



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

Tasmania

**State of River Report
for the Pipers River Catchment**

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This document contains the results of a series of co-ordinated studies by the Department of Primary Industries, Water and Environment (DPIWE) which were conducted in the Pipers River catchment during 1998. These studies, which are reported below, for the basis of the 'State of Rivers' report for rivers in the Pipers catchment.

Executive Summary

Provides a brief summary of the major findings of each study and makes recommendations on any future work which may be required to enhance knowledge about particular problems and direct management of resources.

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Executive Summary

Pipers River State of Rivers Report - 1999

This report is another in the series of studies into water resources around Tasmania which have been undertaken through Tasmania's 'State of River' reporting program. This program aims to provide current information on condition of waterways and the water resources to assist with resource management issues at the catchment level. This is also seen as vital for water management planning and establishing water quality objectives under the 'State Policy for Water Quality Management'. This study was undertaken in conjunction with other studies done in the area during 1998. The major outcomes of the study are presented below.

Water Quality

Conductivity, which is an indicator of salt concentrations, tends to be highest during low summer flows in Pipers River but drops dramatically during and following any significant rainfall and is generally much lower during winter and spring. The ions contributing most to surface water salinity are chloride and sodium. Turbidity levels were variable at sites where monitoring was undertaken, with clearest water occurring during the period January to May, when flows were lowest. During the high flows of winter, turbidity at some sites was significantly higher demonstrating the impact of runoff and erosion on water quality. At the bottom of the catchment, very high turbidity readings of over 350 NTU were measured during flood events.

Dissolved oxygen concentrations at many sites in the catchment were extremely low during low summer flows and was indicative of an ecosystem under significant stress. Oxygen concentrations recovered well during late autumn and winter. Short-term monitoring also showed that oxygen concentration is lowest during the early hours of the morning.

Nutrient concentrations were monitored routinely at only one site towards the bottom of the Pipers River. Results show strong evidence of seasonal changes in nitrate concentrations related to river flows and may reflect flushing of this nutrient from the soil profile during autumn and winter. Phosphorus levels in Pipers River are generally highest during flood events, when suspended sediment carries large loads of phosphorus towards the catchment outlet. There is also some evidence that sediment stored in the river releases dissolved phosphorus during very low summer flows, sustaining aquatic plant and algal growth.

Estimates of catchment exports showed that during the year of the study 91.8 tonnes of nitrogen, 6.5 tonnes of phosphorus and 4,142 tonnes of suspended solids was lost from the Pipers River catchment. When compared against estimates from other catchments in Tasmania, these are towards the higher end of the scale. Opportunistic sampling during an intense thunderstorm provided evidence that there can be significant losses of nutrients and soil from cleared land during these events. The implications of this in terms of catchment loss and environmental risk to the estuary at Weymouth are discussed.

Hydrology

The Pipers River begins on the slopes of Mount Arthur and flows north for about 48km before entering Bass Strait at Weymouth. The river has a catchment area of about 380km² and the main river is unregulated, though flows in tributary streams are modified by on-stream storages. There are few irrigation rights in the catchment and the majority of water is extracted for stock and domestic purposes.

Flow has been monitored at three sites in Pipers River at various intervals between 1952 and the present. The only station currently operating is at Pipers River downstream of Yarrow Creek, which has been collecting flow information since 1972 and now also collects some water quality data as well.

Flow analysis for the three sites on Pipers River shows that there is a strong seasonal pattern, with flows peaking in the period July through to September. Lowest flows occur between January and April. The median annual flow at Pipers downstream of Yarrow Creek is $0.79 \text{ m}^3/\text{sec}$ (68.26 megalitres per day), although during summer the median flow drops to about $0.145 \text{ m}^3/\text{sec}$ (12.53 megalitres per day).

During the period of the present study, July, September, October and November all experienced higher monthly average flows than the historical record. All other months experienced flows that were less than the historical average. This was especially so for the months of May and August, 1998.

Flood frequency analysis was carried out for Pipers River downstream Yarrow Creek. During September 23rd 1998, a flood with a peak flow of $144 \text{ m}^3/\text{sec}$ occurred (the corresponding river height was 2.22m). From the flood frequency analysis it is estimated that a flood of this magnitude corresponds to an approximate annual exceedence probability (A.E.P.) of 1:5. This means that in any given year, there is a 20% chance of a flood of this magnitude or greater occurring.

Flow recession for the lower reaches of Pipers River was also performed. The recession curve essentially reflects groundwater discharge to the river and how groundwater storage influences and sustains flows in the river. This information is especially important during the summer periods and has implications for the establishment of environmental flow allocations and an assessment of risk in supply of water from the river for the purposes of irrigation or domestic use.

River Condition

The condition of rivers and streams in the Pipers River catchment were assessed using a rapid ground survey of sites from within the catchment. The method used is known as the Index of River Condition (IRC) and is based upon similar habitat survey approaches being used elsewhere in Australia. The IRC provides an index of change from what is regarded as a natural state. The index is composed of a number of sub-indices relating to hydrology, water quality, physical stream form, streamside habitat and ecological health. The results presented in this report provide a summary of the current catchment condition and can be used as a benchmark for future comparison.

Field data was collected from 34 representative sites within the Pipers River catchment; 14 on the main-stream Pipers River and 20 on tributary streams. The overall condition ratings for both tributary and main-stream lengths show that no sections are heavily modified. Most modification tends to occur in the middle sections of the catchment. One site located near the top of the catchment came out as essentially natural, however this was also borderline. The data shows that 45% of the main-stream has some modification to condition, 46% is near natural and 9% is essentially natural. For the tributary streams, approximately 35% of total stream length was categorised as modified to some degree, while a larger percentage (64%) was near to natural conditions. In general, it was estimated that 40% of all the catchment streams have some modification from natural conditions and the remaining 60% are near natural.

Analysis of sub-indices indicates that major degradation has occurred in the streamside zones with excellent condition of hydrology, good condition of water quality and physical form although there is significant degradation of physical stream form in a number of areas. Aquatic fauna (freshwater invertebrates) also rated as in good condition overall. Major disturbance to the streamside zone has been detected in approximately 60% of the catchment sites. Issues which arise from this data include the extensive growth of riparian weed species, unvegetated or poorly vegetated riparian zones, and uncontrolled stock access to river banks.

It is clear that riparian (streamside) zone management is a significant issue in the Pipers River catchment and should be a focus of catchment management activities to avoid further degradation. The maps included in this report will allow a strategic approach to the implementation of programs to be undertaken.

Aquatic Ecology

The review of information on the health of the aquatic communities in the Pipers River catchment reveals that impacts tend to be most noticeable in the middle part of the catchment, with analysis showing that changes in the aquatic community have occurred due to habitat modification and possibly water quality deterioration. Sites located uppermost in the catchment appear to be relatively unimpaired at the times measured. Middle catchment sites and sites in both tributaries fluctuate in terms of impairment and at times have been sampled as moderately impaired. Sites in the lower reaches of the catchment are relatively unimpaired and this may be attributable to an improvement in site specific habitat conditions.

No strong patterns were evident in algal community composition at 7 sites surveyed in the Pipers River catchment although the influence of nutrient concentration appears to be most marked in autumn during or following periods of low flow.

In terms of river health the Pipers River catchment at the times sampled ranges from poor to only fair river health with habitat degradation of aquatic and adjacent riparian habitat the primary cause of impairment. Habitat degradation is likely to be related to agricultural land use practices in the middle to lower reaches of the catchment and associated tributaries

Recommendations

When the information from all four reports is considered together, several features arise. It is clear that during the earlier stages of the study period, flows in the river were slightly below or much lower than the historical average. The results from the water quality and aquatic health studies should be viewed in light of this.

Each of the reports has highlighted the fact that there are impacts on water quality, ecosystem health and river condition in the middle reaches of Pipers River. This section of river has several problems which revolve around management of the streamside zone. Poor condition of riparian vegetation and river banks may be causing sedimentation of the lower sections of the river, leading to low oxygen levels and elevated nutrient concentrations. Improved management of the riparian zone is one of the major recommendations arising from these reports and this issue should be given serious consideration in any catchment management activities which are undertaken in future.

Some of the results of water quality testing during flood flows has shown that nutrient and sediment loss from the Pipers River catchment is also an important issue. The retention of soil and nutrients on the land is intimately tied to the long term sustainability of catchment activities and practices which promote this should also given a high priority. In addition to the obvious benefits to landholders of minimising soil loss, there are serious environmental risks to allowing the continued transport of nutrients and sediment to the estuary at Weymouth. The deposition of excessive amounts of nutrients and sediments in estuaries has been identified as a probable cause of the decline of seagrass beds around Australia, and these are important nursery areas for recreational and commercial fish species. Any attempts to reduce sediment loss from catchments to coastal areas are therefore worthwhile on both economic and environmental grounds.

Disclaimer

This report has been prepared with due diligence and care, and is based on the best available information at the time of publication. The Department of Primary Industries, Water and Environment holds no responsibility for any errors or omissions within this report. Any decisions made by other parties based on the information in this report are solely the responsibility of those parties.

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