



# Mackay Whitsunday Healthy Waterways

## Ambient Monitoring Program Regional Report 2008



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## The ambient monitoring component of the Integrated Monitoring Program

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## EXECUTIVE SUMMARY

The Mackay Whitsunday Ambient Monitoring Program is funded by the Natural Heritage Trust and is a component of the Mackay Whitsunday Natural Resource Management Groups (MWNRM) *Healthy Waterways Program*. The initiative seeks to monitor water quality from a multitude of freshwater rivers, streams and creeks that are affected by the characterising land use classifications within the region. This Ambient Monitoring Program acts as an informant to the Water Quality Improvement Plan (WQIP) by aiding in the establishment of goals, objectives and targets for ambient physico-chemical parameters in order to establish a current condition status of aquatic ecosystem health within the region.

The Ambient Monitoring Program is a cooperative program between federal, state and local governments, as well as volunteers within the local community. Volunteers are the driving force behind the success of this program and have been effectively monitoring water quality in the Mackay Whitsunday Region since 2003. They provide countless hours of time and dedication in order to undertake this sampling. Variables monitored include, electrical conductivity, pH, dissolved oxygen, water temperature, air temperature, clarity and filterable reactive phosphorus. This is undertaken on a monthly basis. Volunteers are well trained in all elements of Workplace Health and Safety as well as quality assurance (QA) and quality control (QC) by their individual catchment coordinators (Whitsunday, Pioneer and Sarina).

This report provides an overview of the ambient physico-chemical parameters which were sampled from various freshwater rivers, streams and creeks in the Mackay Whitsunday region.

The main objectives of the Healthy Waterways Ambient Monitoring Program are to:

- Maintain a safe, high quality, volunteer-driven water quality sampling program.
- Develop a monthly, ambient water quality data set from a suite of parameters based on different land use types reflective of the surrounding environment.
- Inform the WQIP by aiding in the establishment of goals, objectives and targets for ambient physico-chemical parameters to provide a current condition status of aquatic ecosystem health.
- Aid in the establishment of a localised set of water quality guidelines pertaining to the Mackay Whitsunday region, therefore being more precise than existing national or state guidelines.

Site selection was based on a variety of factors including stream order or “ecological value”, land use type and proximity to stream-flow gauging stations. The dominant land use types in the region include intensive cropping (primarily sugar cane farming), bushland (national park reference sites), cattle grazing, industrial uses, urban use and various mixtures of these. Direct correlations have been established between land use, water quality and the overall health of the in-stream aquatic environment.

All water quality parameters were analysed for minimum, maximum as well as 20<sup>th</sup>, 50<sup>th</sup> and 80<sup>th</sup> percentile values. This was done to allow comparison of the region's waterways with the Central Queensland values in the Queensland Water Quality Guidelines (QWQG).

The findings in 2008 mimic similar trends to those obtained from 2003 to 2007. These include:

- Relatively uniform water temperatures across the majority of sites and land uses. This indicates that water temperature is primarily governed by the physical structure of the waterway (water depth, stream width and riparian shading etc.) rather than surrounding land use practice.
- Low dissolved oxygen (DO) concentrations were prevalent for the vast majority of sites, with DO concentrations outside Central Queensland Water Quality Guidelines on 50% of occasions. Through these results, it is evident that the Mackay Whitsunday region exhibits behaviour of a hypoxic nature.
- Electrical conductivity (EC) varied among sites with high readings from various sites caused by groundwater influence or catchment geology.
- pH values were within the Central Queensland water quality guideline range on 50% of occasions at each site.
- Filterable reactive phosphorus (FRP) levels were higher in urban catchments, cane / urban catchments or areas where point source pollution was an influence.
- Water clarity was consistently good across all land use types where substantial groundcover was prevalent. This is attributed to the widespread adoption of "Best Management Practices" such as green cane trash blanketing on a paddock scale. Sites exhibiting higher clarity at various times were attributed to localised rainfall events.

# 1 INTRODUCTION

This regional water quality report was commissioned by the Mackay Whitsunday Natural Resource Management Group (MWNRM) as part of the Healthy Waterways program. The MWNRM Group is one of fifteen Natural Resource Management groups in Queensland who are delivering on components of the Reef Plan. They are funded by the Natural Heritage Trust.

The MWNRM Group have produced a Natural Resource Management Plan which aims to protect and restore natural and cultural assets. Through a bi-lateral agreement with the Natural Heritage Trust, the following objectives have been established: (MWNRM 2005)

- Biodiversity conservation – *“The conservation of Australia’s biodiversity by the protection and restoration of terrestrial, freshwater, estuarine and marine ecosystems and habitat for native plants and animals”*
- Sustainable use of natural resources – *“The sustainable use and management of Australia’s land, water and marine resources to maintain and improve the productivity and profitability of resource based industries”*

These plan objectives emphasized the critical need for the Mackay Whitsunday Healthy Waterways program as a long term integrated monitoring regime aimed at determining the effectiveness of on-ground actions and the success of achieving water quality goals, objectives and targets for each major catchment.

A feature of this program is the emphasis on community involvement. A growing contingent of over 70 dedicated volunteers (past and present) have been gathering quality-assured water quality data from 45 sites in the Mackay Whitsunday region since 2003. These sites are distributed throughout the Whitsunday, Pioneer and Plane (Sarina) catchment areas and encompass the primary land use types in these areas.

Previous studies have illustrated that water quality and the ecology of water bodies are greatly influenced by surrounding land use practices (Brodie 2004). The primary land uses dominating the Mackay Whitsunday region consist of bushland, sugarcane, grazing, urban and industrial. By June 2006, the data collected was deemed sufficient for the first statistical analysis to be undertaken. The 2008 data complements previous data and reports.

The continuation of this regional water quality monitoring is essential for a number of reasons:

- It is a way of assessing the ambient health of the waterways
- It bridges information gaps between land use practices and the health of the aquatic environment
- It is an essential tool for making important environmental decisions
- It promotes community partnerships with people - working together to achieve a common goal

This report outlines the results and main findings of the ambient community volunteer component of the *Mackay Whitsunday Healthy Waterways Integrated Monitoring Program*. Other components, reported separately, include the baseline water quality monitoring program (Galea *et al.* 2008b), event-based water quality monitoring program (Rohde *et al.* 2008) and plot-scale monitoring of cane management practices (Masters *et al.* 2008). These reports are supporting documents for the Mackay Whitsunday region's water quality improvement plan (Drewry *et al.* 2008).

Funding for the Mackay Whitsunday Healthy Waterways Ambient Monitoring Program is provided by the Mackay Whitsunday Natural Resource Management Group. They are funded by the Natural Heritage Trust. Catchment project officers implement the program within the volunteer network and provide support to the NRW project officer (Figure 1).



Figure 1 Mackay Whitsunday Healthy Waterways Integrated Monitoring Program Organisational Flow Chart



## 2 REGIONAL DESCRIPTION

The Mackay Whitsunday Natural Resource Management region occupies approximately 9000 km<sup>2</sup> of Central Queensland coastline. The region stretches for 300 kilometres along the coast and is 80 kilometres wide at its widest point (Pioneer catchment) (Rohde *et al.* 2006). It encompasses the popular tourist areas of Finch Hatton Gorge and Eungella National Park

The Pioneer, O'Connell / Andromache and Proserpine are the major rivers in the region. These rivers, along with a number of smaller streams, discharge directly into the Great Barrier Reef lagoon. The region displays an abundance of natural assets which includes extensive wetlands, riparian areas, national parks, waterfalls and dynamic mangrove and seagrass ecosystems (Rohde *et al.* 2006).

The Proserpine, O'Connell, Pioneer and Plane basins (Figure 2 left) which make up the region and are identified as 4 of the top 10 high-risk basins illustrated in the Reef Water Quality Protection Plan (The State of Queensland and Commonwealth of Australia 2003). The Reef Plan aims to address the decline in water quality entering the Great Barrier Reef World Heritage Area by addressing diffuse pollution from broad scale land use, particularly nutrients and sediments (The State of Queensland and Commonwealth of Australia 2003).

The Mackay Whitsunday region is one of the most intensively developed agricultural areas in Queensland. The region is the centre of extensive agricultural development (primarily sugar cane farming), with numerous small townships and communities associated with sugar production based out of Mackay and Proserpine. Widespread cattle grazing contributes to the region, occupying the fringes of the sugar cane farming areas. Cooler temperatures and higher than average rainfall have ensured that rainforest and Notophyll vine forests have colonised the Clarke, Conway and Connors ranges (Figure 2 right).

Temperatures within the region bare resemblance of a subtropical coastal zone with extensive durations or warm temperatures before, during and after the wet season and short periods of cool weather during the middle of June, July and August. Temperatures range from a mean overnight low of 23°C to a mean maximum of 30°C in January to a mean overnight low of 13°C to a mean maximum of 21°C in July.

Streamflow within the region is variable, depending on climatic conditions. As a general trend, flows peak during the wet season (December – April) and then reside to low or no flow during the dry season (May – November). Within the region, the Pioneer and O'Connell Rivers display the highest mean annual discharges (900,000ML and 200,000ML respectively) (Arthington *et al.* 2001).

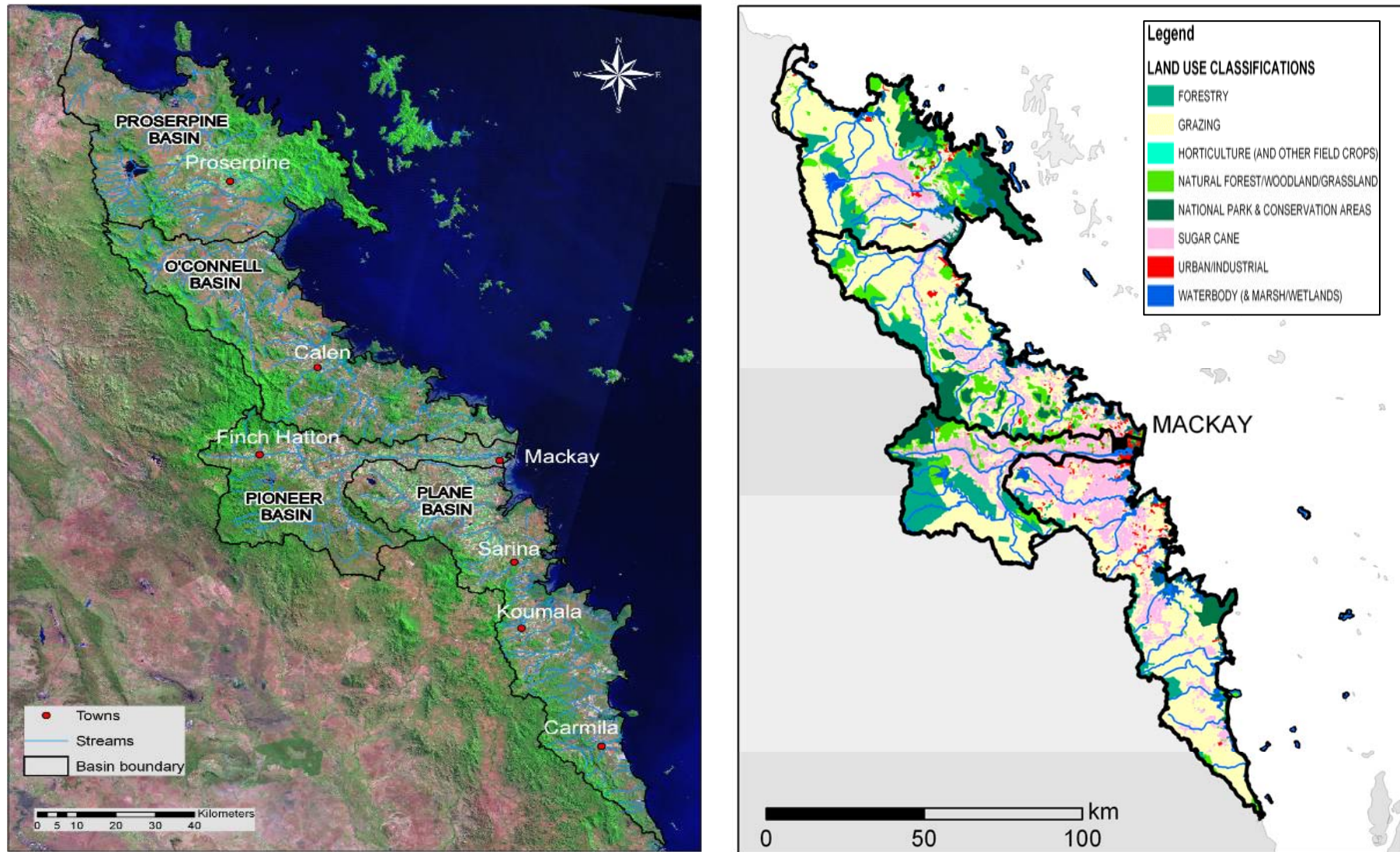


Figure 2 Mackay Whitsunday region showing the major catchments (left) and land uses (right)

## 2.1 Whitsunday Catchment (Proserpine and O’Connell Basins)

The Australian Water Resource Council (AWRC) issued the Proserpine basin “number 122” and O’Connell basin “number 124” in the hydrological basin network. These 2 basins are situated within the Whitsunday catchment (Figure 3). Sugarcane farming and cattle grazing are the major land use types in these basins. This catchment includes the townships of Proserpine, Cannonvale and Airlie Beach (Brodie *et al.* 2004).

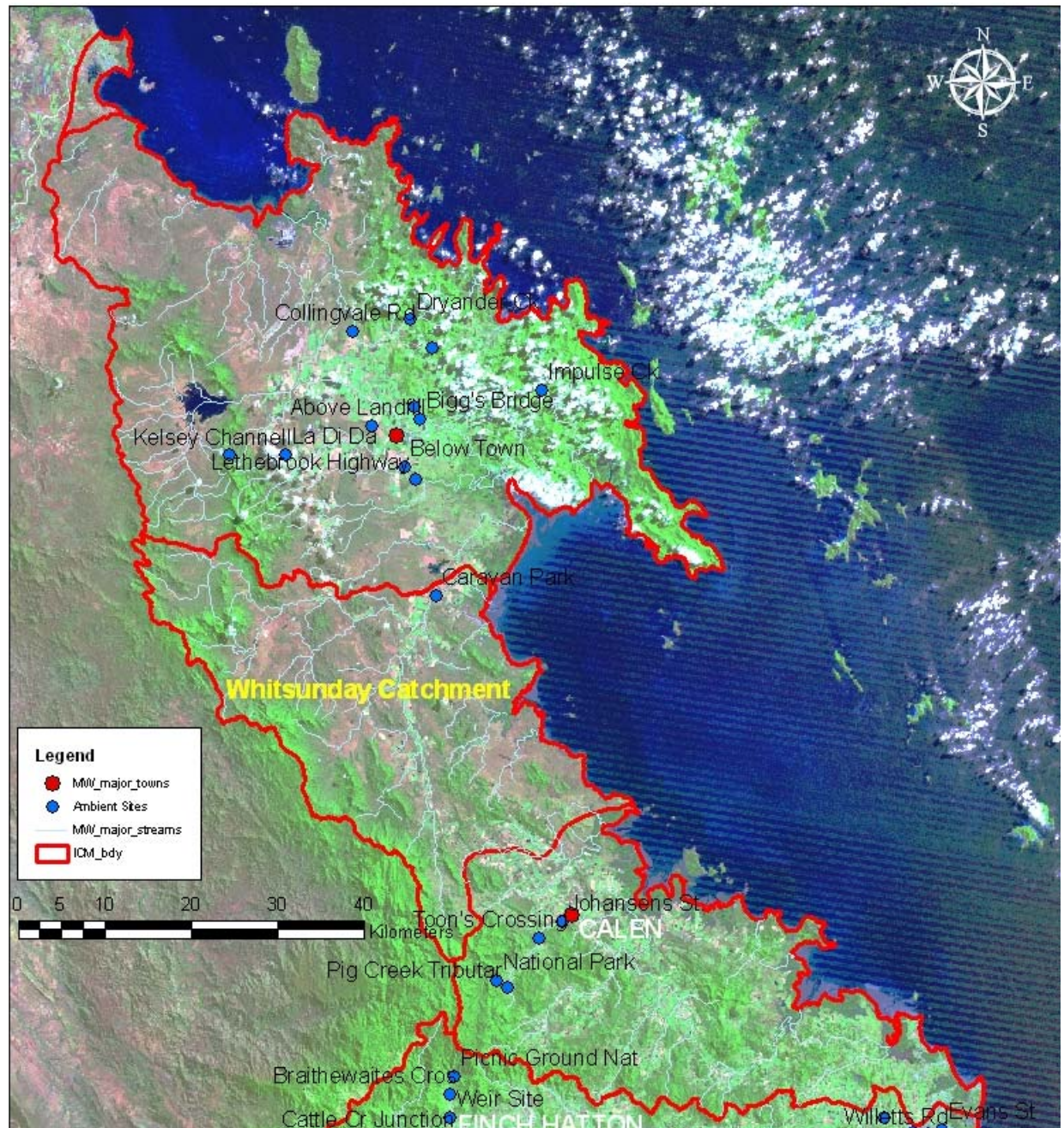


Figure 3 Healthy Waterways Ambient Monitoring Sites – Whitsunday Catchment

## 2.2 Pioneer Catchment

The Pioneer catchment (AWRC Basin 125) is 120 km in length and has a catchment area of 1550 km<sup>2</sup> (Figure 4). The Pioneer River is highly regulated, supplying water for extensive sugarcane farming throughout the Pioneer valley. Cattle grazing is also prevalent in the middle and lower reaches.

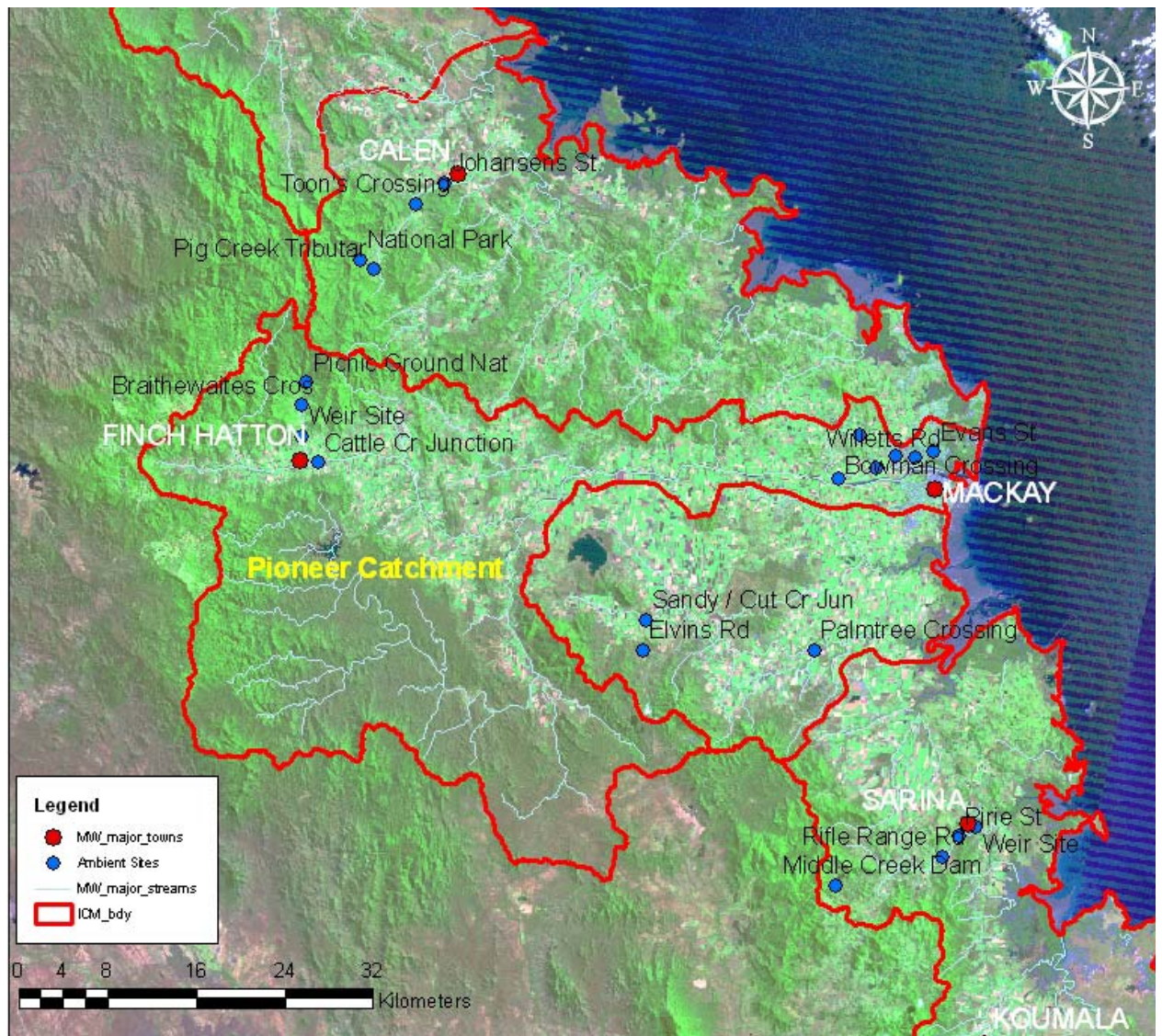


Figure 4 Healthy Waterways Ambient Monitoring Sites – Pioneer Catchment

### 2.3 Plane Catchment

The Plane Catchment (Figure 5) (AWRC Basin 126) is bordered by Sandy Creek in the north, Clairview in the south and by the Connors Range in the west. Sugarcane dominates the northern part of the basin whereas cattle grazing dominates the southern part.



Figure 5 Healthy Waterways Ambient Monitoring Sites – Plane Creek Catchment

