



DEPARTMENT *of*  
PRIMARY INDUSTRIES,  
WATER *and* ENVIRONMENT

Tasmania

## **Aquatic Ecology Of Rivers In the Ringarooma Catchment**

**A Report Forming Part of The Requirements for State of Rivers Reporting**

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## Glossary

<b>anadromous</b>	-refers to fishes which migrate from salt water to freshwater to spawn.
<b>diadromous</b>	-refers to fishes that migrate freely between freshwater and saltwater in either direction.
<b>macroinvertebrate</b>	- <b>invertebrate</b> (without a backbone) animals which can be seen with the naked eye. In rivers common macroinvertebrates are insects, crustaceans, worms and snails.
<b>riparian</b>	-of or on the river bank

## **1 Introduction**

This chapter deals with aspects of the aquatic ecology of the Ringarooma River and associated tributaries. The section provides a brief overview of the aquatic fauna found in the catchment and provides some detail of the habitat requirements and potential threats to some of the more vulnerable and endangered species found in the Ringarooma catchment. Another section deals specifically with endangered species found in the catchment and covers potential threats to the distribution of each species. The main focus of the chapter details work carried out in the Ringarooma catchment under the Monitoring Riverine Health Initiative (MRHI), a national program aimed at the development of models to assess riverine health using macroinvertebrates as a bio-indicator. These models are comprehensive in their development and allow a relatively rapid assessment of riverine health of specific sites along the river and surrounding tributaries. Finally, algal community composition at selected sites in the Ringarooma catchment is examined in respect to potential impacts. Algae were sampled concurrently with macroinvertebrates under the MRHI program in spring and autumn of 1997.

## **2 Aquatic Fauna**

At least six different species of frogs are found in the Ringarooma catchment. The Northeast region has been identified as a significant region for frogs due to extensive coastal wetlands which form excellent frog habitat (Brown, 1996). It is especially significant to the species *Litoria raniformis*, which is classified as 'vulnerable' in the State. Preservation of wetlands is seen as vital to the long term preservation of frog species diversity in the Northeast.

There are 18 freshwater fish species found in northeast Tasmania, three of which are introduced species (Chilcott, 1995). Most of these species are diadromous and have a Tasmania wide distribution. Three of the native fish species are confined entirely to freshwater areas (Table 1), and all three have the most limited natural distributions of species occurring in the northeast (Fulton, 1990).

Of the species listed below, the dwarf galaxias, *Galaxiella pusilla* Mack (dwarf galaxiid), is the only species having a conservation status of 'rare' in Tasmania. This species is also considered 'vulnerable' on mainland Australia, with causes of decline being seen as drainage of wetlands, river channelisation, removal of riparian vegetation and interactions with introduced fish (Koehn, 1990a; Koehn, 1990b). The only other species currently requiring conservation attention is *Prototroctes maraena* Gunther (Australian grayling), which is considered 'vulnerable'. Two other species, *Galaxias cleaveri* Scott (Tasmanian mudfish) and *Lovettia sealli* Johnston (Tasmanian whitebait) although quite common (Fulton, 1990), are subject to various pressures that may limit their abundance and distribution on a local scale.

The usual habitat of *G.cleaveri* is swampy areas near the coast and the species is found mostly in still waters, heavily vegetated mud bottomed swamps and drains (McDowall & Fulton, 1996). Mudfish are regarded as widespread and common around Tasmania (Fulton, 1990), although its habitat is under continual threat from drainage of swamps and reclamation of estuarine marshes. These activities have been common in the past in Rushy Lagoon (a RAMSAR listed wetland at the outlet of the Ringarooma River). The juvenile fish form part of the whitebait runs on their return from the sea in spring and they take up residence in the lower part of coastal streams (Fulton, 1990).

The true whitebait *L.sealli* exhibit an anadromous lifestyle migrating into freshwater to breed. Spawning occurs during spring and early summer when large schools of year old adults migrate into freshwater. Eggs are attached in clusters to submerged logs, stones or plants and

hatching occurs in 2-3 weeks. The larvae are then washed down into the sea. In the past, this species was the basis of an important commercial fishery, however since the 1940's populations have declined to the point where the fishery was closed from 1973 to 1990. The fishery has since been opened on a restricted basis.

**Table 1** : Freshwater Fish of northeast Tasmania

Life History: M = migrates to and from sea or estuary, NM = freshwater only

Habitat: R = rivers, L = lake, W = wetlands

Common Name	Scientific Name	Life History	Habitat
<b>Native Fish</b>			
short-headed lamprey	<i>Mordacia mordax</i>	M	R
pouched lamprey	<i>Geotria australis</i>	M	R
short-finned eel	<i>Anguilla australis</i>	M	R/L/W
long-finned eel	<i>Anguilla reinhardtii</i>	M	R/L/W
jollytail	<i>Galaxias maculatus</i>	M	R/L
spotted galaxias	<i>G. truttaceus</i>	M	R/L
climbing galaxias	<i>G. brevipinnus</i>	M	R
Tasmanian mudfish	<i>G. cleaveri</i>	M	R/W
dwarf galaxias	<i>Galaxiella pusilla</i>	NM	R/W
Tasmanian whitebait	<i>Lovettia sealii</i>	M	R
Australian grayling	<i>Prototroctes maraena</i>	M	R
Tasmanian smelt	<i>Retropinna tasmanica</i>	M	R
river blackfish	<i>Gadopsis marmoratus</i>	NM	R/L
southern pygmy perch	<i>Nannoperca australis</i>	NM	R/W
sandy flathead	<i>Pseudaphritis urvillii</i>	M	R
<b>Introduced Fish</b>			
brown Trout	<i>Salmo trutta</i>	M	R/L
Atlantic salmon	<i>Salmo salar</i>	M	R/L
rainbow trout	<i>Oncorhynchus mykiss</i>	M	R/L

# Taken from Chilcott and Humphries (1995)

There are two major genus' of freshwater crayfish found in the northeast region, *Astacopsis* (including the Giant Freshwater Crayfish, *Astacopsis gouldi*) and *Engaeus* (a smaller burrowing crayfish) which consist of about eight species in northeast Tasmania (Horwitz, 1996). Both *Astacopsis gouldi*, Clark and *Astacopsis franklinii*, Gray are found in the Ringarooma catchment (Hamr, 1992), while at least three species of *Engaeus* are also known to occur. *Astacopsis gouldi* is presently registered as a 'vulnerable' species and is now protected under the Rare and Threatened Species Act and will be discussed in the next section.

### 3 Endangered Species

A species is regarded as endangered if it is in danger of extinction because long term survival is unlikely while the factors causing them to be endangered continue operating. Approximately 4 endangered aquatic species are listed that have distributions in the Ringarooma catchment. The best known of these is *Astacopsis gouldi* ( the Giant Freshwater Crayfish). *A. gouldi* is listed as "vulnerable" under Tasmanian *Threatened Species Protection Act* 1995. At the beginning of 1998 *A. gouldi* was declared a "Protected fish" under the *Inland Fisheries Act* 1995 ending recreational fishing for the species.

*Astacopsis gouldi* has been the subject of numerous scientific studies (Hamr, 1990; Horwitz, 1994; Grown, 1995) and a draft recovery plan currently exists for the species (Bluhdorn, 1997). *A. gouldi* is a lowland wet forest/rainforest species with a preferred habitat in heavily forested stream and creeks. Distribution is limited between sea level and around 400m altitude although most animals are found below 200m (Horwitz, 1994). *A. gouldi* requires streams with high quality water ( low nutrients and sedimentation ), a stable thermal regime of relatively low water temperature, and habitat cover in the form of woody debris, undercut banks and ample canopy cover (Grown, 1995; Bluhdorn, 1997). Large scale habitat disturbance from agricultural and urban landuse, forestry activity and fishing pressure has reduced both the species abundance and viability of some populations. Localised extinction's or large depletion's of stocks are thought to have occurred in the Ringarooma River as well as many other northeastern rivers (Bryant, 1998a).

(Bryant, 1998b) listed key issues associated with the protection of the habitat of *A. gouldi* as follows:

- Protection of stream side vegetation
- Appropriate willow removal and retention of stumps and rehabilitation of native riparian vegetation
- Retention of large woody debris
- Management of stock access
- Appropriate use of fertilisers and chemicals

Two aquatic hydrobiid snails are also listed as endangered (Jackson & Munks, 1998). *Beddomia fromensis* have been sampled from the Frome River and *Beddomia tasmanica* from the Weld River. Both of these rivers are tributaries of the Ringarooma River. The family Beddomia displays a high level of local endemism with over 62 Tasmanian species in this group (Davies, 1995). The survival of hydrobiid snail populations primarily depend on the retention of native riparian vegetation and maintenance of good water quality. Ponder (1988) also suggests that landuse impacts and competition with introduced species such as *Potamopyrgus antipodarium* are also having a deleterious effect on snail populations and these impacts are primarily in lowland rural and urban streams (Davies, 1995).

*Galaxiella pusilla* (Dwarf Galaxiid) is found in northeastern lowland rivers and inhabits still or slow flowing waters such as swamps and backwaters of creeks, frequently amongst marginal vegetation (Humphries, 1986; Jackson & Munks, 1998). Spawning occurs from August to October. Eggs are usually deposited on macrophytes or leaf litter. Locally abundant populations have been found in Rushy Lagoon, a RAMSAR listed wetland at the mouth of the river. The species current status is rare due to a limited distribution at unprotected sites. Important management considerations include retention of riparian vegetation, maintenance of water quality and flow regime and decrease in sediment input from roads and drainage of swamps.

*Prototroctes maraena* (Australian Grayling) lives in coastal streams and rivers around the Tasmanian coast and occurs most commonly in clear gravelly streams with a moderate flow. Its need to migrate to and from the sea makes it vulnerable to depletion in rivers that prevent fish passage as a result of barriers to upstream and downstream migration (McDowall, 1986). Spawning takes place in Autumn and once larvae have hatched, they are swept downstream towards the sea. Larval life is marine and juveniles return to rivers from the sea during spring and the rest of their life is spent in rivers. The current status of this species is vulnerable due to a decline in its population resulting in decreased numbers across much of its former range.

In summary, many of these species are affected by habitat degradation. Management prescriptions in the form of retention and rehabilitation of native riparian vegetation and minimal disturbance to instream habitat particularly in the lower reaches of the Ringarooma River will increase the chances of recovery for many of these species.

#### **4 Macroinvertebrates**

The National River Health Program was formed in 1993 by the Federal Government to provide a means of assessing the ecological condition of Australia’s river systems. MRHI in Tasmania commenced in 1994 and the programs primary objectives were to develop predictive models to allow assessment of river health using macroinvertebrates as biological indicators. Over 120 sites in Northern Tasmania were sampled in order to build the bioassessment models. As part of this sampling, twelve sites ( Figure 1 ) were sampled at various times from spring 1994 to spring 1997 in the Ringarooma catchment. One site (Ringarooma at Branxholm) has been sampled consistently each spring and autumn from 1994 to the present. Five reference sites were sampled in spring 1994 and autumn 1995 and seven test sites were sampled in autumn and spring 1997. Reference sites are defined as sites that are least disturbed and are suitable for use in the construction of predictive models. Test sites are those sites defined to be of importance in assessing the condition of a river known or thought to be experiencing an impact from water quality or habitat degradation. Because the selection of sites in the Ringarooma catchment was primarily aimed at the development and testing of the river health model, the overall coverage of the catchment was not extensive. However, a suite of sites were sampled, ranging from small tributaries in both the upper and lower catchments as well as the mainstream channel of the Ringarooma River.

As a comprehensive description of sampling protocols is given in CEPA(1994) and extensive discussion of the development of river health models for northern Tasmania is already provided by Oldmeadow (1998), a detailed description of both of these procedures will not be given here. The biological monitoring package AUSRIVAS (Australian River Assessment System) was used to provide a broad scale picture of the health of previously sampled sites in the Ringarooma catchment at different times.

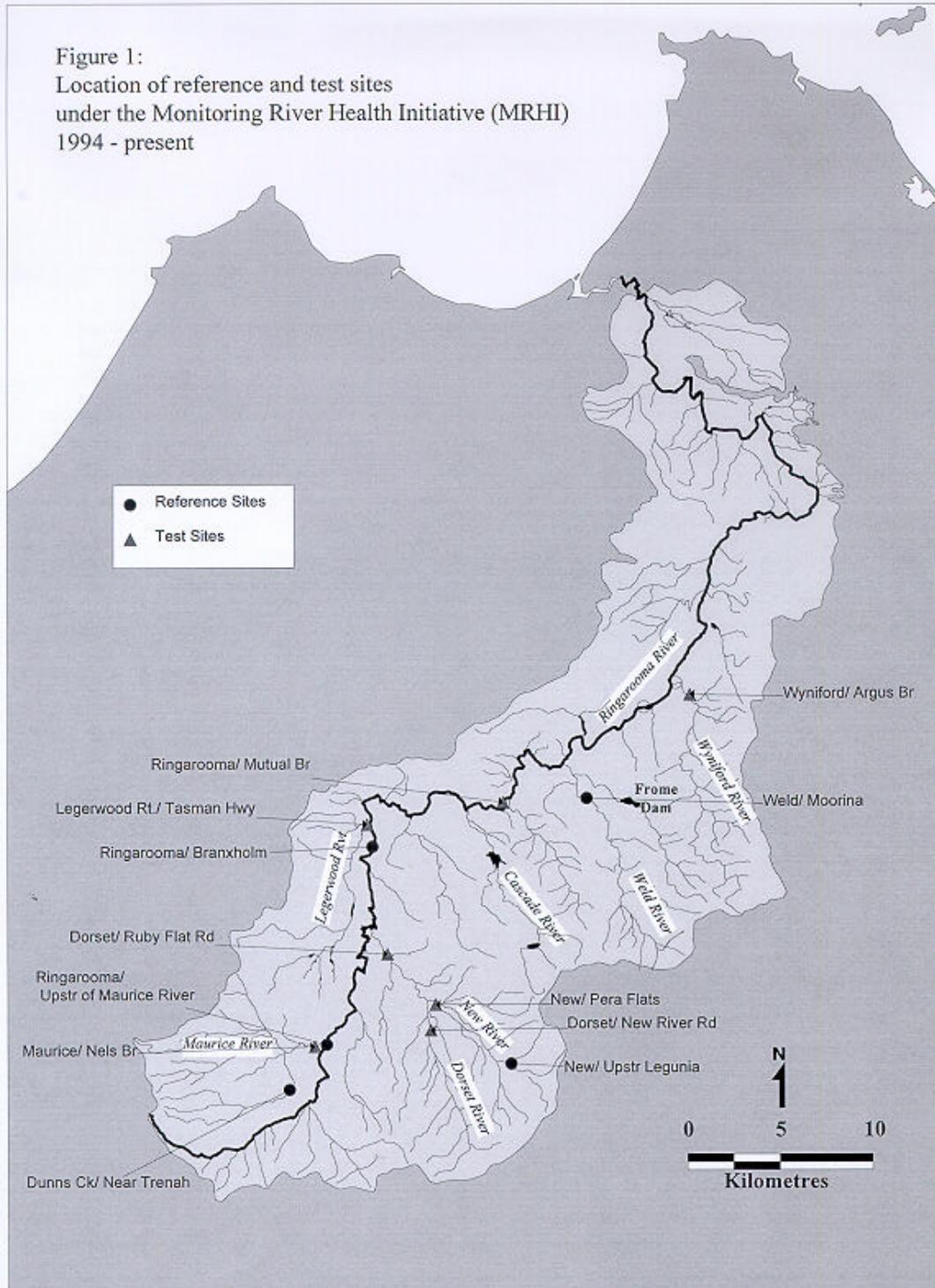
The model AUSRIVAS essentially compares the observed taxonomic composition of the macroinvertebrate community at a site with the expected composition if the site were unimpacted. Each site is classified into four categories based on the ratio of macroinvertebrates “Observed” (or sampled) to the macroinvertebrates “Expected”. This ratio is known as the observed / expected score or “O/E”. Table 2 presents the categories used and the O/E ratio ranges for each cut off.

**Table 2:** River Health categories and Associated O/E scores

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

The O/E ratio represents the percentage of taxa sampled at a site. From the above table, a site with less than 41 percent of the taxa expected to be present at the site is considered to be severely impaired. The advantages of these river health models is that not only the presence of an impact but also the magnitude can be determined for a specific site.

Figure 1:  
 Location of reference and test sites  
 under the Monitoring River Health Initiative (MRHI)  
 1994 - present



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 of macroinvertebrates is assigned a grade according to their tolerance, where the “observed” SIGNAL score is the sum of the grades divided by the number of taxa collected and the “expected” score is the sum of the grades divided by the number of taxa expected. The biotic index is sensitive to water quality and combined with the O/E ratio provides an insight into the nature of the disturbance or impact.

All macroinvertebrates were identified to family level. A total of 53 families were identified from edgewater habitats and 43 families from riffle habitats. These taxa represented all the major taxonomic groups typical of freshwater streams. Insects were the most dominant, representing around 86% of the total number of taxa collected and accounting for 90% of the total number of individuals collected. The two most dominant families in edgewater habitats were Leptoceridae (Caddisflies) and Chironomidae (Midges). The two most dominant families in riffle habitats were Leptophlebiidae (Mayflies) and Hydrobiosidae (Caddisflies).

In Table 3, the category classifications for both riffle and edgewater habitats are presented for sites visited in the Ringarooma catchment since the programs inception in 1994. Figure 2a) and 2b) are plots of the O/E scores against the ratio of the SIGNAL scores (OESIGNAL) for edgewater and riffle habitats respectively of sites in the Ringarooma catchment. OESIGNAL emphasises the effects of water quality on the fauna whereas O/E reflects a wide variety of impacts including habitat degradation as well as reduced water quality.

### Upper Catchment Tributaries

With the exception of Dunns Creek, many of the upper catchment tributaries are influenced to various degrees by agricultural activities. Both the Dorset and New Rivers are heavily influenced by farming activities and are subject to erosion and unrestricted stock access. This is also true for the lower reaches of the Maurice River.

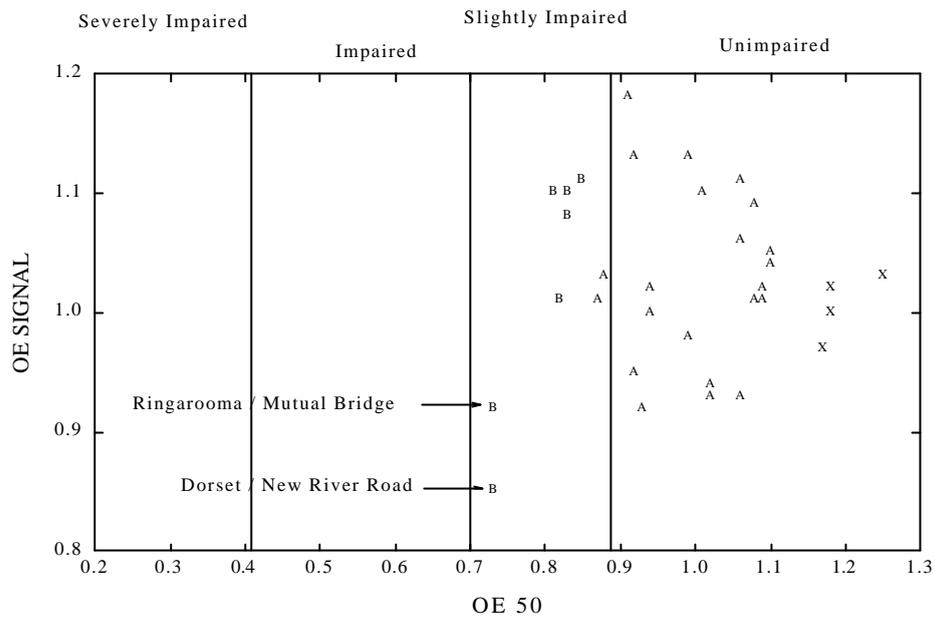
Riffle habitats sampled at Dunns Creek near Trenah have consistently been found to have an unimpaired river health rating on each sampling occasion. In contrast the edgewater habitats sampled at Dunns Creek have been slightly impaired on the majority of sampling occasions. This is surprising given that Dunns Creek is largely unimpacted by activities upstream and the cause for slightly impaired ratings is unclear. It is possible that localised stock access or bankside erosion is affecting the macroinvertebrate fauna at these sites or alternatively, localised low flows are having an impact on some of the more intolerant taxa in edgewater habitats.

Both habitats sampled on the New River upstream of Legunia have shown degrees of slight impairment on occasions. The riffle habitat sampled in autumn 1995 was rated as impaired (the lowest river health rating in the Ringarooma to date). The most likely reason for a drop in the rating at this point in time was the observed combination of extremely low flows and evidence of unrestricted stock access. Further downstream, the New River at Pera Flats Rd has been rated as unimpaired on all sampling occasions bar one (riffle habitat in spring 1997). Both sites on the Dorset River are unimpaired with the exception of the edgewater habitat sampled at New River Road in Autumn 1997.

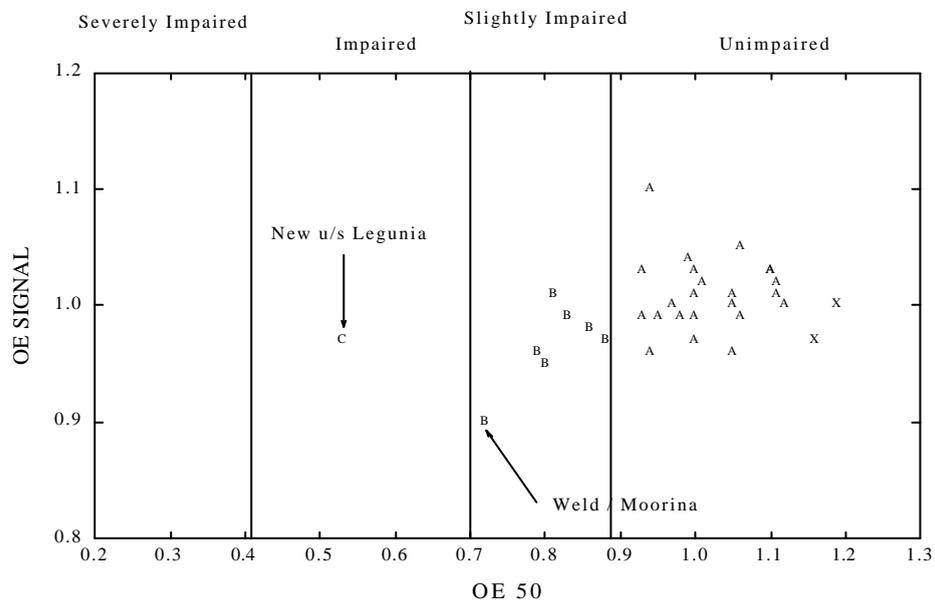
Site	Code	Spring 94		Autumn 95		Spring 95		Autumn 96		Autumn 97		Spring 97		Autumn 98		Spring 98	
		Riffle	Edge	Riffle	Edge	Riffle	Edge	Riffle	Edge	Riffle	Edge	Riffle	Edge	Riffle	Edge	Riffle	Edge
Ringarooma/Branxholm	D01	X	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Ringarooma u/s Maurice Riv.	D02	A	A	A	A	A	A	<b>B</b>	X	-	-	-	-	-	-	-	-
Weld/Moorina	D25	A	A	<b>B</b>	A	-	-	-	-	-	-	-	-	-	-	-	-
Dunns Ck/near Trenah	D26	A	<b>B</b>	X	<b>B</b>	A	<b>B</b>	A	X	-	-	-	-	-	-	-	-
New u/s Leguna Rd	D27	A	A	<b>C</b>	<b>B</b>	<b>B</b>	A	A	X	-	-	-	-	-	-	-	-
Dorset/New River Road	DT03	-	-	-	-	-	-	-	-	A	<b>B</b>	A	A	-	-	-	-
Dorset/Ruby Flat Road	DT04	-	-	-	-	-	-	-	-	A	A	A	A	-	-	-	-
Legerwood Rt./Tasman Hwy	DT08	-	-	-	-	-	-	-	-	A	A	<b>B</b>	A	-	-	-	-
Maurice/Nells Br.	DT09	-	-	-	-	-	-	-	-	A	A	A	<b>B</b>	-	-	-	-
New/Pera Flats Rd.	DT11	-	-	-	-	-	-	-	-	A	A	<b>B</b>	A	-	-	-	-
Ringarooma/Mutual Bridge	DT13	-	-	-	-	-	-	-	-	A	<b>B</b>	<b>B</b>	X	-	-	-	-
Wyniford/Argus Bridge	DT15	-	-	-	-	-	-	-	-	<b>B</b>	A	A	A	-	-	-	-

**Table 3:** River health categories for riffle and edgewater habitats at sites visited under the Monitoring River Health Initiative 1994-1998.  
Ratings are as follows

- Category
- X - Above Reference banding (high river health)
  - A - Unimpaired
  - B - Slightly impaired
  - C - Impaired
  - D - Severely impaired



**Figure 2a:** Plot of O/E50 and OESIGNAL for edgewater habitats at each site in the Ringarooma catchment. Some data points represent several visits to a site between 1994-1998



**Figure 2b:** Plot of O/E50 and OESIGNAL for riffle habitats at each site in the Ringarooma catchment. Some data points represent several visits to a site between 1994-1998.

The Dorset River at New River Road in Autumn 1997 (Figure 2a) plots relatively low on the OESIGNAL axis indicating that impacts were more likely to be due to a deterioration in water quality rather than habitat degradation. Physical water quality parameters measured at this time appear to be satisfactory and nutrient inputs were not measured during this period. However high nutrient levels in the river have been found during the present water quality study and it is likely that dairying activities, stock access to the river and runoff may have contributed to elevated nutrient levels in the Dorset River in the past.

Slightly lower in the catchment, Legerwood Rivulet has been shown to be unimpaired on the majority of times visited although the riffle habitat was rated as slightly impaired in spring 1997. The relatively healthy grade for this tributary is surprising given that the rivulet is highly modified upstream and is subject to poor river management practices and unrestricted stock access and the upper reaches possess poor riparian vegetation. It is possible that macroinvertebrate community composition at this downstream site show a small recovery from the significant impacts further up the Legerwood catchment.

In summary, the majority of edgewater habitats sampled in the upper tributaries are unimpaired, although at various times some sites have shown river health to be slightly impaired. With the exception of sites commented on above, most of slightly impaired sites plot reasonably high on the OESIGNAL axis indicating the impacts are most likely due to habitat degradation rather than water quality. This is understandable as the Dorset, New and Legerwood tributaries are highly modified river systems. All are subject to intensive agricultural practices, bankside erosion and unrestricted stock access. Many reaches on these rivers lack intact native riparian vegetation.

### Middle Catchment Tributaries

Both middle catchment tributaries sampled appear relatively unimpaired. The Weld River is essentially in good riverine condition in the lower reaches with the majority of landuse impacts occurring in the upper reaches where agricultural activities occur. Only riffle habitats in Autumn 1995 showed a slight degree of impairment.

The Wyniford River is subject to forestry and has been subject to isolated mining activities in the catchment although the instream habitat and riparian zone are largely intact. This is reflected by unimpaired river health ratings for most times sampled with the exception of the riffle habitat at Argus Bridge in Autumn 1997.

Both sites at these times plot slightly low on the OESIGNAL axis indicating that impacts are most likely due to a slight deterioration in water quality. Water quality measurements at these times at both sites were of a satisfactory standard. The only anomaly in terms of the present water quality study indicates higher amounts of aluminium in both rivers in comparison to other reaches in the Ringarooma catchment. Aluminium is one of the more toxic of the trace metals and has been shown to decrease diversity in riverine habitats and also influences growth rates and survival of many aquatic invertebrates (Dallas & Day, 1993). This may have contributed to both sites on the Weld and Wyniford having slightly impaired river health ratings.

### Ringarooma River

Three sites were sampled on the Ringarooma mainstream. Two of these were located in the upper catchment. Both riffle and edgewater habitats in the Ringarooma river upstream of the confluence with the Maurice River have been unimpaired on all sampling occasions with the

exception of the riffle habitat in autumn 1996. This site plots slightly low on the OE50 axis indicating a slight impact due to habitat degradation. The Ringarooma River at Branhholm which has been monitored consistently since spring 1994 has been unimpaired on all occasions sampled.

Lower in the catchment the Ringarooma River at Mutual Bridge has ranged from unimpaired to slightly impaired on the occasions sampled. Edgewater habitats in Autumn 1997 and riffle habitats in Spring 1997 were found to be slightly impaired. At these times the site plots low on the OESIGNAL axis indicating that the impacts are most likely related to a deterioration in water quality. Water quality information during the times sampled is not comprehensive enough to make further judgments on the nature of the water quality impact.

## Summary

In general the Ringarooma River and tributaries are in good health, with most sites classified as unimpaired on the majority of sampling occasions. There is evidence to suggest that some sites undergo periodic episodes of slight impairment (although the New River upstream of Legunia has been moderately impaired on one occasion). In reference sites this is more common in edgewater habitats whereas in test sites sampled in 1997 this extends to riffle habitats. The majority of impacts at slightly impaired sites appear to have been due to habitat degradation although sites labeled in figure 2a) and 2b) are further impacted by a periodic deterioration in water quality around the time sampled. This appears to be temporary as most of these sites have been found to be unimpaired on subsequent visits. This indicates that although impacts on macroinvertebrate communities are primarily related to habitat degradation at many of these sites, further impacts may be due to periodic episodes of water quality deterioration. This may be further exacerbated by periods of low flow and elevated nutrient inputs into reaches in the form of runoff from agricultural land practices upstream or stock access evidenced at impaired sites such as the New River.

## 5 Algae

Algae are simple plants that vary considerably in size, shape and colour, and are found in a range of habitats. They are a natural part of the surface water ecosystem and are encountered in every water body that is exposed to sunlight. While a few algae are found in soils and in surfaces exposed to air, the great majority are truly aquatic and grow submerged in ponds, lakes, water supply storages, streams, estuaries and oceans. In water storages the phytoplankton, or floating microscopic plants, are of major importance, and are the basic food source of small aquatic animals. There are four main types of freshwater algae: Green Algae (Chlorophyceae), of which the threadlike filamentous form is the most common, Blue-green Algae (Cyanophyceae), Diatoms (Bacillariophyceae) and Euglenoids (Euglenieae). Excessive growth of algae can cause numerous problems in waterways. Blooms can severely reduce the oxygen content of the water and cause the death of fish and other aquatic animals. Mats of filamentous algae can clog irrigation channels and pipes and severely reduce flow and certain blue-green algal blooms (in particular *Anacystis cyanea*) are toxic and have been known to kill live stock, including cattle, sheep, horses and domestic fowl.

Algae has many advantages over traditional indicators of water quality particularly in an urban setting (Round, 1991). Unlike macroinvertebrates, algae are a ubiquitous component of a water environment and are even found in concrete drains (common in urban environments). Algae have particular advantages as bio-indicators over other animals such as fish and macroinvertebrates in that they are often present before and after pollution incidents, reflect nutrient composition of the water more closely than animals and are often different to macroinvertebrates in their sensitivity to toxic materials (Whitton & Kelly, 1995).

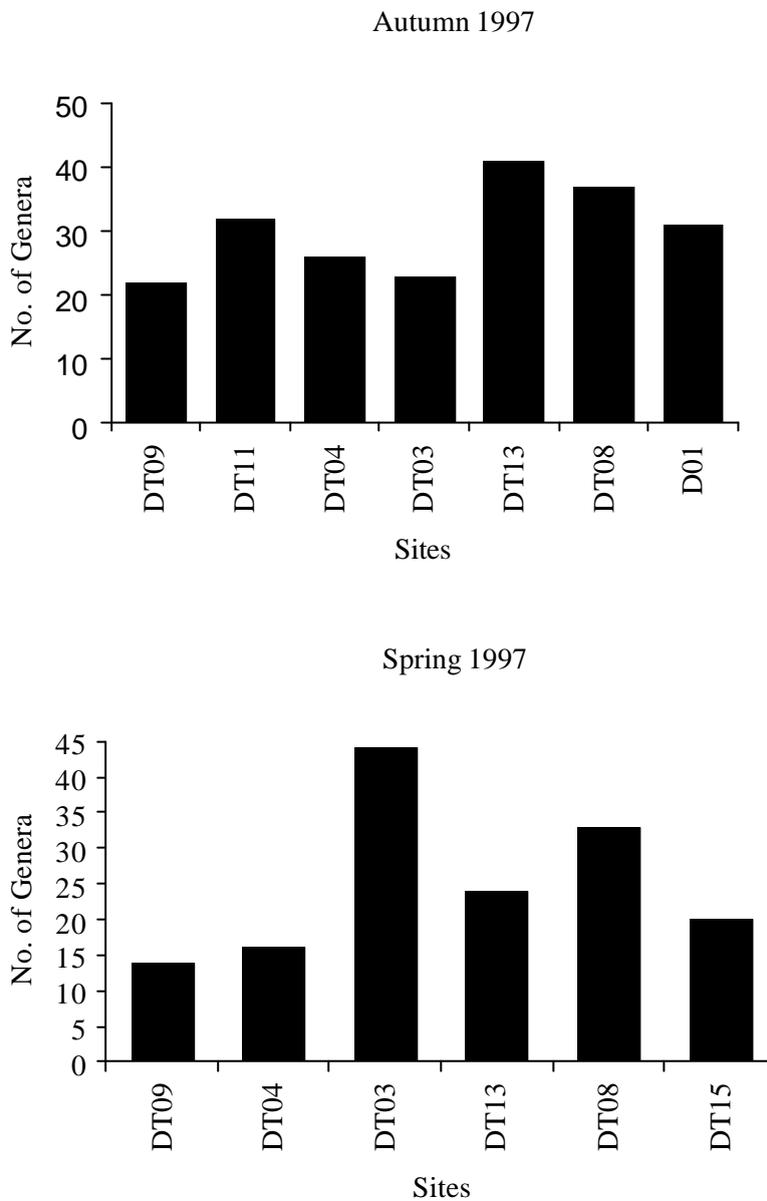
In many Australian states, algae have been used on small spatial scales for bio-monitoring (Chessman, 1986; Sonnerman & Breen, 1997). There have been investigations into the feasibility of using algal taxa to assess river health and many researchers have suggested various protocols for bioassessment of rivers using algae as indicators (Hotzel & Croome, 1998). The development of river health models such as AUSRIVAS, the current platform for using macroinvertebrates to assess river health, has prompted various workers to develop similar models using algae as the indicator taxa. In this vein, DPIWE has been sampling algae at sites where macroinvertebrates have been sampled for the Monitoring Riverine Health Initiative (MRHI) and the First National Assessment of River Health (FNARH) since late 1996 with the long term plan to develop bioassessment models for algae similar to those currently being developed for macroinvertebrates. To date, over 247 genera have been identified from over 350 sites around Tasmania.

As part of this program algal samples were collected from 7 sites in the Ringarooma catchment in Autumn 1997 and 6 sites in spring 1997. These sites were located on the Ringarooma mainstream and associated tributaries. Samples were taken from both riffle and edgewater habitats by scraping the top surface of a cobble. They were preserved in 5% formalin and identified to genus level under a compound microscope in the laboratory.

56 genera of algae were identified from the Ringarooma catchment, including Diatoms, Green algae, Blue-green algae and Euglenoids. These species are common throughout Tasmania and as such pose no public risk.

The number of genera of algae recorded per site ranged from 14 to 44, with the lowest numbers recorded from the relatively undisturbed tributaries in both the upper and lower catchment (Figure 3). These sites include both sites sampled on the Dorset River, the Ringarooma River upstream of the confluence with the Maurice River and the Wyniford River at Argus Bridge. Low algal taxon numbers are most likely due to nutrient limitation at these sites. In contrast, high numbers of algal taxa correspond with rivers that have high Total Nitrogen and are subject to intensive agricultural activity and unrestricted stock access. Sites on these rivers include the New River at Pera Flats Road, Legerwood Rivulet at the Tasman Highway and the Ringarooma River at Mutual bridge. All these sites had relatively high numbers of algal taxa in comparison to sites subject to less agricultural activity. Comparatively high Total N recorded in the present water quality study shows a strong relationship with sites that had a high number of algal taxa in 1997. Despite this, the types of algae encountered at all sites in this study such as *Cymbella*, *Fragilaria*, *Gomphonema*, *Navicula* and *Synedra* are generally characteristic of healthy unimpacted streams (Chessman, 1986) and contain a high diversity of algal groups with the exception of blue green algae. The most likely reason for the reduction of blue green algal taxa is the low pH of the water, particularly in the upper Ringarooma catchment. Dallas(1993) reviewed studies that generally found low pH conditions are responsible for reductions in the types and number of blue green algae present.

To make further comments on the composition of algal communities and how these relate to specific water quality impacts or habitat degradation in the Ringarooma catchment would be inappropriate as too few sites were sampled in 1997 for a rigorous analysis. However the brief survey carried out at this time indicates that algal communities at all sites are diverse and indicative of good river health. Some sites with high numbers of algae are possibly responding to elevated nutrient levels and sites with low numbers of algal taxa are commonly in undisturbed low nutrient streams and tributaries of the Ringarooma river.



**Figure 3:** Number of algal genera sampled at each site in the Ringarooma catchment in autumn 1997 and spring 1997: Site codes for the following sites are as follows

- DT11 - New River at Pera Flats Road
- DT09 - Maurice River at Nells Bridge
- DT04 - Dorset River at Ruby Flats Road
- DT03 - Dorset River at New River Road
- DT13 - Ringarooma River at Mutual Bridge
- DT08 - Legerwood Rivulet at Tasman Highway
- DT15 - Wyniford River at Argus Bridge
- D01 - Ringarooma River at Branhholm

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