



DEPARTMENT *of*  
PRIMARY INDUSTRY  
*and* FISHERIES

Tasmania

**State of River Report on  
Mersey River Catchment Health**

**AUSRIVAS Model for the Mersey  
Catchment**

David Oldmeadow,  
River Health Officer  
Water Resource Assessment Unit  
DPIF.

Report Series WRA 97/03  
July, 1997.

# Executive Summary

The biological monitoring package, AusRivAS, was used to develop a broad scale picture of the health of the Mersey catchment. Nineteen sites were selected within the catchment, five on the mainstream Mersey River, three on the Dasher River, two each on the Minnow River, Redwater Creek and Lobster Rivulet, and one each on smaller tributaries downstream from Parangana Dam.

Key findings from the survey:

- The majority of the Mersey River appears to be in reasonable health. The macroinvertebrate community in lower the reaches indicates a slight impact, most likely a result of water quality, and just below Parangana Dam there is evidence that the river is slightly impaired, a result of flow and habitat alterations caused by the dam.
- There is a general loss of taxa sensitive to water pollution down the length of the Mersey River.
- Tributaries in the lower catchment are of a major concern. Kings and Parramatta Creeks were identified to be severely impaired and Bonneys Creek was identified to be impaired. Both water quality and habitat alterations are more than likely the primary causes. Other tributaries of concern include the lower Dasher River and Coilers Creek.
- Habitat alteration is a potential cause of macroinvertebrate degradation on the Dasher River at Paradise Road, upper Minnow River in the pine plantation and the upper Lobster Rivulet off Parsons Road.
- Tributaries in the upper catchment around the Mole Creek - Chudliegh area are in reasonable health.
- Water quality, habitat degradation from both forestry and agricultural practices, and Parangana Dam are impacts that effect the health of rivers and streams within the Mersey catchment.

# Table of Contents

## 1. Introduction

## 2. Assessing the Health of River Sites using AusRivAS

Table 1. River Health Categories and Associated OE Scores

Table 2. OE score and category for Mersey River catchment sites

Figure 1. Plot of Observed / Expected Taxa (OE) and OESIGNAL

Figure 2. Location of Sites within the Mersey catchment

## 3. Discussion

Mersey River

Dasher River

Minnow River

Tributaries of the Mole Creek/Chudleigh area

Tributaries of the Lower Mersey

## 4. Summary

## 5. References

# CATCHMENT HEALTH - MERSEY RIVER

## 1. Introduction

This study was conducted in conjunction with a major catchment survey of the Mersey River and its tributaries. The study was developed with a protocol to analyse river health through monitoring macroinvertebrate assemblages. Through the use of AUSRIVAS model packages and the availability of an invertebrate scoring index (SIGNAL) it is possible to develop a broad scale picture of catchment health using aquatic fauna.

Biological monitoring provides a unique perspective in the assessment of the condition of a stream or river. Macroinvertebrates form the basis of most biological monitoring of freshwater eco-systems as they respond readily to stress placed on the environment, whether it be in the form of habitat degradation, water quality or water quantity.

Currently no published information on aquatic macroinvertebrates exists on the Mersey or any of its tributaries. The Department of Primary Industry and Fisheries conducted a survey and analysis of river health within the catchment during spring 1996. Nineteen sites were selected for the study. Five sites were located on the mainstream Mersey River, three on the Dasher River, two each on the Minnow River, Redwater Creek and Lobster Rivulet, and one on Kings Creek, Bonnys Creek, Parramatta Creek, Caroline Creek, Mole Creek, Sassafras Creek and Coilers Creek.

## 2. Assessing the Health of River Sites using AusRivAS.

To assess the health of sites in the Mersey catchment an AusRivAS model produced from the Monitoring Riverine Health Initiative (MRHI) was used. This model compares the observed taxonomic composition of the macroinvertebrate community at a site with the expected composition if the site were unimpacted. Each site is classified into four categories based on the ratio of the macroinvertebrates 'Observed' to the macroinvertebrates 'Expected' (or OE). Table 1 shows the categories used and the OE ratio scores at each cut off.

**Table 1.** River Health Categories and Associated OE Scores.

<b>Site Status</b>	<b>OE</b>
Unimpaired	>0.89
Slightly impaired	0.70 - 0.89
Impaired	0.41 - 0.69
Severely impaired	<0.41

The OE ratio essentially equates to the percentage of taxa sampled from a site. As can be seen, a site with less than 41 percent of the taxa that is expected to be present is considered to be severely impaired. This approach allows both the presence and magnitude of an impact to be determined.

A biotic index (SIGNAL, Stream Invertebrate Grade Number Average Level, Chessman, 1995) is incorporated into the model output in the form of a ratio of the observed SIGNAL score (or that sampled) to the expected SIGNAL score. The index is based on the sensitivity of macroinvertebrates to common types of pollutants. Each Family is assigned a grade according to their tolerance, where the 'observed' SIGNAL score is the sum of the grades divided by number of taxa collected and the 'expected' score is the sum the grades divided by the number of taxa expected. The biotic index is sensitive to water quality and combined with the OE ratio provides an insight into the nature of the disturbance or impact. Table 2 illustrates the breakdown of OE scores for all catchment sites with their associated category classification.

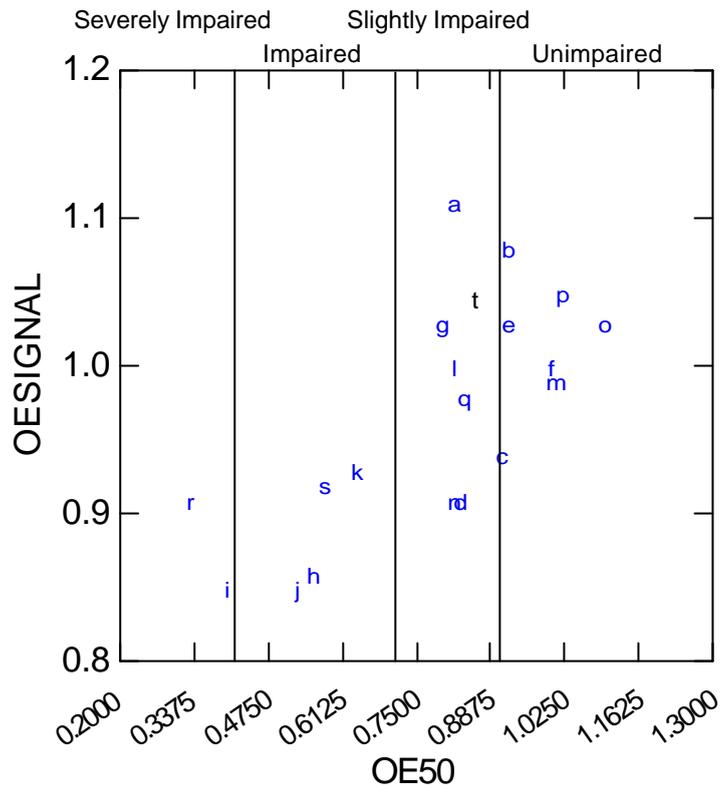
**Table 2.** OE score and category for Mersey River catchment sites.

<b>Site</b>	<b>OE Score</b>	<b>Category</b>
Coilers Creek / Rail Crossing	0.56	<b>C</b>
Parramatta Creek / Upstr Mersey	0.40	<b>D</b>
Dasher River / upstr Mersey	0.53	<b>C</b>
Dasher River / Paradise Rd	0.64	<b>C</b>
Dasher River / Upstr Gowrie Park	0.92	<b>A</b>
Lobster / Parsons Rd	0.82	<b>B</b>
Lobster Rivulet / Chudleigh	0.82	<b>B</b>
Mole Creek / Den Rd	1.01	<b>A</b>
Redwater Creek / Pine Plantation	1.00	<b>A</b>
Redwater Creek / Native Plains Rd	0.82	<b>B</b>
Caroline Creek / Railton Rd	1.10	<b>A</b>
Minnow / upstr of Dasher	1.02	<b>A</b>
Minnow River / Upstr of Lower Beulah	0.80	<b>B</b>
Sassafras Creek / Howes Rd	0.84	<b>B</b>
Kings Creek / Latrobe	0.33	<b>D</b>
Bonneys Creek / Shale Rd	0.58	<b>C</b>
Mersey River / Dwnstr Parangana	0.85	<b>B</b>
Mersey River / Dogs Head Hill	0.92	<b>A</b>
Mersey River / Dynans Bridge	0.91	<b>A</b>
Mersey River / Kimberley	N/A	<b>N/A</b>
Mersey River / Lovetts Flats	0.83	<b>B</b>

Category	A - Unimpaired
	B - Slightly impaired
	C - Impaired
	D - Severely impaired

Figure 1 is a plot of the OE scores against the ratio of the SIGNAL scores (OESIGNAL). OESIGNAL emphasises the effects of water quality on the fauna whereas OE generally reflects a wide variety of impacts including habitat degradation as well as reduced water quality.



**Figure 1.** Plot of OE and OESIGNAL showing the position of each site.

### Mersey River - Catchment Health Sites

- a - Lobster Rt / Parsons Rd
- b - Mersey R / Dogs Head hill
- c - Mersey R / Dynans Bridge
- d - Mersey R / Lovetts Flats
- e - Dasher R / upstream of Gowrie Park
- f - Redwater Ck / off Sheffield Rd
- g - Minnow R / upstream of Lower Beulah
- h - Coilers Ck
- i - Parramatta Ck
- j - Dasher R / upstream of Mersey confluence
- k - Dasher R / Paradise Rd.
- l - Lobster Rt / Chudliegh
- m - Mole Ck / Den Rd
- n - Redwater Ck / Native Plains Rd.
- o - Caroline Ck / Railton Rd.
- p - Minnow R / upstream of Dasher confluence
- q - Sassafras Ck
- r - Kings Ck
- s - Bonnys Ck
- t - Mersey R / downstream of Paragana

### **3. Discussion**

This discussion considers the implications of the results in relation to the mainstream Mersey River and the tributaries (see Figure 2).

#### **Mersey River**

The Mersey below Parangana dam is relatively unimpaired. Of the five sites sampled on the river, only four were used in the assessment since the fifth was outside the experience of the model. All sites assessed had faunal assemblages indicative of either unimpaired or slightly impaired rivers. From Dogs Head Hill (above Union Bridge) downstream there is a slight reduction in O/E scores culminating in the lowest score at Lovetts Flats which is rated as slightly impaired (Table 2). The main trend is the large reduction in OESIGNAL along the length of the river which is represented in the plot between this and the O/E score, shown in Figure 1. This suggests a loss of taxa that are sensitive to pollutants as you go down the catchment, perhaps indicating that the lower Mersey at Lovetts Flats is slightly stressed because of water quality problems rather than habitat degradation. Indeed, the overall physical form (see Index of Stream Condition) at Lovetts Flats is similar to sites upstream at Dynans Bridge, Kelleys Bridge and above Lake Rowallan.

The site immediately below Parangana is rated as slightly impaired. The fauna at this site indicates a possible stress on the environment, similar to that at Lovetts Flats. However, in this case the stress is most likely to be a response to flow and habitat alterations caused by Parangana Dam.

#### **Mersey River Tributaries**

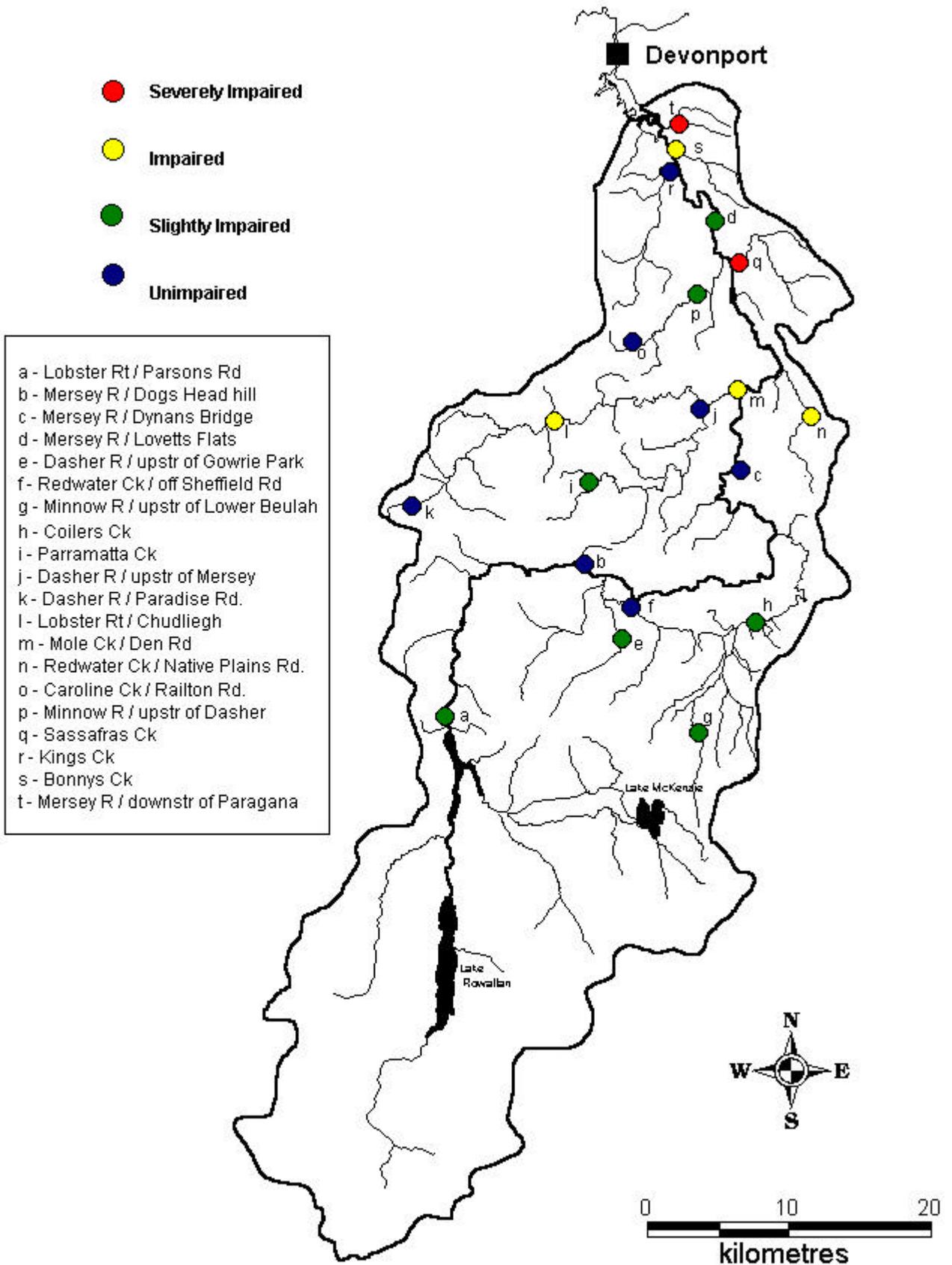
##### **Dasher River**

Most of the catchment of this tributary has been cleared for intensive agriculture. The upstream site above Gowrie Park is unimpaired, however by Paradise Road the river is clearly impacted. Only seven of the thirteen taxa that were predicted at this site were collected. This site in particular has a very poor streamside zone and there is evidence of extensive erosion in areas. Stock access was also evident upstream from the site resulting in extremely high *E.coli* counts ( see Water Quality section). The site however plots reasonably high on the OESIGNAL axis, shown in Figure 1, indicating a potential impact other than water quality. At the Dasher site just upstream from the confluence with the Mersey there was a further drop in the O/E score. At this site twenty taxa were predicted but only eight were collected. There is an extensive willow infestation and once again erosion is evident. This site plots in the lower bottom left hand corner of the OESIGNAL/OE plot (Figure 1) indicating that the impact could be water quality and/or habitat related.

##### **Minnow River**

The Minnow is essentially a healthy river. The site low in the catchment just upstream from the confluence with the Dasher is unimpaired. Fourteen out of the predicted eighteen taxa were sampled from this site. Compared with other areas throughout the

**Figure 2: Site Assessment: Mersey River Catchment  
Catchment Health - MRHI model**



catchment the native stream side vegetation of this section is relatively intact. No water quality problems have been identified and throughout the lower section there is a good cobble boulder substrate that helps promote species diversity. The site upstream from Lower Beulah is within forestry operations in the upper catchment and is slightly impaired. The site itself is located within a pine plantation and has very poor stream side vegetation. The lack of native riparian vegetation is more than likely a contributing factor to the degradation of the macroinvertebrate community at this site. Indeed, for an impaired site it plots very high on the OESIGNAL axis suggesting an impact that is habitat and not water quality related.

### **Tributaries of the Mole Creek/Chudleigh area**

The majority of sites in this area of the Mersey catchment are slightly impaired, the exception being a site on Mole Creek at Dens Road. Mole Creek has recorded high nutrient loads and at this particular site the streamside zone is dominated by willows, however the macroinvertebrate fauna remains relatively unaffected. Lobster Rivulet at Chudleigh and upstream of Caveside, and Sassafras Creek are all slightly impaired. The site on Lobster Rivulet upstream of Caveside plots extremely high on the OESIGNAL axis indicating that the impact is almost certainly not water quality related. Indeed, no great water quality problems have been identified in this area, although Chudleigh has recorded relatively high *E.coli* counts.

### **Tributaries of the Lower Mersey**

Parramatta Creek and Kings Creek are severely impaired. At Parramatta Creek only six of the nineteen taxa predicted were sampled and the majority of those are taxa that are tolerant of pollutants. While Parramatta has a good rating for physical form and streamside vegetation it has considerable water quality problems (see Water Quality report). Kings Creek is in the worst condition of all the tributaries sampled. Both the physical form and streamside vegetation are in poor condition and the water quality is of concern with high turbidity and conductivity readings. Both sites plot in the lower left hand corner of Figure 1 indicating that the impact is either water quality and/or habitat related.

Coilers Creek is on the verge of being classified as severely impaired. Nineteen taxa were predicted but only eight were sampled. It has considerable water quality problems with conductivity readings exceeding 500 microsiemens (see Water Quality section) and the streamside vegetation is rated as poor. Upstream of the site no vegetation exists and there is evidence of stock access and erosion. Redwater Creek on Native Plains Road below Railton is classified as slightly impaired. While high nutrient levels have been detected at this site and the streamside vegetation rated as poor, the macroinvertebrate community indicates a reasonably healthy eco-system. Caroline Creek on Railton Road is rated as unimpaired. The forestry in the upper catchment and agriculture lower down does not seem to have affected the aquatic eco-system to any large degree.

#### **4. Summary**

Results of this study indicate that the area of major concern in the catchment is the condition of the lower Mersey tributaries, in particular Kings, Parramatta and Coilers Creeks. All of these three tributaries plot in the lower left hand corner of the OESIGNAL / OE plot (Figure 1) indicating that the impact is water quality and/or habitat related. The Dasher just upstream from the Mersey also plots in this region. A number of sites, such as Lobster rivulet at Parsons Road and the Minnow upstream of Lower Beulah are slightly impaired by an impact that is more than likely habitat related.

The Mersey River as a whole is reasonably unimpaired. At Lovetts Flats there is evidence to suggest that the macroinvertebrate community is stressed. This may be related to water quality as there is a general loss of tolerant taxa down the catchment. The site just below Parangana Dam is also slightly impaired which is possibly related to flow and habitat alterations caused by Parangana Dam.

#### **5. Reference**

Chessman, B.C. (1995) Rapid Assessment of Rivers using Macroinvertebrates: A Procedure Based on Habitat-Specific Sampling, Family Level Identification and a Biotic Index. *Australian Journal of Ecology*. 33, pp122-129.