56 tonnes. Commercial fishing effort (days fished) by method comprised line (4), net (130), pot (1), trawl (65), not stated (52). (Ref 1).

Details of References 1. QLD state data, 2. AGSO, 3. Derived from BRS landcover data

Source: ESTUARY ASSESSMENT FRAMEWORK FOR NON-PRISTINE ESTUARIES 2000 (ANRA)

OzEstuary ID 403 Althaus Creek

Condition assessment

This estuary is in largely unmodified condition.

Process based classification

The way Althaus Creek function is primarily a result of river energy. It is a wave- dominated delta. This means that the estuary would have low sediment trapping efficiency; naturally low turbidity, salt wedge/ partially mixed circulation and there is a low risk of habitat loss due to sedimentation.

Habitat Condition Index

Althaus Creek was mapped in 2000 and the following facies areas were calculated: Flood and ebb tidal delta 0.3 sq. km; Intertidal flats 0. 1 sq. km; Mangroves 0.4 sq. km; Saltmarsh/ Saltflats 0.6 sq. km; Total facies area 1.4 sq. km. The following habitat deviations from expected were identified -1; no fluvial- bayhead delta
Mangrove coverage 0.261 sq km
Saltmarsh coverage 0.445 sq km

Fish Condition Index

In the 1997 RFISH diary program (not a comprehensive geographical survey), ranked recreational catch for Leichardt Creek + Althaus Creek + Black River + Sleeper Log Creek + Bluewater Creek included Mullet, Whiting, Sardine, Herring (Bait), Mud Crab, Garfish, Flathead, Grunter, Stripey, Coral Cod (14 species total) (Ref 1).

Pressure Component (Overall)

Utilisation Index

1995 BRS data: Crop/ pasture & Plantations comprise 14. 3256 % of the catchment. Native woody vegetation comprises 81. 7408 % of the catchment (Ref 3)

Recreational fishing

Total estimated recreational catch (harvest & released) for Leichardt Creek + Althaus Creek + Black River + Sleeper Log Creek + Bluewater Creek in 1997 was 32, 550 fish (0. 06% of Qld total) from 2,697 trips (0. 03% of Qld total). Estimated catch (top 5 species by no.) Mullet 15, 876, Whiting 6,357, Sardine 6,027, Herring (Bait) 1,470, Mud Crab 735 1 (Ref 1).

Commercial fishing

A maximum of 8 boats fished Leichardt Creek + Althaus Creek + Black River + Sleeper Log Creek + Bluewater Creek in 1999, for a total catch of 17. 56 tonnes. Commercial fishing effort (days fished) by method comprised line (4), net (130), pot (1), trawl (65), not stated (52). (Ref 1).

Details of References 1. QLD state data, 2. AGSO, 3. Derived from BRS landcover data

OzEstuary ID 404 Black River

Condition assessment

This estuary is in modified condition.
This initial classification was based on the changes to land use: urban.

Process based classification

The way Black River function is primarily a result of river energy. It is a wave- dominated delta. This means that the estuary would have low sediment trapping efficiency; naturally low turbidity, salt wedge/ partially mixed circulation and there is a low risk of habitat loss due to sedimentation.

Habitat Condition Index

Black River was mapped in 2000 and the following facies areas were calculated: Flood and ebb tidal delta 1. 8 sq. km; Intertidal flats 0.7 sq. km; Mangroves 0. 4 sq. km; Saltmarsh/ Saltflats 0.1 sq. km; Total facies area 3.1 sq. km. The following habitat deviations from expected were identified -2 / +1; no fluvial- bayhead delta/ contains tidal sand banks (Ref 2).

Mangrove coverage 0.144 sq km
Saltmarsh coverage 0.043 sq km

Fish Condition Index

In the 1997 RFISH diary program (not a comprehensive geographical survey), ranked recreational catch for Leichardt Creek + Althaus Creek + Black River + Sleeper Log Creek + Bluewater Creek included Mullet, Whiting, Sardine, Herring (Bait), Mud Crab, Garfish, Flathead, Grunter, Stripey, Coral Cod (14 species total) (Ref 1).

Pressure Component (Overall)

Utilisation Index

1995 BRS data: Crop/ pasture & Plantations comprise 14. 3256 % of the catchment. Native woody vegetation comprises 81. 7408 % of the catchment (Ref 3).

Recreational fishing

Total estimated recreational catch (harvest & released) for Leichardt Creek + Althaus Creek + Black River + Sleeper Log Creek + Bluewater Creek in 1997 was 32, 550 fish (0. 06% of Qld total) from 2,697 trips (0. 03% of Qld total). Estimated catch (top 5 species by no.) Mullet 15, 876, Whiting 6,357, Sardine 6,027, Herring (Bait) 1,470, Mud Crab 735 (Ref 1).

Commercial fishing

A maximum of 8 boats fished Leichardt Creek + Althaus Creek + Black River + Sleeper Log Creek + Bluewater Creek in 1999, for a total catch of 17. 56 tonnes. Commercial fishing effort (days fished) by method comprised line (4), net (130), pot (1), trawl (65), not stated (52) (Ref 1).

Details of References 1. QLD state data, 2. AGSO, 3. Derived from BRS landcover data

Source: ESTUARY ASSESSMENT FRAMEWORK FOR NON-PRISTINE ESTUARIES 2000 (ANRA)

OzEstuary ID 405 Bohle River

Condition assessment

This estuary is in modified condition.
This initial classification was based on the changes to land use: urban.

Process based classification

The way Bohle River function is primarily a result of river energy. It is a tide- dominated delta. This means that the estuary would have low sediment trapping efficiency; naturally high turbidity, well mixed circulation and there is a low risk of habitat loss due to sedimentation.

Habitat Condition Index

Bohle River was mapped in 2000 and the following facies areas were calculated: Flood and ebb tidal delta 2. 2 sq. km; Intertidal flats 1.5 sq. km; Mangroves 3. 8 sq. km; Saltmarsh/ Saltflats 12.9 sq. km; Total facies area 20.4 sq. km. No habitat deviation was identified (Ref 2).

Mangrove coverage 18.6% - Extensive stands of mangroves present
Saltmarsh coverage 63.1% - Extensive areas of saltmarsh and unvegetated claypans present
(Ref 2,3).

Fish Condition Index

In the 1997 RFISH diary program (not a comprehensive geographical survey), ranked recreational catch for Bohle River included Poppy Mullet, Whiting, Longtom, Bream, Box Fish, Mud Crab, Shark (7 species total); Fisheries values: barramundi, blue salmon, bream, estuary cod, flathead, grey mackerel, grunter, mangrove jack, queenfish, recreational fishing, sea mullet, school mackerel tiger prawns, banana prawns, blue legged king prawns (Ref 1,3).

Pressure Component (Overall)

Utilisation Index

1995 BRS data: Crop/ pasture & Plantations comprise 37. 9235 % of the catchment. Native woody vegetation comprises 43. 6138 % of the catchment (Ref 4).

Recreational fishing

Total estimated recreational catch (harvest & released) for Bohle River in 1997 was 20, 467 fish (0.04% of Qld total) from 2,095 trips (0. 02% of Qld total). Estimated catch (top 5 species by no.) Poppy Mullet 16,771, Whiting 1,416, Longtom 1, 082, Bream 541, Box Fish 287 (Ref 1).

Commercial fishing

A maximum of 5 boats fished Bohle River in 1999, for a total catch of 4. 29 tonnes. Commercial fishing effort (days fished) by method comprised line (0), net (60), pot (2), trawl (15), not stated (54) (Ref 1).

Details of References 1. QLD state data, 2. AGSO, 3. Beumer J et al. 1997. Declared Fish Habitat Areas in Queensland, 4. Derived from BRS landcover data

Source: ESTUARY ASSESSMENT FRAMEWORK FOR NON-PRISTINE ESTUARIES 2000 (ANRA)

OzEstuary ID 406 Ross River

Condition assessment

This estuary is in modified condition.
Initial classification was severely modified.
This initial classification was based on the changes to land use: urban.

Process based classification

The way Ross
River function is primarily a result of tide energy. It is classified as a tidal flat/tidal creek. This means that the estuary would have low sediment trapping efficiency; naturally high turbidity, well mixed circulation and there is a low risk of habitat loss due to sedimentation.

Habitat Condition Index

Bohle River was mapped in 2000 and the following facies areas were calculated: Flood and ebb tidal delta 1. 1 sq. km; Intertidal flats 1.0 sq. km; Mangroves 2. 7 sq. km; Saltmarsh/ Saltflats 0.7 sq. km; Total facies area 5.5 sq. km. The following habitat deviations from expected were identified; -1, no tidal sand banks (Ref 2).

Mangrove coverage 0.487
Saltmarsh coverage 0.13
(Ref 2,2).

Fish Condition Index

In the 1997 RFISH diary program (not a comprehensive geographical survey), ranked recreational catch for Ross River + Sandfly Creek included Grunter, Mud Crab, Silver Bream, Barramundi, Trevally, Bream, Whiting, Red Bream, Butter Bream, Cod (75 species total) (Ref 1).

Pressure Component (Overall)

Utilisation Index

1995 BRS data: Crop/ pasture & Plantations comprise 37. 9235 % of the catchment. Native woody vegetation comprises 43. 6138 % of the catchment (Ref 4).

Recreational fishing

Total estimated recreational catch (harvest & released) for Ross River + Sandfly Creek in 1997 was 494,831 fish (0.89% of Qld total) from 74,161 trips (0.69% of Qld total). Estimated catch (top 5 species by no.) Grunter 79,997, Mud Crab 58, 072, Silver Bream 52, 512, Barramundi 33,744, Trevally 27,306 (Ref 1).

Commercial fishing

A maximum of 6 boats fished Ross River + Sandfly Creek in 1999, for a total catch of 3. 91 tonnes.
Commercial fishing effort (days fished) by method comprised line (3), net (76), pot (74), trawl (17), not stated (6) (Ref 1).

Susceptibility Index

Flow modifying structures	Mostly impounded system	Rating 4

Details of References 1. QLD state data, 2. AGSO, 3. Derived from BRS landcover data

Source: ESTUARY ASSESSMENT FRAMEWORK FOR NON-PRISTINE ESTUARIES 2000 (ANRA)

OzEstuary ID 407 Sandfly Creek

Condition assessment

This estuary is in modified condition.
This initial classification was based on the changes to catchment hydrology: STP.

Process based classification

The way Sandfly Creek functions is primarily a result of tide energy. It is classed as a tidal flat/ tidal creek. This means that the estuary would have low sediment trapping efficiency; naturally high turbidity, well mixed circulation and there is low risk of sedimentation.

Habitat Condition Index

Sandfly Creek was mapped in 2000 and the following facies areas were calculated: Intertidal flats 0. 1 sq. km; Mangroves 0.8 sq. km; Saltmarsh/ Saltflats 4.3 sq. km; Total facies area 5.2 sq. km. The following habitat deviations from expected were identified -2; no flood and ebb tidal delta/ no tidal sand banks (Ref 2).

Mangrove coverage 0.153 sq km
Saltmarsh coverage 0.824 sq km

Fish Condition Index

In the 1997 RFISH diary program (not a comprehensive geographical survey), ranked recreational catch for Ross River + Sandfly Creek included Grunter, Mud Crab, Silver Bream, Barramundi, Trevally, Bream, Whiting, Red Bream, Butter Bream, Cod (75 species total) (Ref 1).

Pressure Component (Overall)

Utilisation Index

1995 BRS data: Crop/ pasture & Plantations comprise 42. 2428 % of the catchment. Native woody vegetation comprises 36. 0567 % of the catchment (Ref 3).

Recreational fishing

Total estimated recreational catch (harvest & released) for Ross River + Sandfly Creek in 1997 was 494,831 fish (0.89% of Qld total) from 74,161 trips (0.69% of Qld total). Estimated catch (top 5 species by no.) Grunter 79,997, Mud Crab 58, 072, Silver Bream 52, 512, Barramundi 33,744, Trevally 27,306 (Ref 1).

Commercial fishing

A maximum of 6 boats fished Ross River + Sandfly Creek in 1999, for a total catch of 3. 91 tonnes. Commercial fishing effort (days fished) by method comprised line (3), net (76), pot (74), trawl (17), not stated (6) (Ref 1).

Details of References 1. QLD state data, 2. AGSO, 3. Derived from BRS landcover data

Source: ESTUARY ASSESSMENT FRAMEWORK FOR NON-PRISTINE ESTUARIES 2000 (ANRA)

OzEstuary ID 408 Alligator Creek

Condition assessment
This estuary is in largely unmodified condition.
This initial classification was based on the changes to land use: agriculture.

Process based classification
The way Alligator Creek functions is primarily a result of river energy. It is a tide- dominated delta. This means that the estuary would have low sediment trapping efficiency; naturally high turbidity, well mixed circulation and there is a low risk of habitat loss due to sedimentation.

Habitat Condition Index
Alligator Creek was mapped in 2000 and the following facies areas were calculated: Flood and ebb tidal delta 2.3 sq. km; Intertidal flats 0. 4 sq. km; Mangroves 4.9 sq. km; Saltmarsh/ Saltflats 5.0 sq. km; Total facies area 12. 6 sq. km. The following habitat deviations from expected were identified -1; no tidal sand banks (Ref 2).
Mangrove coverage 0.39 sq km
Saltmarsh coverage 0.399 sq km

Pressure Component (Overall)
Utilisation Index
1995 BRS data: Crop/ pasture & Plantations comprise 12. 8728 % of the catchment. Native woody vegetation comprises 65. 4939 % of the catchment (Ref 5).

Recreational fishing
Medium pressure - adjacent fisherman's retreat (Ref 3).

Commercial fishing
Gill net fishery; A maximum of <5 boats fished Alligator Creek + Crocodile Creek in 1999. Commercial fishing effort (days fished) by method comprised line (0), net (41), pot (11), trawl (0), not stated (2) (Ref 3).

Urbanisation and urban runoff
Rural residential adjacent.

Industry
Industrial meat works (historical).

Ports & Port Works
Absent - used to be a port

Details of References 1. QLD state data, 2. AGSO, 3. Expert opinion through state workshop, 4. Derived from BRS landcover data

Source: ESTUARY ASSESSMENT FRAMEWORK FOR NON-PRISTINE ESTUARIES 2000 (ANRA)

OzEstuary ID 409 Crocodile Creek

Condition assessment
This estuary is in near pristine condition.

Source: ESTUARY ASSESSMENT FRAMEWORK FOR NON-PRISTINE ESTUARIES 2000 (ANRA)

Appendix C

Wetland Habitat Proforma

Wetland Habitat Proforma

Index of sites:

Bohle River Wetland Habitat Pro-forma

Wetland Type Classification (after Blackman *et al* 1992)	Simple wetland aggregation
Biogeographic Region	Brigalow Belt (North)
Ecological system/subsystem	Estuarine/Intertidal
Class/subclass	Streambed/Mud
Dominance Type	*Avicennia marine*
Water Regime	Regularly flooded
Water Chemistry	Mixohaline
Soil	Organice
Associated Vegetation	*Bruguiera* spp., *Ceriops tagal*
Size	Channel <20m
Management Issues	Streambank erosion, fishing pressure, exotics, access track.
Conservation Value	Low-Medium.

Ross Creek Wetland Habitat Pro-forma

Wetland sample site No.	7.15 Ross Creek - Townsville
Grid Reference No.	DU805698
Wetland Type Classification (after Blackman *et al* 1992)	Simple wetland aggregation
Biogeographic Region	Brigalow Belt (North)
Land system	
Landform pattern/ element	
Ecological system/subsystem	Estuarine/Subtidal
Class/subclass	Consolidated Bottom/Mud
Dominance Type	*Avicennia marina*
Water Regime	Subtidal
Water Chemistry	Mixohaline
Soil	Organic
Special modifiers	Impounded
Associated Vegetation	*Sporobolus virginicus, Halosarcia indica*
Size	Channel ~30m
Management Issues	Stormwater, litter, recreational use
Conservation Value	Medium-High
Recommended action	1 Control access to the creek to prevent erosion of banks and deposition of litter 2 Revegetation 3 Clean up and water quality and sediment monitoring program

Ross River Wetland Habitat Pro-forma

Wetland Type Classification (after Blackman *et al* 1992)	Simple wetland aggregation
Biogeographic Region	Brigalow Belt (North)
Ecological system/subsystem	Riverine/Intermittent
Class/subclass	Streambed/Sand
Dominance Type	*Urochloa mutica*
Water Regime	Seasonally flooded
Water Chemistry	Fresh
Soil	Mineral
Associated Vegetation	*Cyperus* spp.
Size	Channel ~20m
Management Issues	Potable water supply, grazing, weeds.
Conservation Value	Very high

Toonpan Lagoon Wetland Habitat Pro-forma

Wetland Type Classification (after Blackman *et al* 1992)	Simple wetland aggregation
Biogeographic Region	Brigalow Belt (North)
Ecological system/subsystem	Palustrine
Class/subclass	Emergent/Persistent
Dominance Type	*Urochloa mutica*
Water Regime	Seasonally flooded
Water Chemistry	Fresh
Soil	Organic
Associated Vegetation	*Panicum maximum, Chloris spp.*
Management Issues	Grazing, weeds
Conservation Value	Low-Medium

Antill Plains Creek Wetland Habitat Pro-forma

Wetland Type Classification (after Blackman *et al* 1992)	Simple wetland aggregation
Biogeographic Region	Brigalow Belt (North)
Ecological system/subsystem	Riverine/Intermittent
Class/subclass	Streambed/Rubble
Dominance Type	*Callistemon viminalis*
Water Regime	Temporarily flooded
Water Chemistry	Fresh
Soil	Mineral
Associated Vegetation	*Lophostemon grandiflorus, Melaleuca leucadendra.*
Size	Channel ~>10m
Management Issues	Potable water supply, land tenure.
Conservation Value	Very high

Sachs Creek Wetland Habitat Pro-forma

Wetland Type Classification (after Blackman *et al* 1992)	Simple wetland aggregation
Biogeographic Region	Brigalow Belt (North)
Ecological system/subsystem	Riverine/Intermittent
Class/subclass	Aquatic bed/Floating leaved
Dominance Type	*Nymphaea gigantea*
Water Regime	Temporarily flooded
Water Chemistry	Fresh
Soil	Organic
Associated Vegetation	*Marsilea mutica, Ludwigia peploides, Vallisneria spiralis, Aponogeton queenslandica.*
Size	Channel ~10m
Management Issues	Potable water supply, semi rural subdivision, recreational use.
Conservation Value	High

Stuart Creek Wetland Habitat Pro-forma

Wetland Type Classification (after Blackman *et al* 1992)	Simple wetland aggregation
Biogeographic Region	Brigalow Belt (North)
Ecological system/subsystem	Riverine/Lower Perennial
Class/subclass	Emergent/Persistent
Dominance Type	*Urochloa mutica*
Water Regime	Permanently flooded
Water Chemistry	Fresh
Soil	Organic
Associated Vegetation	*Communis riccinus, Panictum maximum*
Size	Channel ~<20m
Management Issues	Exotics, stormwater contamination
Conservation Value	Low

Sandfly Creek Wetland Habitat Pro-forma

Wetland Type Classification (after Blackman *et al* 1992)	Simple wetland aggregation
Biogeographic Region	Brigalow Belt (North)
Ecological system/subsystem	Riverine/Tidal
Class/subclass	Streambed/Mud
Dominance Type	*Avicennia marina*
Water Regime	Regularly flooded
Water Chemistry	Mixohaline
Soil	Organic
Associated Vegetation	*Brugueira spp. Rhizophera spp.*
Size	Channel ~15m
Management Issues	Sewerage disposal
Conservation Value	High

Alligator Creek Wetland Habitat Pro-forma

Wetland Type Classification (after Blackman *et al* 1992)	Simple wetland aggregation
Biogeographic Region	Brigalow Belt (North)
Ecological system/subsystem	Riverine/Lower Perennial
Class/subclass	Unconsolidated bottom/sand
Dominance Type	*Urochloa mutica*
Water Regime	Intermittently exposed
Water Chemistry	Fresh
Soil	Mineral
Associated Vegetation	*Cyperus spp. Potamogeton crispus, Vallisneria spiralis.*
Size	Channel <5m
Management Issues	Agricultural runoff, recreational use, weeds
Conservation Value	High

Horseshoe Bay Wetland Habitat Pro-forma

Wetland Type Classification (after Blackman *et al* 1992)	Simple wetland aggregation
Biogeographic Region	Brigalow Belt (North)
Ecological system/subsystem	Palustrine
Class/subclass	1. Forested/Evergreen 2. Emergent/ Non Persistent
Dominance Type	1. *Melaleuca leucadendra* 2. *Eleocharis dulcis*
Water Regime	Seasonally flooded
Water Chemistry	Fresh
Soil	Organic
Associated Vegetation	*Urochloa mutica, Passiflora foetida.*
Size	800x100m
Management Issues	Sewerage disposal, urban encroachment, exotics, fire.
Conservation Value	High

Appendix D

Wetland Reports Extracts

Wetland Reports Extracts

Index of sites:

Leichhardt Creek
Water Quality in the Townsville/Burdekin Dry Tropics Region (ACTFR Report 2002)

Bohle River
Wetlands of the Townsville Area (ACTFR Report 1996)

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

Stuart Creek
Water Quality in the Townsville/Burdekin Dry Tropics Region (ACTFR Report 2002) and
Assessment of Values, Condition and Strategic Management Options for lower Stuart Creek Reaches (Stuart Prison – Bruce Highway) (2006)

Alligator Creek
Cocoa Creek
Cape Cleveland
Magnetic Island
Wetlands of the Townsville Area (ACTFR Report 1996)

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)

Appendix E

EPA Catchment Profiles Extracts

EPA Catchment Profiles

Background

The following information was prepared by Niall Connolly (EPA) as part of the process for determining the environmental values of the waterways of the Black Ross WQIP area. Reference material used included:

- OzEstuary 2000
- Page & Hoolihan 2002
- Maughan et al 2008;
- Bainbridge et al 2007;
- Liessman et al 2007 Vol. 1 & 2; Black Ross Event monitoring 2006/07 (for Creek to Coral CCI project)
- Lewis et al 2007;
- Moss et al (unpubl.)

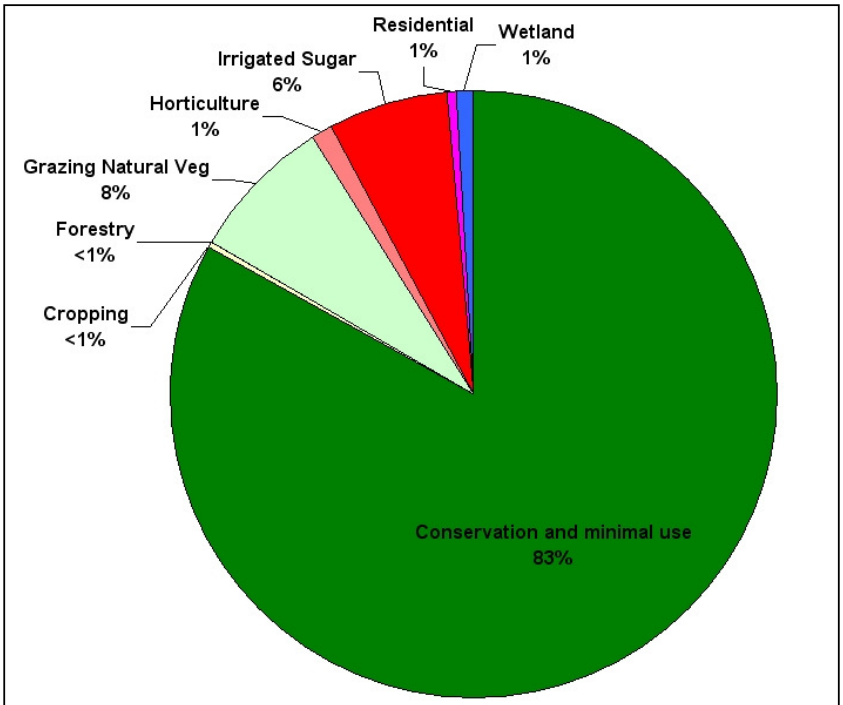
Not all catchments in the Black Ross WQIP area have been profiled due to gaps in available information. Catchments profiled in Appendix F are:

Catchment	LUG	CC	OzEst	P&H	WQE	Sub basin
Crystal Creek	▲	▲	▲	▲	▲	Crystal Creek
Lorna Creek	▲	▲				Crystal Creek
Ollera Creek	▲	▲	▲	▲		Crystal Creek
Hencamp Creek	▲	▲			▲	CrystalCreek
Rollingstone Creek	▲	▲	▲	▲		Rollingstone Creek
Wild Boar Creek	▲	▲				Rollingstone Creek
Saltwater Creek	▲	▲				Rollingstone Creek
Leichhardt Creek	▲	▲	▲	▲		Rollingstone Creek
Sleeper Log Creek	▲	▲	▲	▲		Bluewater Creek
Bluewater Creek	▲	▲	▲	▲	▲	Bluewater Creek
Black River	▲	▲	▲	▲	▲	Black River
Bohle River	▲	▲	▲	▲	▲	Bohle River
Pallarenda	▲	▲				Lower Ross River
Ross Creek	▲	▲			▲	Lower Ross River
Lower Ross River	▲	▲	▲	▲	▲	Lower Ross River
Stuart Creek	▲	▲	▲	▲	▲	Stuart Creek
Alligator Creek	▲	▲	▲	▲	▲	Alligator Creek
Crocodile Creek	▲	▲	▲	▲	▲	Alligator Creek
Cape Cleveland		▲				Alligator Creek

Note: ▲ indicates information included for that catchment. LUG is land use graph (pie chart), CC is catchment characteristics, OzEst is Oz Estuary 2002 information, P&H is Page and Hoolihan 2002 and WQE is water quality exposure information.

Crystal Creek catchment – EPA initial profile information

Crystal Creek Catchment Land Use



Source: EPA – Estuary and Marine HEV profiles

Crystal Creek catchment

Catchment Characteristic	Description
Average river flow	27.876 Gl/Year
Flow modification	Yes
Number of fish barriers	4
Presence of EVR species or ecosystems	Not known
Presence of STP point source	No
Presence of other point source	No
Catchment cleared	14%
Estuarine vegetation cleared	1%
OzEstuary 2000	
Type	WDD
Bryce Heap	Tidal estuary
Condition	Largely unmodified
Page & Hoolihan 2002	
Naturalness Estuary	High
Naturalness Catchment	Moderate
Habitat Diversity	Low
International Significance	High
Level of protection	Low

Crystal Creek catchment - Water Quality Exposure

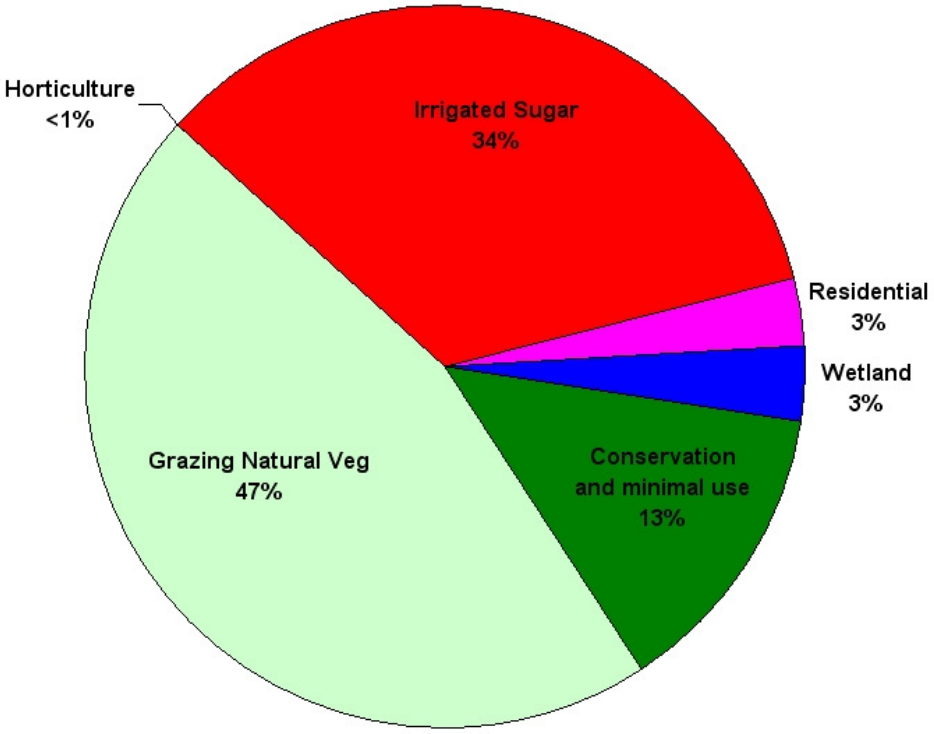
	Sediment	Nitrogen	Phosphorus	Pesticides
Contaminant Exposure Risk	Low	Low	Low	Low
Chronic or Storm	(Storm)	(Storm)	(Storm)	(Storm)

Derived from information in Maughan et al 2008; Bainbridge et al 2007; Liessman et al 2007 Vol. 1 & 2; Lewis et al 2007; Moss et al (unpubl.)

Source: EPA – Estuary and Marine HEV profiles

Lorna Creek catchment – EPA initial profile information

Lorna Creek Catchment Land Use



Source: EPA – Estuary and Marine HEV profiles

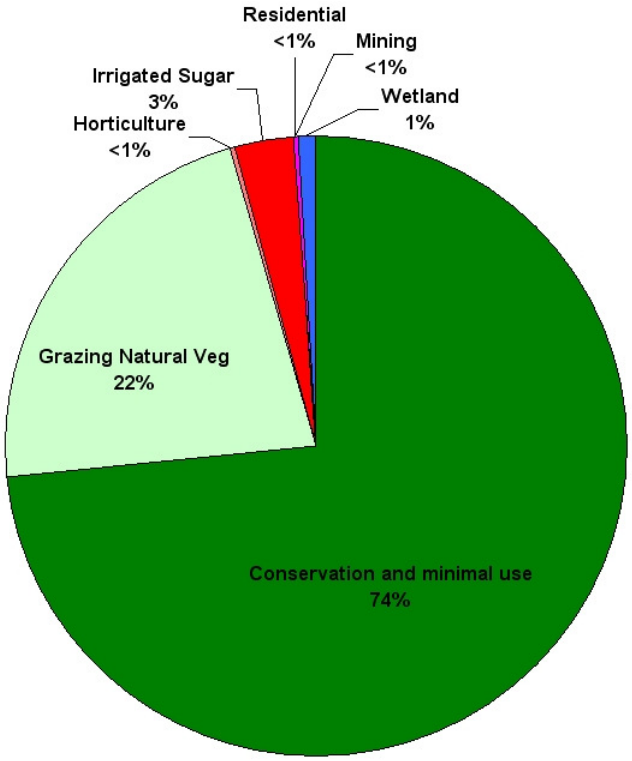
Lorna Creek catchment

Catchment Characteristic	Description
Average river flow	Not known
Flow modification	No
Number of fish barriers	0
Presence of EVR species or ecosystems	Not known
Presence of STP point source	No
Presence of other point source	No
Catchment cleared	50%
Estuarine vegetation cleared	0%

Source: EPA – Estuary and Marine HEV profiles

Ollera Creek catchment – EPA initial profile information

Ollera Creek Catchment Land Use



Source: EPA – Estuary and Marine HEV profiles

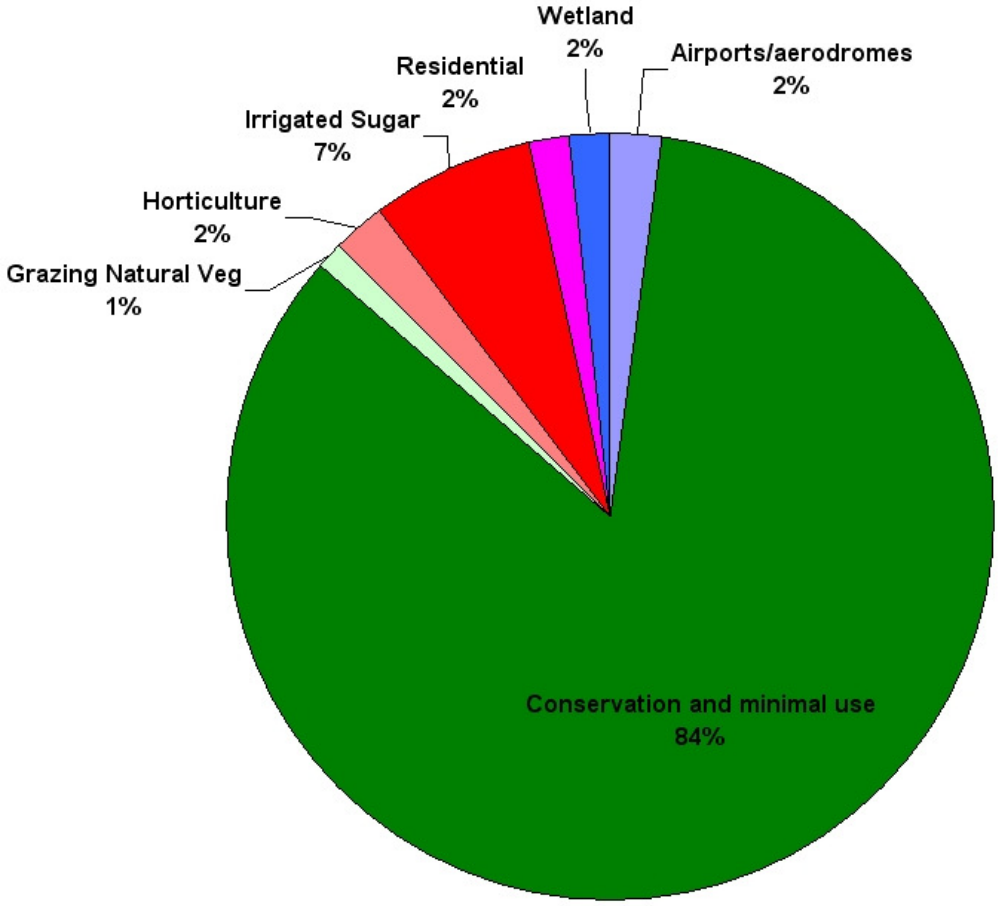
Ollera Creek catchment

Catchment Characteristic	Description
Average river flow	14.847 Gl/Year
Flow modification	No
Number of fish barriers	0
Presence of EVR species or ecosystems	Not known
Presence of STP point source	No
Presence of other point source	No
Catchment cleared	11%
Estuarine vegetation cleared	0%
OzEstuary 2000	
Type	WDD
Bryce Heap	Tidal estuary
Condition	Largely unmodified
Page & Hoolihan 2002	
Naturalness Estuary	High
Naturalness Catchment	Moderate
Habitat Diversity	Moderate
International Significance	High
Level of protection	Low

Source: EPA – Estuary and Marine HEV profiles

Hencamp Creek catchment – EPA initial profile information

Hencamp Creek Catchment Land Use



Source: EPA – Estuary and Marine HEV profiles

Hencamp Creek catchment

Catchment Characteristic	Description
Average river flow	Not known
Flow modification	No
Number of fish barriers	0
Presence of EVR species or ecosystems	1
Presence of STP point source	No
Presence of other point source	No
Catchment cleared	19%
Estuarine vegetation cleared	7%

Hencamp Creek catchment - Water Quality Exposure

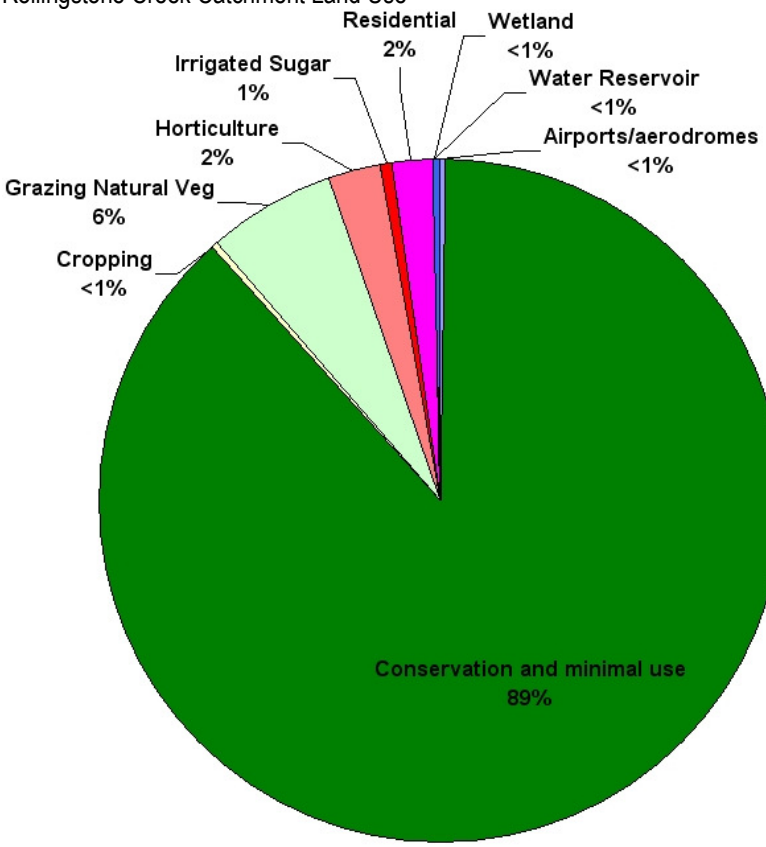
	Sediment	Nitrogen	Phosphorus	Pesticides
Contaminant Exposure Risk	V. Low	V. Low	V. Low	Low
Chronic or Storm	(Storm)	(Storm)	(Storm)	(Storm)

Derived from information in Maughan et al 2008; Bainbridge et al 2007; Liessman et al 2007 Vol. 1 & 2; Lewis et al 2007; Moss et al (unpubl.)

Source: EPA – Estuary and Marine HEV profiles

Rollingstone Creek catchment – EPA initial profile information

Rollingstone Creek Catchment Land Use



Source: EPA – Estuary and Marine HEV profiles

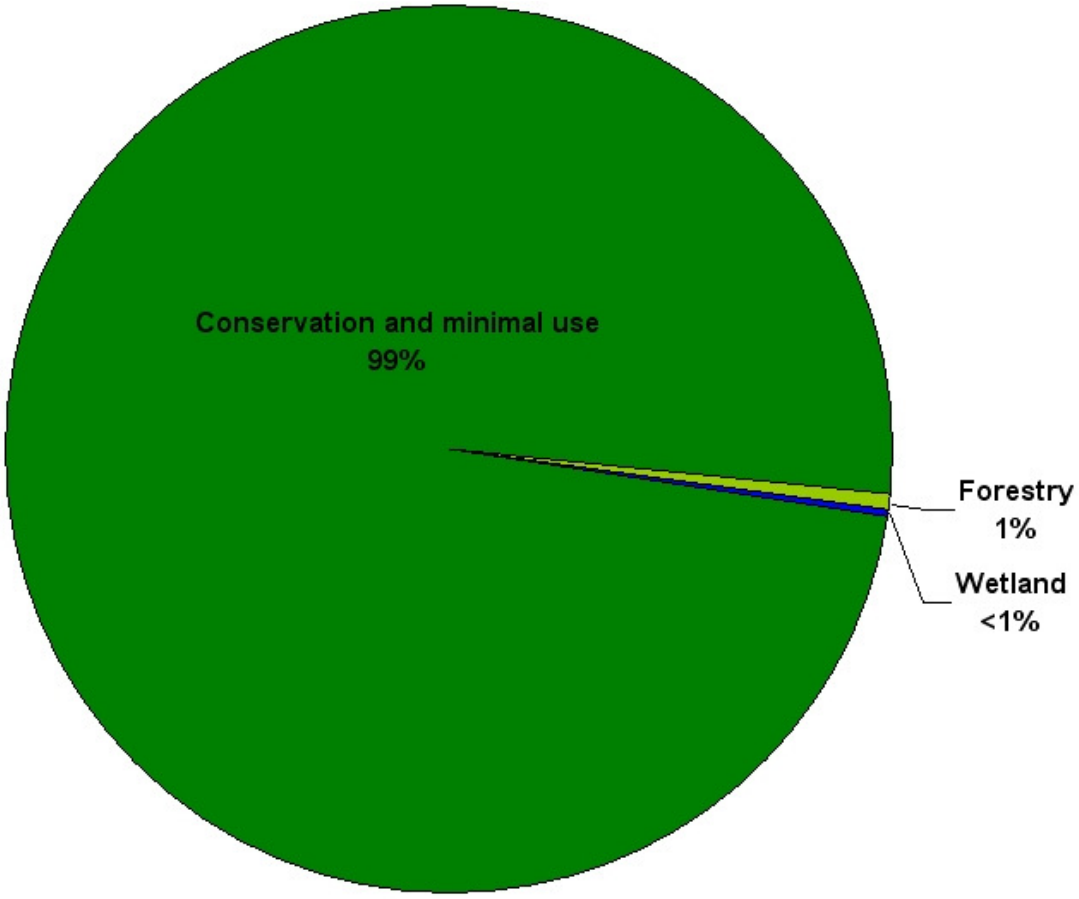
Rollingstone Creek catchment

Catchment Characteristic	Description
Average river flow	35.572 Gl/Year
Flow modification	No
Number of fish barriers	1
Presence of EVR species or ecosystems	7
Presence of STP point source	No
Presence of other point source	No
Catchment cleared	10%
Estuarine vegetation cleared	0%
OzEstuary 2000	
Type	WDD
Bryce Heap	Tidal Estuary
Condition	Largely unmodified
Page & Hoolihan 2002	
Naturalness Estuary	High
Naturalness Catchment	Moderate
Habitat Diversity	Moderate
International Significance	High
Level of protection	Low

Source: EPA – Estuary and Marine HEV profiles

Wild Boar Creek catchment – EPA initial profile information

Wild Boar Creek catchment land Use



Source: EPA – Estuary and Marine HEV profiles

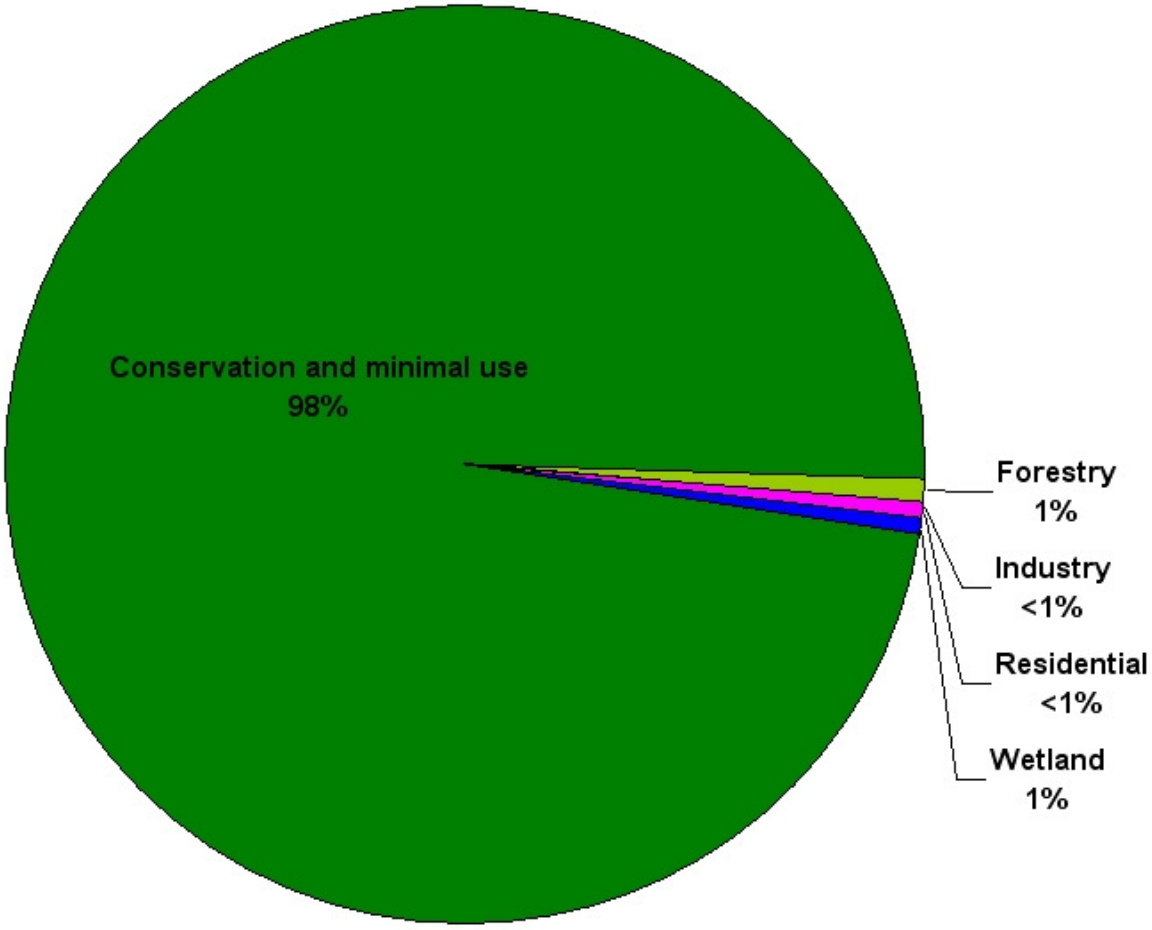
Wild Boar Creek catchment

Catchment Characteristic	Description
Average river flow	Not known
Flow modification	No
Number of fish barriers	0
Presence of EVR species or ecosystems	2
Presence of STP point source	No
Presence of other point source	No
Catchment cleared	3%
Estuarine vegetation cleared	0%

Source: EPA – Estuary and Marine HEV profiles

Saltwater Creek catchment – EPA initial profile information

Saltwater Creek Catchment Land Use



Source: EPA – Estuary and Marine HEV profiles

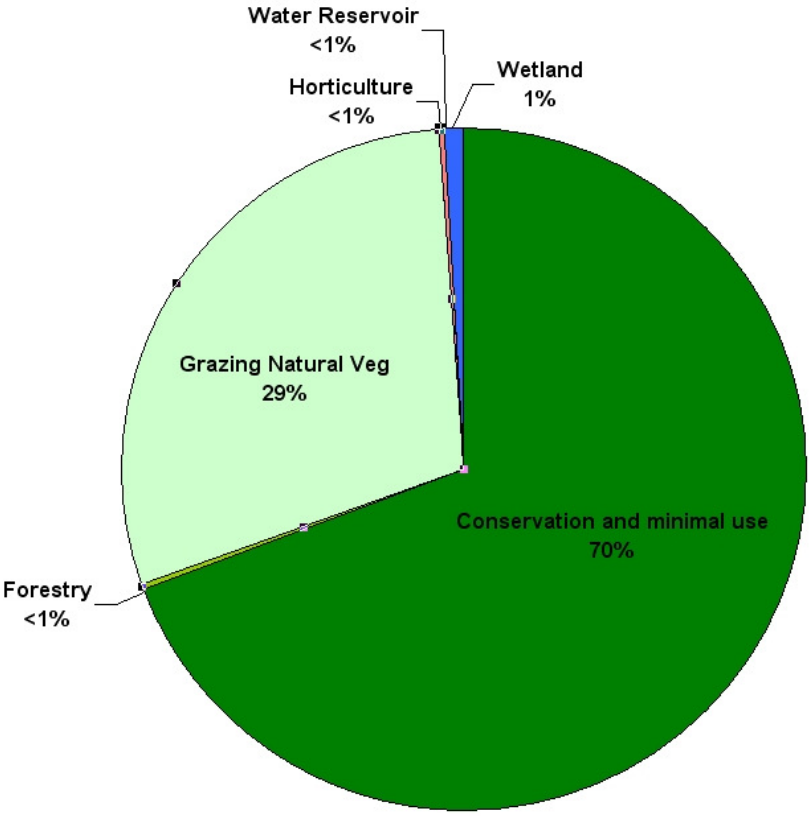
Saltwater Creek catchment

Catchment Characteristic	Description
Average river flow	Not known
Flow modification	No
Number of fish barriers	0
Presence of EVR species or ecosystems	19
Presence of STP point source	No
Presence of other point source	No
Catchment cleared	4%
Estuarine vegetation cleared	4%

Source: EPA – Estuary and Marine HEV profiles

Leichhardt Creek catchment – EPA initial profile information

Leichhardt Creek Catchment Land Use



Source: EPA – Estuary and Marine HEV profiles

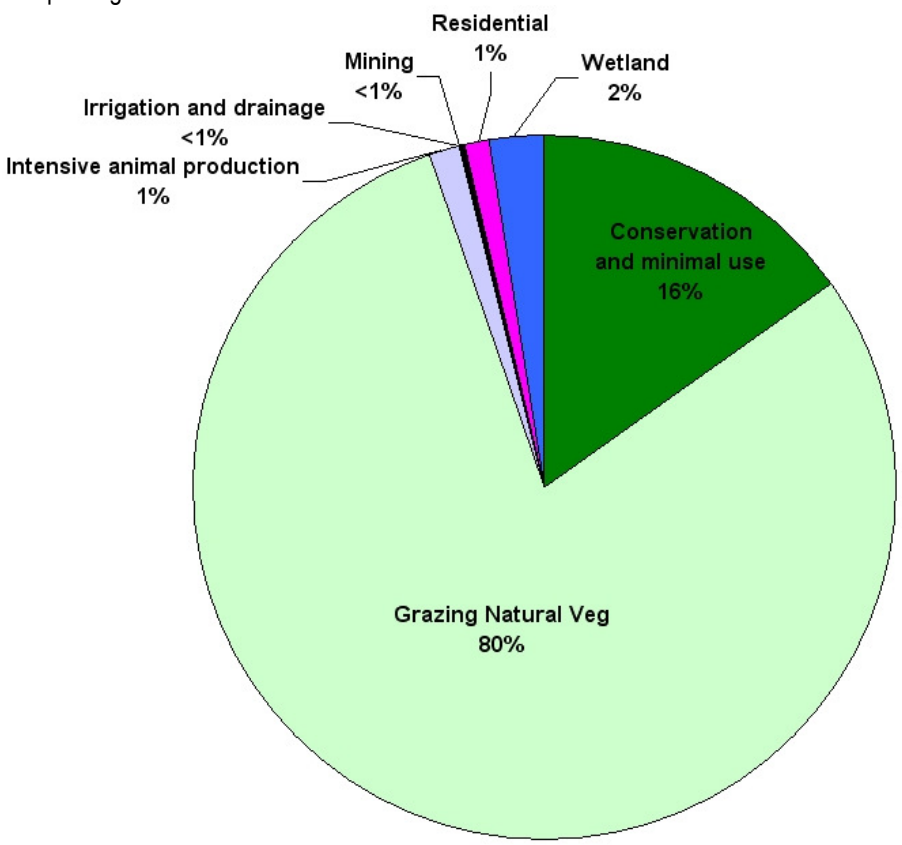
Leichhardt Creek catchment

Catchment Characteristic	Description
Average river flow	25.933 Gl/Year
Flow modification	No
Number of fish barriers	2
Presence of EVR species or ecosystems	10
Presence of STP point source	No
Presence of other point source	No
Catchment cleared	9%
Estuarine vegetation cleared	0%
OzEstuary 2000	
Type	WDD
Bryce Heap	Tidal Estuary
Condition	Near Pristine
Page & Hoolihan 2002	
Naturalness Estuary	High
Naturalness Catchment	Moderate
Habitat Diversity	High
International Significance	High
Level of protection	Low

Source: EPA – Estuary and Marine HEV profiles

Sleeper Log Creek catchment – EPA initial profile information

Sleeper Log Creek Catchment Land Use



Source: EPA – Estuary and Marine HEV profiles

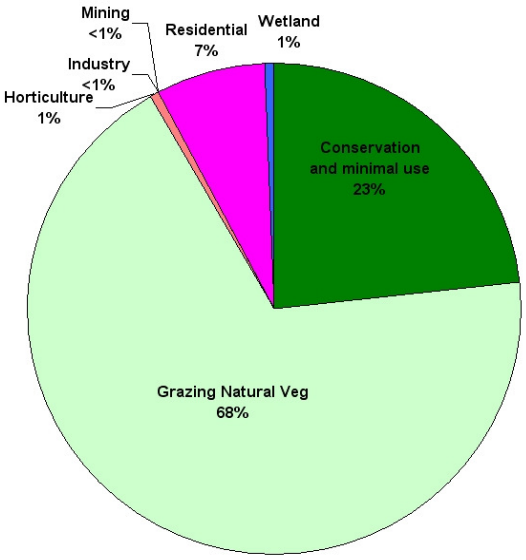
Sleeper Log Creek catchment

Catchment Characteristic	Description
Average river flow	29.473 Gl/Year
Flow modification	No
Number of fish barriers	0
Presence of EVR species or ecosystems	No
Presence of STP point source	No
Presence of other point source	No
Catchment cleared	8%
Estuarine vegetation cleared	6%
OzEstuary 2000	
Type	WDD
Bryce Heap	Tidal Estuary
Condition	Largely unmodified
Page & Hoolihan 2002	
Naturalness Estuary	High
Naturalness Catchment	Moderate
Habitat Diversity	High
International Significance	High
Level of protection	Low

Source: EPA – Estuary and Marine HEV profiles

Bluewater Creek catchment – EPA initial profile information

Bluewater Creek Catchment Land Use



Source: EPA – Estuary and Marine HEV profiles

Bluewater Creek catchment

Catchment Characteristic	Description
Average river flow	72.474 Gl/Year
Flow modification	No
Number of fish barriers	1
Presence of EVR species or ecosystems	No
Presence of STP point source	No
Presence of other point source	No
Catchment cleared	11%
Estuarine vegetation cleared	<1%
OzEstuary 2000	
Type	WDD
Bryce Heap	Tidal Estuary
Condition	Largely unmodified
Page & Hoolihan 2002	
Naturalness Estuary	High
Naturalness Catchment	Moderate
Habitat Diversity	Moderate
International Significance	High
Level of protection	Low

Bluewater Creek catchment - Water Quality Exposure

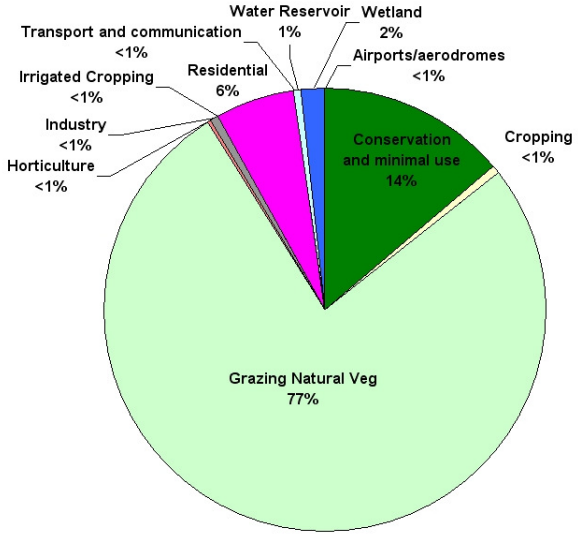
	Sediment	Nitrogen	Phosphorus	Pesticides
Contaminant Exposure Risk	Low	Low	V. Low	Low
Chronic or Storm	(Storm)	(Storm)	(Storm)	(Storm)

Derived from information in Maughan et al 2008; Bainbridge et al 2007; Liessman et al 2007 Vol. 1 & 2; Lewis et al 2007; Moss et al (unpubl.)

Source: EPA – Estuary and Marine HEV profiles

Black River catchment – EPA initial profile information

Black River Catchment Land Use



Source: EPA – Estuary and Marine HEV profiles

Black River catchment

Catchment Characteristic	Description
Average river flow	141.566 Gl/Year
Flow modification	No
Number of fish barriers	0
Presence of EVR species or ecosystems	3
Presence of STP point source	Yes
Presence of other point source	Yes
Catchment cleared	23%
Estuarine vegetation cleared	1%
OzEstuary 2000	
Type	WDD
Bryce Heap	Tidal Estuary
Condition	Modified
Page & Hoolihan 2002	
Naturalness Estuary	Moderate
Naturalness Catchment	Moderate
Habitat Diversity	High
International Significance	High
Level of protection	Low

Note: Groundwater extraction is a significant factor that modify flow. Not enough information to determine impacts.

Black River catchment - Water Quality Exposure

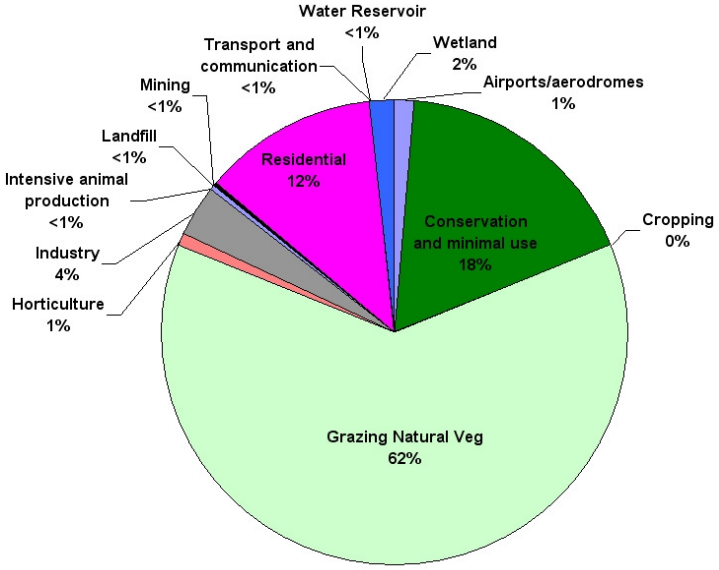
	Sediment	Nitrogen	Phosphorus	Pesticides
Contaminant Exposure Risk	High	Moderate	Moderate/High	V. Low
Chronic or Storm	(Storm)	(Storm/Chronic)	(Storm/Chronic)	(Storm)

Derived from information in Maughan et al 2008; Bainbridge et al 2007; Liessman et al 2007 Vol. 1 & 2; Lewis et al 2007; Moss et al (unpubl.)

Source: EPA – Estuary and Marine HEV profiles

Bohle River catchment – EPA initial profile information

Bohle River Catchment Land Use



Source: EPA – Estuary and Marine HEV profiles

Bohle River catchment

Catchment Characteristic	Description
Average river flow	72.114 Gl/Year
Flow modification	Yes
Number of fish barriers	6
Presence of EVR species or ecosystems	416
Presence of STP point source	Yes
Presence of other point source	Yes
Catchment cleared	34%
Estuarine vegetation cleared	10%
OzEstuary 2000	
Type	TDD
Bryce Heap	Strand plain
Condition	Modified
Page & Hoolihan 2002	
Naturalness Estuary	Moderate
Naturalness Catchment	Low
Habitat Diversity	Moderate
International Significance	High
Level of protection	High

Note: STP discharge supplements stream flow

Bohle River catchment - Water Quality Exposure

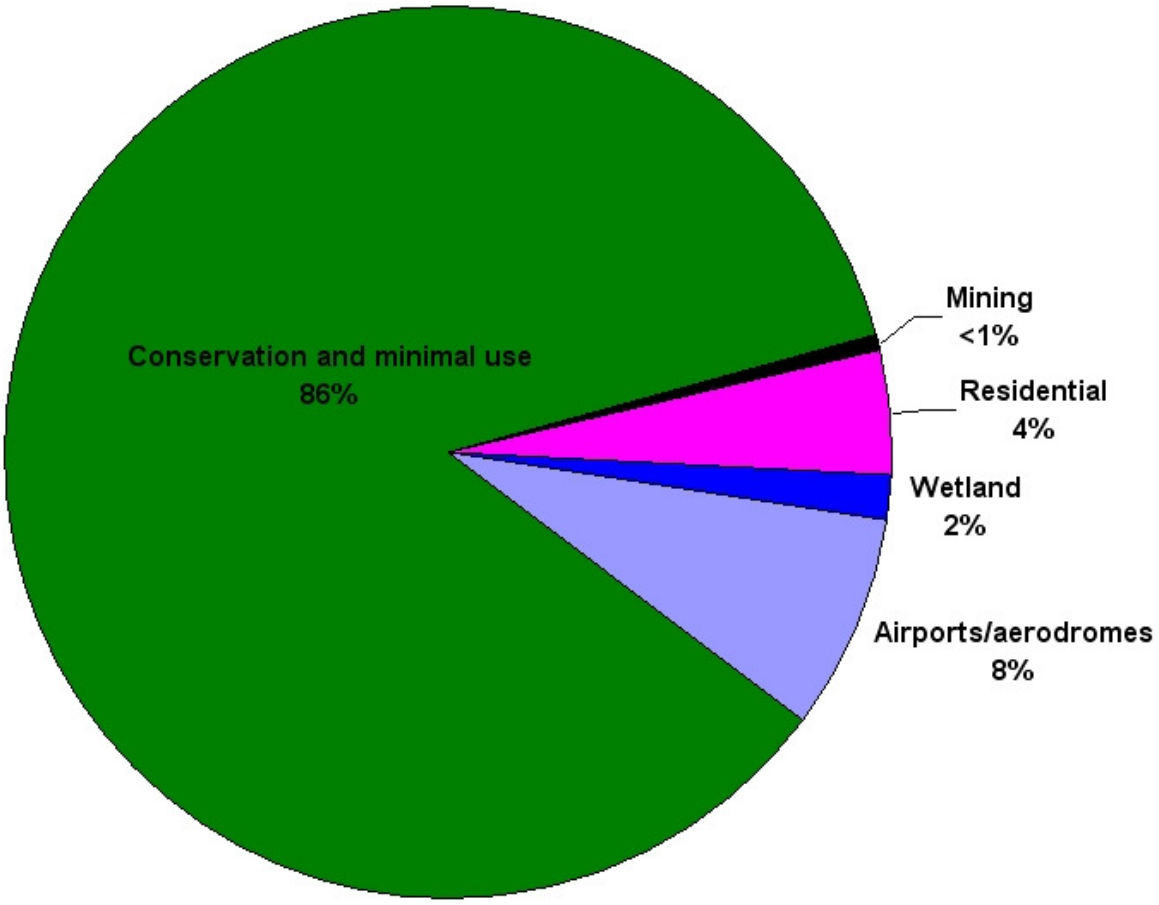
	Sediment	Nitrogen	Phosphorus	Pesticides
Contaminant Exposure Risk	High/V.High	Moderate/High	High/V.High	V. Low
Chronic or Storm	(Storm)	(Storm/Chronic)	(Storm/Chronic)	(Storm)

Derived from information in Maughan et al 2008; Bainbridge et al 2007; Liessman et al 2007 Vol. 1 & 2; Lewis et al 2007; Moss et al (unpubl.)

Source: EPA – Estuary and Marine HEV profiles

Pallarenda catchment – EPA initial profile information

Pallarenda Catchment Land Use



Source: EPA – Estuary and Marine HEV profiles

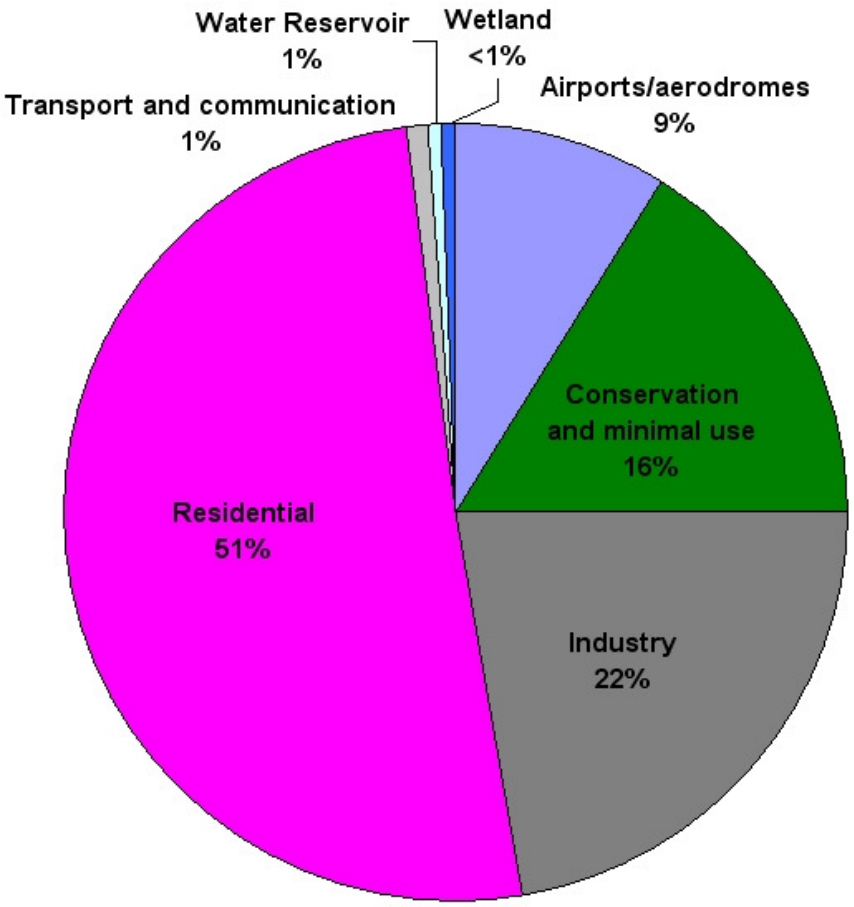
Pallarenda catchment

Catchment Characteristic	Description
Average river flow	
Flow modification	No
Number of fish barriers	0
Presence of EVR species or ecosystems	55
Presence of STP point source	No
Presence of other point source	No
Catchment cleared	30%
Estuarine vegetation cleared	35%

Source: EPA – Estuary and Marine HEV profiles

Ross Creek catchment – EPA initial profile information

Ross Creek Catchment Land Use



Source: EPA – Estuary and Marine HEV profiles

Ross Creek catchment

Catchment Characteristic	Description
Average river flow	
Flow modification	Yes (stormwater network)
Number of fish barriers	1
Presence of EVR species or ecosystems	17
Presence of STP point source	No
Presence of other point source	No (but urban stormwater)
Catchment cleared	92%
Estuarine vegetation cleared	95%

Ross Creek catchment - Water Quality Exposure

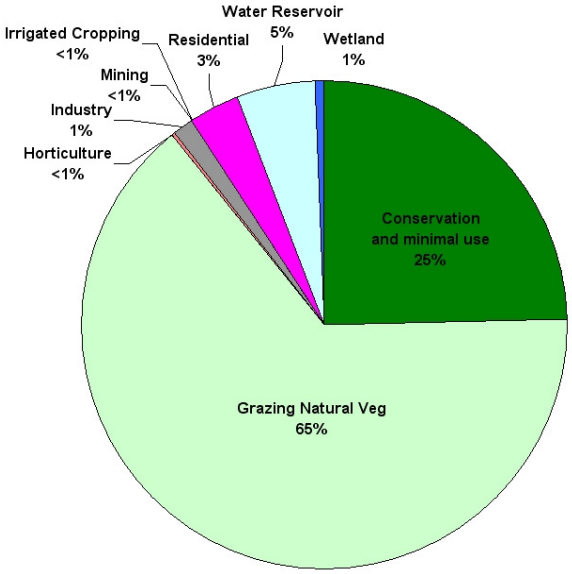
	Sediment	Nitrogen	Phosphorus	Pesticides
Contaminant Exposure Risk	Low	Moderate	V.High	Moderate
Chronic or Storm	(Storm/Chronic)	(Storm/Chronic)	(Storm/Chronic)	(Storm)

Derived from information in Maughan et al 2008; Bainbridge et al 2007; Liessman et al 2007 Vol. 1 & 2; Lewis et al 2007; Moss et al (unpubl.)

Source: EPA – Estuary and Marine HEV profiles

Lower Ross River catchment – EPA initial profile information

Lower Ross River Catchment Land Use



Source: EPA – Estuary and Marine HEV profiles

Lower Ross River catchment

Catchment Characteristic	Description
Average river flow	307.927 Gl/Year
Flow modification	Yes (Ross Dam and Weirs)
Number of fish barriers	19
Presence of EVR species or ecosystems	253
Presence of STP point source	No
Presence of other point source	No (but urban stormwater)
Catchment cleared	18%
Estuarine vegetation cleared	30%
OzEstuary 2000	
Type	TFC
Bryce Heap	Tidal Flat
Condition	Modified
Page & Hoolihan 2002	
Naturalness Estuary	Low
Naturalness Catchment	Low
Habitat Diversity	Moderate
International Significance	High
Level of protection	Low

Lower Ross River catchment - Water Quality Exposure

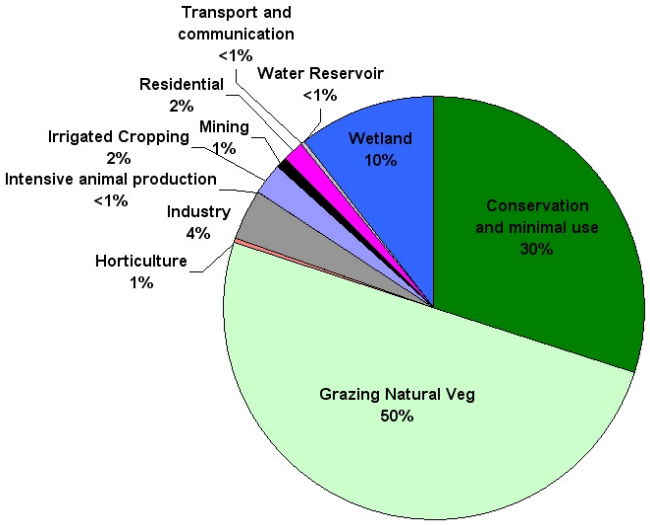
	Sediment	Nitrogen	Phosphorus	Pesticides
Contaminant Exposure Risk	Moderate/High	Low/Moderate	Low/Moderate	Low
Chronic or Storm	(Storm)	(Storm)	(Storm)	(Storm)

Derived from information in Maughan et al 2008; Bainbridge et al 2007; Liessman et al 2007 Vol. 1 & 2; Lewis et al 2007; Moss et al (unpubl.)

Source: EPA – Estuary and Marine HEV profiles

Stuart Creek catchment – EPA initial profile information

Stuart Creek Catchment Land Use



Source: EPA – Estuary and Marine HEV profiles

Stuart Creek catchment

Catchment Characteristic	Description
Average river flow	60.557 Gl/Year
Flow modification	No
Number of fish barriers	1
Presence of EVR species or ecosystems	42
Presence of STP point source	Yes
Presence of other point source	No (but urban stormwater)
Catchment cleared	23%
Estuarine vegetation cleared	5%
OzEstuary 2000	
Type	TFC
Bryce Heap	Tidal Flat
Condition	Modified
Page & Hoolihan 2002	
Naturalness Estuary	Moderate
Naturalness Catchment	Low
Habitat Diversity	Moderate
International Significance	High
Level of protection	Low

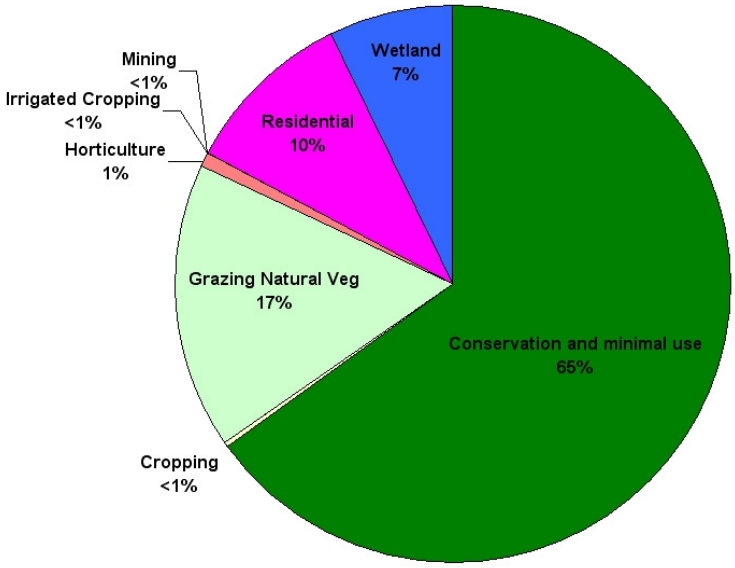
Stuart Creek catchment - Water Quality Exposure

	Sediment	Nitrogen	Phosphorus	Pesticides
Contaminant Exposure Risk	High	Moderate	High	Low
Chronic or Storm	(Storm)	(Storm)	(Storm)	(Storm)

Derived from information in Maughan et al 2008; Bainbridge et al 2007; Liessman et al 2007 Vol. 1 & 2; Lewis et al 2007; Moss et al (unpubl.)

Source: EPA – Estuary and Marine HEV profiles

Alligator Creek catchment – EPA initial profile information



Source: EPA – Estuary and Marine HEV profiles

Alligator Creek catchment

Catchment Characteristic	Description
Average river flow	
Flow modification	No
Number of fish barriers	8
Presence of EVR species or ecosystems	15
Presence of STP point source	No
Presence of other point source	No
Catchment cleared	14%
Estuarine vegetation cleared	1%
OzEstuary 2000	
Type	TDD
Bryce Heap	Strand plain
Condition	Largely unmodified
Page & Hoolihan 2002	
Naturalness Estuary	High
Naturalness Catchment	Low
Habitat Diversity	Moderate
International Significance	Very High
Level of protection	Moderate

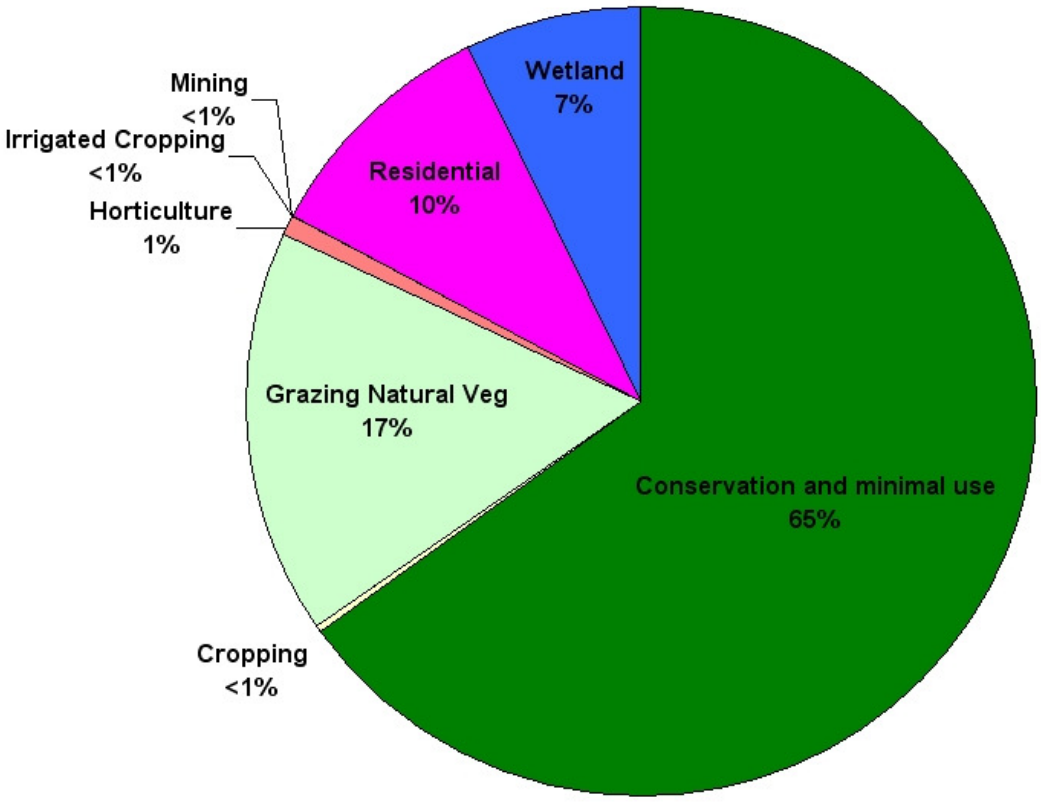
Alligator Creek catchment - Water Quality Exposure

	Sediment	Nitrogen	Phosphorus	Pesticides
Contaminant Exposure Risk	Low	Low	Low/Moderate	Low
Chronic or Storm	(Storm)	(Storm)	(Storm)	(Storm)

Derived from information in Maughan et al 2008; Bainbridge et al 2007; Liessman et al 2007 Vol. 1 & 2; Lewis et al 2007; Moss et al (unpubl.)

Source: EPA – Estuary and Marine HEV profiles

Crocodile Creek catchment – EPA initial profile information



Source: EPA – Estuary and Marine HEV profiles

Crocodile Creek catchment

Catchment Characteristic	Description
Average river flow	
Flow modification	No
Number of fish barriers	8
Presence of EVR species or ecosystems	15
Presence of STP point source	No
Presence of other point source	No
Catchment cleared	14%
Estuarine vegetation cleared	1%
OzEstuary 2000	
Type	TDD
Bryce Heap	Strand plain
Condition	Near Pristine
Page & Hoolihan 2002	
Naturalness Estuary	V. High
Naturalness Catchment	Low
Habitat Diversity	Moderate
International Significance	V. High
Level of protection	Moderate

Crocodile Creek catchment - Water Quality Exposure

	Sediment	Nitrogen	Phosphorus	Pesticides
Contaminant Exposure Risk	Low	Low	Low/Moderate	Low
Chronic or Storm	(Storm)	(Storm)	(Storm)	(Storm)

Derived from information in Maughan et al 2008; Bainbridge et al 2007; Liessman et al 2007 Vol. 1 & 2; Lewis et al 2007; Moss et al (unpubl.)

Source: EPA – Estuary and Marine HEV profiles

Cape Cleveland catchment – EPA initial profile information

Catchment Characteristic	Description
Average river flow	
Flow modification	No
Number of fish barriers	0
Presence of EVR species or ecosystems	No
Presence of STP point source	No
Presence of other point source	No
Catchment cleared	0%
Estuarine vegetation cleared	0%

Source: EPA – Estuary and Marine HEV profiles