ENVIRONMENTAL CONDITION OF RIVERS AND STREAMS IN THE LATROBE, THOMSON AND AVON CATCHMENTS

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1 INTRODUCTION

This publication provides an overview of the environmental condition of the rivers and streams in the Latrobe, Thomson and Avon catchments[1] (Figure 1).

The Latrobe, Thomson and Avon catchments contain some of Victoria's most significant river systems. Located in the Gippsland region of Victoria, these three river systems form the total catchment of Lake Wellington, the western-most of the Gippsland Lakes. The demands on these freshwater resources are considerable. Australia's largest pulp and paper mill, most of the State's power industry, much of Melbourne's water supply and the State's second largest irrigation district fall within their catchment boundaries.

Much change has occurred in these catchments since early settlement. Forests have been cleared, extensive gold mining operations were common, large-scale coal mining and power generation, industrialisation, development of intensive agriculture, and impoundment and diversion of water from the major tributaries has occurred. These activities have contributed to a significant change in the quantity and quality of water delivered to Lake Wellington and there is a significant amount of public concern regarding impacts on the health of the Gippsland Lakes.

The Latrobe and Thomson river systems, for example, contribute approximately twice the nutrient inputs to the Gippsland Lakes than all other riverine inputs. The most significant nutrient loading is associated with high flow events and reflects the increased surface runoff and erosion caused through land clearance and urbanisation.

It is commonly agreed that the only long-term solution for improving the condition of Lake Wellington is to significantly reduce the nutrient loads from the Latrobe and Thomson river systems. Restoration of the catchments to a more sustainable land use, revegetating riparian zones and reducing erosion are also considered critically important.

Scope

The assessment is based largely on biological indicators, being the best indicators of overall condition, but also incorporates water and habitat quality assessments. It attempts to relate observed environmental quality with broad scale catchment issues rather than assessing specific point source impacts.

[1] EPA Victoria, *Environmental Condition of the Rivers and Streams in the Latrobe, Thomson and Avon Catchments*, Publication 831, 2002.

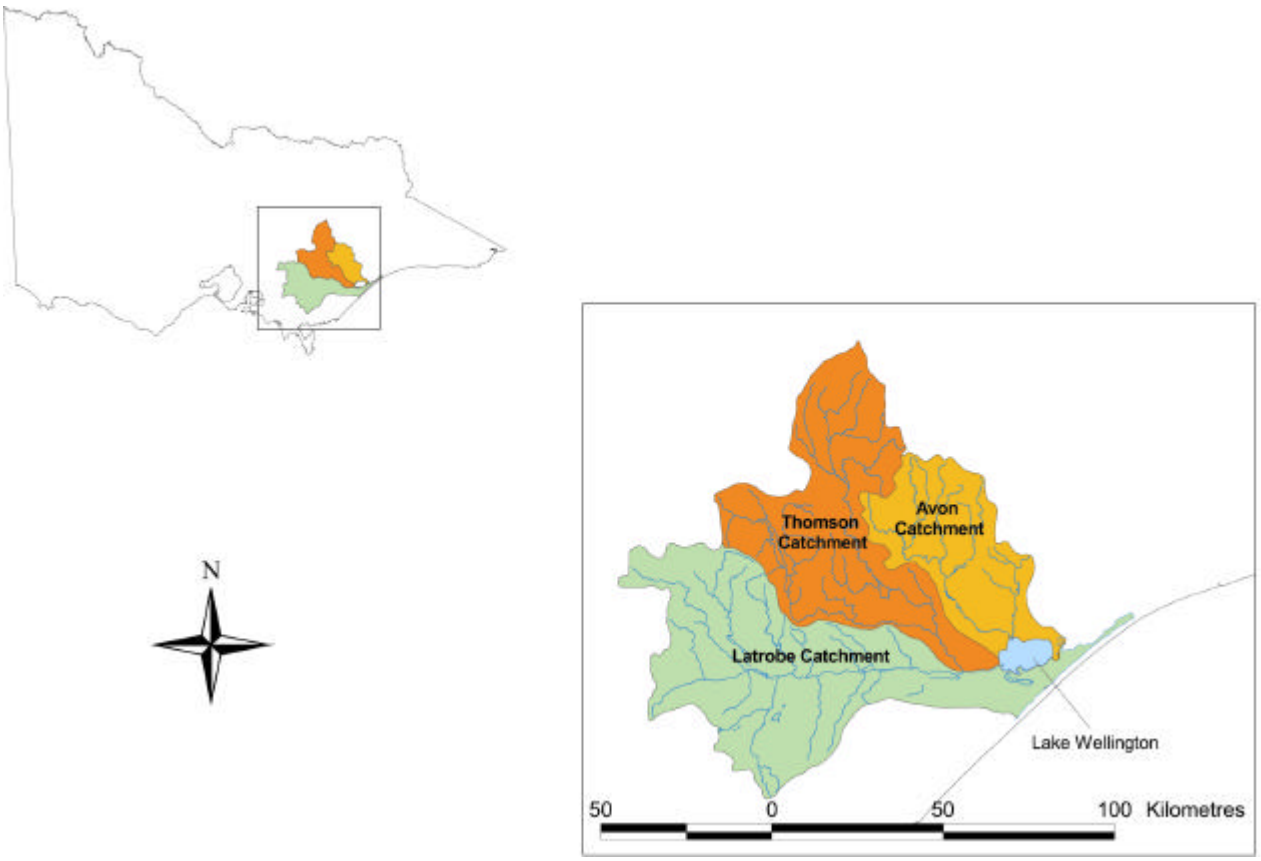


Figure 1: Location of the Latrobe, Thomson and Avon catchments in Victoria

2 ASSESSMENT METHODS

Indicators of Condition

Ecosystems are affected by many factors not detected by spot sampling programs, for example, fluctuations in water quality, changed flow regimes and deterioration in habitat. Biological indicators respond to all these stresses and provide a direct measure of overall ecological health.

The study examined measures of biological health, then used habitat health indices and physical and chemical water quality parameters to explain why sites may be degraded.

Several biological indices - AUSRIVAS, Key Families, SIGNAL, Number of Families and EPT Index – are used in the assessment.

The key physical and chemical water quality indicators considered are nutrients (phosphorus and nitrogen), turbidity, salinity, pH, temperature and dissolved oxygen.

Even with good water quality and flows, a healthy aquatic ecosystem cannot be supported if suitable habitat is not present. Two measures, the USEPA (United States Environmental Protection Agency) Rapid Habitat Assessment (RHA) Protocol and the Index of Stream Condition (ISC), providing semi-quantitative assessments of habitat condition have been included.

Descriptions of all these indices can be found in the detailed study report.

Environmental quality objectives

Through State environment protection policies (SEPPs), EPA sets environmental quality objectives in order to maintain healthy ecosystems and bring about improvements in degraded water bodies.

The waters of the Latrobe, Thomson and Avon catchments are generally covered by Schedule F5: Waters of the Latrobe and Thomson Basins and Merriman Creek[2]. For indicators of environmental condition not covered by Schedule F5, the objectives in the principal policy SEPP Waters of Victoria [3] apply.

The principal policy SEPP (WoV) is being reviewed and a draft has recently been released[4]. Draft biological objectives have been developed as part of the WoV review. Since Schedule F5 does not have quantitative biological objectives, this condition assessment uses the draft biological objectives developed as part of the WoV review.

A fundamental feature of the draft biological objectives is that they are based on biological regions[5]. Four biological regions are represented across the combined Latrobe, Thomson and Avon catchments: Highlands, Forests A, Forests B, and Cleared Hills and Coastal Plains (Figure 2). These regions are further described in the detailed study report.

Data sources

The information presented in this report (Figure 3, Table 1) incorporates a number of data sources, but relies predominantly on biological monitoring and water quality snap-shots undertaken by EPA between 1990 and 1998, as part of the National River Health Program (NRHP). Other primary sources of information include the Index of Stream Condition assessment and water quality data collected for the Victorian Water Quality Monitoring Network (VWQMN) (http://www.vicwaterdata.net/).

[2] Government of Victoria, *Variation of the State environment protection policy (Waters of Victoria) – insertion of Schedule F5. Waters of the Latrobe and Thomson River basins and Merriman Creek Catchment*, 1996.

[3] Government of Victoria, *State environment protection policy (Waters of Victoria)*, 1988.

[4] EPA Victoria, *Draft State environment protection policy (Waters of Victoria)*, Publication 795, 2001.

[5] EPA Victoria, *Draft State environment protection policy (Waters of Victoria), Biological Objectives for Rivers and Streams – Ecosystem Protection*, Publication 793, 2001.

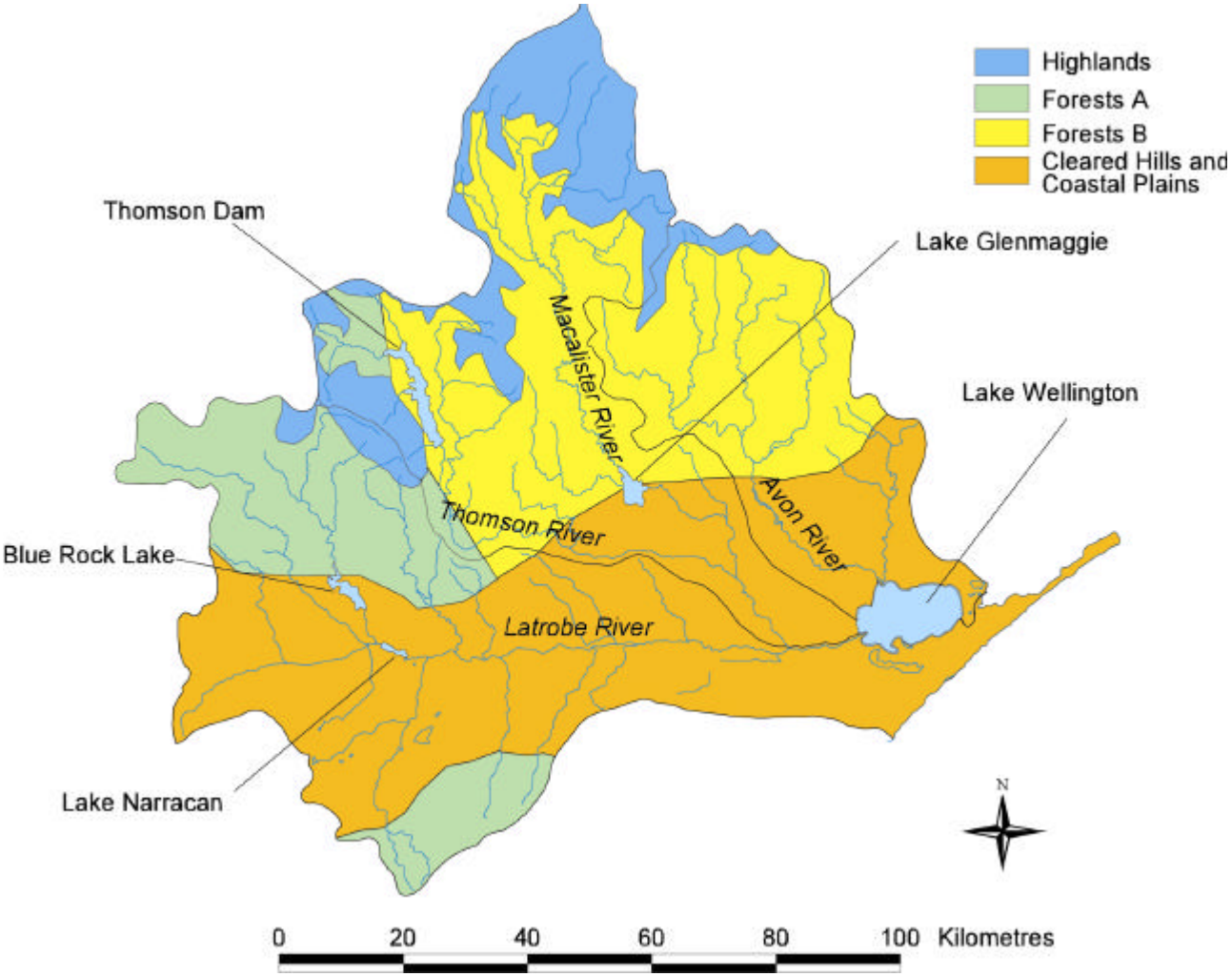


Figure 2: Biological Regions in the Latrobe, Thomson, and Avon catchments

3 ENVIRONMENTAL CONDITION

For the convenience of discussion, catchment areas within the Latrobe, Thomson and Avon river systems have been assigned to one of three groups: Highlands, Upper Catchments and Lowland Reaches. These groups broadly correspond to the topography, present land use and, to some extent, the biological regions.

Highlands

The main highland areas are in the Latrobe (Baw Baw Plateau) and the Thomson (Baw Baw Plateau and Snowy Range) catchments. No highland sites were assessed in the Avon catchment. Streams in this group are, for the most part, in a relatively natural state. The majority of the land is contained within various parks, reserves and State Forest Management Zones.

In general, the sites were found to be in excellent ecological condition, however four sites did not meet all of the draft SEPP biological objectives.

Caledonia River at Howitt Hut failed to meet several draft biological objectives. While this suggests the site may be degraded, possibly due to summer cattle grazing and heavy recreational use of the nearby hut, the site scored well on the habitat index. The poor results may, in reality, be due to the uniqueness of the river at this site and not any real degradation of the habitat or water quality. Further investigation is needed to clarify this.

The three Latrobe tributaries on the Baw Baw Plateau – the ***Eastern Tanjil River at Mt Baw Baw***, ***Hope Creek and Charity Creek*** – each failed one draft biological objective. This result, rather than indicating poor biological condition, most likely reflects the naturally restricted riffle habitat at these sites.

Upper Catchments

Included in this group are the Latrobe River and tributaries upstream of Willow Grove, the Southern tributaries of the Latrobe River originating in the Strezlecki Ranges, the Thomson River and tributaries upstream of Cowwarr Weir, the Macalister River and tributaries upstream of Lake Glenmaggie, the Avon River upstream of Valencia Creek and its tributaries, Valencia and Freestone creeks.

The upper catchments are largely forested. The only significant clearing occurs in valleys in the lower parts of the catchment, especially in the Latrobe River system. There are impoundments on the Tanjil River (Blue Rock Lake), the Tyers River (Moondarra Reservoir) and the Thomson River (Thomson Dam).

Generally, the water quality and ecological condition of these upper catchment sites was very good to excellent. However, there were exceptions.

The ***Loch River at the Loch River Road*** failed one draft SEPP biological objective. The fairly sandy substratum suggests that logging and significant softwood plantations in the catchment may have impacted on this site. The site also had moderately elevated nutrient levels at the time of sampling.

The ***Narrows on the Thomson River*** failed to meet two draft SEPP biological objectives. A study in 1982[6], prior to the construction of the Thomson Dam, collected several species not found during this assessment. While water quality at this site is good, the impact of flow regulation from the Dam – its construction and/or operation – is likely responsible for the loss of species.

A fire in January 1998, which burnt 32,000 ha in the upper Macalister catchment, has had an evident impact on the Macalister, Wellington and Caledonia rivers. The fire was followed by a severe thunderstorm that washed a large quantity of ash and sediment into the Caledonia River and the main stem of the Macalister River. The ***Caledonia River***

[6] Malipatil, M.B., and Blyth, J.D., *A qualitative study of the macroinvertebrate fauna of the Thomson River and its major tributaries, Gippsland, Victoria*. Reports of the National Museum of Victoria, No. 1, 1982, pp 1-96.

upstream of the Macalister River, sampled after the 1998 fire, failed two draft SEPP biological objectives. Low flows and deposition of ash and sediment along the river's edge are the likely causes.

The ***Macalister River at Licola and downstream of Stringybark Creek*** failed to meet a number of draft SEPP biological objectives. Results indicate that diminished water quality due to minor agricultural pressures may be having an impact on macroinvertebrate fauna. At Licola, the riparian zone is also significantly modified by introduced species, especially willows. The Macalister River downstream of Stringybark Creek appears to be impacted by a combination of the input of sediment and ash from the Caledonia fire, low flows (drought) around the time of sampling, damage to the riverbank by stock, and reduced stability and quality of the streamside zone.

Most of the sites in the upper Avon catchment failed the draft SEPP biological SIGNAL objective for the edge habitat. This is surprising for the ***Avon River at Avon Wilderness*** in particular, as the area surrounding this site is a protected catchment. Another study conducted in 1999[7] indicated that this site was ecologically healthy, although susceptible to drought. This current assessment is also based on sampling in a drought period. In addition, results from these sites suggest that the natural habitat is limiting the faunal composition. Further work is needed to determine whether some of the draft biological objectives are set too high for this type of stream or if there is, in fact, minor degradation of water or habitat quality caused by a natural influence such as drought, or human activity in the catchment.

The only site in the upper Avon catchment clearly of identifiable concern is ***Freestone Creek at Blue Pools***. This site failed most draft SEPP biological objectives. No water quality issues were identified during sampling and the habitat index measures indicate very good habitat condition. Further investigation is needed to clarify the cause of biotic community degradation.

Lowland Reaches

This group includes the Latrobe River downstream of Lake Narracan, the Moe River/Drain, the Thomson River downstream of Cowwarr Weir, the Macalister River downstream of Lake Glenmaggie, and the Avon River downstream of Valencia Creek.

This area comprises the floodplains of the three major rivers and, as such, has been largely cleared. Much of the lower catchment is devoted to agriculture, including the Macalister Irrigation District (MID), but also includes most of the area's industries and towns. Impoundments just upstream of this area (Lake Narracan, Cowwarr Weir and Lake Glenmaggie) are used to supply irrigation and potable water, and to generate electricity. Consequently, the rivers downstream of these impoundments have heavily modified flow regimes. Irrigation water from the MID is returned to the Latrobe, Thomson and Macalister rivers via man-made and natural drains.

[7] Vertessy, D and Cameron, A., *River Health monitoring of the Gellibrand Catchment, and the Thomson, Wimmera, and Glenelg Catchments. – Final Report*. AWT Report 341/99. Water Ecoscience trading as AWT Victoria Pty Ltd., Report for the Department of Natural Resources and Environment, 1999

Generally, sites on the lowland reaches of these rivers failed to meet most or all of the draft SEPP biological objectives and are considered to be in very poor ecological condition. Poor physical condition and water quality, and modified flow regimes were all identified as contributing factors with the exception of the Avon River, which was considered to be affected by poor physical condition alone.

Hazel Creek and the ***Moe River/Drain*** are clearly ecologically impaired. Moderate pollution levels and very high levels of nutrients are indicated in both waterways. Hazel Creek receives Warragul's urban drainage as well as input from the Sewage Treatment Plant (STP). The Moe River/Drain receives inputs from Hazel Creek and also flows through an intensively farmed district that, although not irrigated, receives high rainfall. The Moe River/Drain is very likely a major contributor to recurring algal bloom problems in Lake Narracan.

The three sites on the ***Latrobe River below Lake Narracan*** had highly degraded macroinvertebrate communities and failed to meet any of the draft SEPP biological objectives. Poor stream bank stability, highly modified flow regimes and inputs from the MID, and industrial and urban sources all contribute to the highly degraded state of this section of the Latrobe River. The operation of Lake Narracan also likely contributes to instability of the streambed and banks. A long-term upward trend in dissolved oxygen levels at Thoms Bridge and Rosedale has been identified, which is probably linked to the progressive reduction and removal of thermal discharges from power stations.

The ***Thomson River at Bundalaguah*** below the MID is in poor ecological condition. This can largely be attributed to poor hydrology and elevated levels of nutrients, in particular, total phosphorus.

All sites within the MID decisively fail to meet all, or almost all, the draft SEPP biological objectives. The habitat and biological indices suggest that both water quality and habitat quality are very poor. Nutrient levels are very elevated in all of the creeks that drain the MID, and clearly farming practices within the MID are contributing to the poor water quality of the lower Thomson River. There is also a small STP discharge to the Macalister River at Maffra. In addition, diversion of flows at the Thomson Dam, Cowwarr Weir, and directly from the River by irrigators can occasionally result in the complete cessation of flow in the lower Thomson River in summer.

The three sites in the lower Avon catchment failed to meet the draft SEPP biological objectives for most of the indicators. The habitat indices for the ***Avon River at Stratford*** indicate that the actively eroding status of the River is probably the main factor contributing to its degraded state. A fair degree of habitat degradation and moderately high salinity was evident at ***Blackall Creek***. High habitat index scores for the ***Perry River upstream of the Perry River Bridge*** suggest that poor water quality is at fault and, indeed, this site had the highest salinity of all the sites sampled in the study. There were, however, still several saline sensitive species present, suggesting that further study of this and other ephemerally flowing river systems is needed as they are under-represented in biological assessment.

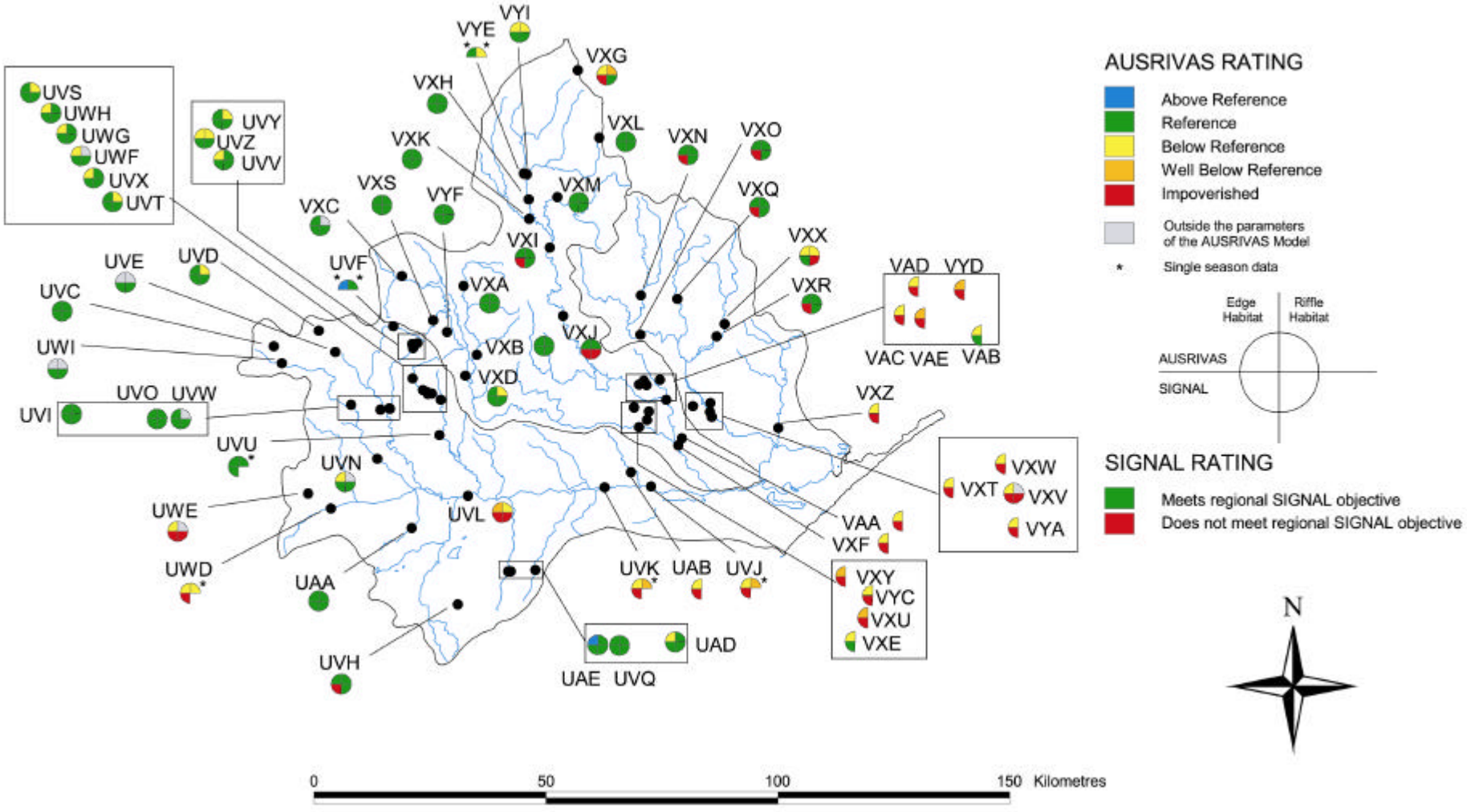


Figure 3: AUSRIVAS and SIGNAL ratings for sites in the Latrobe, Thomson and Avon catchments

Table 1: Results for the draft biological objectives, ISC, and RHA for sites in the Latrobe, Thomson and Avon catchments.

Site	Site Code	AUSRIVAS		Key Families Combined Habitats	SIGNAL		Number of		EPT Taxa		ISC Reach	ISC score	RHA	Total N (mg/l)	Total P (mg/l)	Turbidity (NTU)	EC25 (uS/cm)
		Edge	Riffle		Edge	Riffle	Edge	Riffle	Edge	Riffle							
Highland Sites																	
Eastern Tanjil R, Mt Baw Baw	UVY	1.03 (A)	0.75 (B)	21	6.7	6.8	25	21	10	8	24	43	175	0.136	0.004	2	24
Hope Ck, Mt Baw Baw	UVV	0.83 (B)	0.87 (A)	24	6.9	7.1	25	18	13	11	N/A	N/A	181	0.052	0.004	2	26
Charity Ck, Mt Baw Baw	UVZ	0.66 (B)	0.74 (B)	18	7.2	7.0	21	17	9	14	N/A	N/A	178	0.127	0.005	2	27
Little Boy Ck, Baw Baw NP	VXS	1.02 (A)	1.06 (A)	29	6.8	7.1	25	27	13	14	N/A	N/A	170	0.270	0.019	2	22
Nth Cascade Ck, Baw Baw NP	VYF	1.12 (A)	1.02 (A)	29	7.4	6.9	30	39	17	20	N/A	N/A	167	0.296	0.020	1	21
Shaws Ck, Rowleys Bridge	VXL	1.05 (A)	1.13 (A)	25	6.2	6.7	29	28	10	15	N/A	N/A	186	0.160	0.012	2	26
Caledonia R, Howitt Hut	VXG	0.65 (B)	0.53 (C)	21	6.0	6.5	31	24	5	9	N/A	N/A	188	0.182	0.028	3	50
Upper Catchments																	
Latrobe R, west of Noojee	UWI	O/S	O/S	33	6.7	6.8	32	28	14	12	7	41	144	0.410	0.020	4	52
Latrobe R, Hawthorn Bridge	UVI	0.94 (A)	0.99 (A)	N/A	5.7	6.4	33	28	9	14	6	41	180	0.440	0.032	4	60
Ada R, Ada R Rd	UVC	1.04 (A)	0.99 (A)	N/A	6.6	7.0	30	30	18	17	N/A	N/A	131	0.600	0.010	2	56
Loch R, Loch R Rd	UVD	1.03 (A)	0.64 (B)	N/A	6.9	7.1	28	33	15	19	N/A	N/A	182	0.690	0.046	7	81
Toorongo R, Toorongo Rd	UVE	O/S	O/S	36	7.1	7.1	32	31	14	13	N/A	N/A	196	0.350	0.017	5	51
Eastern Tanjil R, Tanjil Jn	UVW	0.93 (A)	O/S	N/A	6.2	7.0	27	36	9	17	24	43	192	0.294	0.018	4	45
Western Tanjil R, Saxtons Rd[1]	UVF	1.37 (X)	1.01 (A)	24	6.6	7.0	20	19	11	12	25	41*	N/A	0.109	0.004	2	32
Western Tanjil R, Tanjil Jn	UVO	1.07 (A)	0.94 (A)	N/A	6.4	6.5	33	32	12	15	25	41*	189	0.368	0.022	2	54
Western Tyers, Christmas Ck	UVS	0.95 (A)	0.81 (B)	N/A	6.8	7.1	36	38	15	18	17	41*	189	0.500	0.018	2	42
Western Tyers, Site 4	UWH	0.81 (B)	1.11 (A)	N/A	6.4	6.7	24	37	11	15	17	41*	188	0.232	0.020	3	27
Western Tyers, Site 3	UWG	0.79 (B)	1.14 (A)	N/A	6.4	7.0	22	36	9	18	17	41*	187	0.191	0.016	3	27
Western Tyers, Site 2	UWF	0.79 (B)	O/S	N/A	6.5	7.2	22	29	10	15	17	41*	181	0.194	0.020	4	27
Western Tyers, Site 1	UVX	0.79 (B)	1.07 (A)	N/A	6.2	6.6	25	37	11	17	17	41*	182	0.238	0.027	7	29
Middle Tyers above Tyers Jn	UVT	0.95 (A)	0.84 (B)	N/A	7.0	7.1	31	35	12	17	17	41*	158	0.220	0.009	3	52
Tyers R, Moe-Erica Rd	UVU	0.89 (A)	1.03(A)[2]	N/A	6.2	6.4[2]	24	22[2]	10	11[2]	17	41*	174	0.174	0.009	2	61
Middle Ck, Middle Ck Rd Ford	UVH	0.94 (A)	0.99 (A)	N/A	5.4	6.3	29	35	6	17	22	42*	N/A	0.239	0.024	5	243
Traralgon Ck, Koornalla	UVQ	0.99 (A)	0.95 (A)	N/A	5.7	6.8	38	33	12	17	12	47*	140	0.528	0.018	5	169
Jeeralang Ck, Koornalla	UAE	1.31 (X)	0.90 (A)	N/A	6.0	6.2	39	38	16	18	N/A	N/A	149	0.450	0.047	7	212
Flynn's Ck u/s Lyndons Rd	UAD	0.75 (B)	0.95 (A)	N/A	5.8	6.6	30	34	9	13	N/A	N/A	140	0.364	0.018	4	343
Latrobe R, Willow Grove	UVN	0.70 (B)	O/S	N/A	6.1	6.4	22	26	9	10	5	29*	123	0.560	0.054	8	88
Aberfeldy R u/s Lilly Ck	VXA	0.87 (A)	1.06 (A)	N/A	6.7	6.8	32	39	17	20	18	45	N/A	0.418	0.011	2	55
Aberfeldy R, Beardmore	VXB	1.02 (A)	0.90 (A)	N/A	6.4	6.2	40	29	17	13	18	45	N/A	0.189	0.009	1	72
Thomson R, Thomson Adit	VXC	1.04 (A)	O/S	N/A	6.8	7.1	38	31	19	17	5	N/A	N/A	0.270	0.015	3	38
Thomson R, The Narrows	VXD	0.85 (A)	0.66 (B)	N/A	6.3	6.5	31	25	14	9	4	N/A	N/A	0.225	0.008	2	43
Caledonia R u/s Macalister	VYI	0.80 (B)	0.80 (B)	N/A	6.3	7.0	24	26	8	14	N/A	N/A	186	0.156	0.012	2	53
Wellington R, Camp 16	VXM	0.91 (A)	0.85 (A)	N/A	6.0	6.9	31	30	11	16	N/A	N/A	184	0.090	0.002	2	48
Macalister R u/s Caledonia [2]	VYE	0.93 (A)	0.80 (B)	N/A	6.3	6.6	19	19	6	11	12	44*	189	0.095	0.002	1	31

Macalister R,at Glencairn	VXH	1.03 (A)	1.03 (A)	N/A	6.6	6.8	41	33	20	17	12	44*	168	0.203	0.016	2	32
Barkly R, Barkly Bridge	VXK	1.08 (A)	1.13 (A)	N/A	6.1	6.5	37	37	13	18	13	37*	180	0.203	0.006	1	75
Macalister R, Licola	VXI	0.94 (A)	0.95 (A)	N/A	5.7	6.3	31	27	9	14	11	35	122	0.116	0.013	1	58
Macalister R d/s Stringybark Ck	VXJ	0.86 (A)	0.93 (A)	N/A	5.5	5.8	30	29	7	11	9	30*	153	0.242	0.025	6	77
Avon R, Avon Wilderness	VXN	0.96 (A)	1.01 (A)	N/A	5.68	6.56	29	35	10	14	22	42*	181	0.203	0.014	2	62
Freestone Ck, Blue Pools	VXX	0.71 (B)	0.82 (B)	N/A	5.85	5.5	21	31	7	9	28	42	140	0.168	0.008	1	92
Freestone Ck, Briagolong	VXR	0.99 (A)	1.04 (A)	N/A	5.63	6.18	35	36	8	15	28	42	183	0.268	0.008	1	95
Avon R, The Channel	VXO	0.85 (A)	1.11 (A)	N/A	5.74	6.41	30	37	8	18	22	42*	198	0.155	0.011	1	71
Valencia Ck, Gillio Rd	VXQ	1.03 (A)	1.07 (A)	N/A	5.66	6.41	35	37	10	16	30	38*	163	0.161	0.013	2	127
Lower Catchments																	
Narracan Ck, Coalville	UAA	1.14 (A)	0.88 (A)	N/A	6.0	6.3	34	25	11	10	26	29*	129	1.10	0.054	10	224
Hazel Ck D/s Warragul STP	UWE	0.57 (B)	O/S	N/A	4.5	5.0	21	12	0	2	N/A	N/A	94	4.65	1.54	30	306
Moe R near Princes Hwy	UWD	0.63 (B)	0.80[1] (B)	N/A	5.0	5.8[1]	23	14[1]	3	7	27	27*	106	2.95	0.435	20	357
Latrobe R, Thoms Bridge	UVL	0.53 (C)	0.61 (B)	N/A	5.1	4.8	17	21	4	5	4	25	96	0.522	0.080	11	229
Latrobe R, Rosedale	UVK	0.60 (B)	0.38[1] (C)	N/A	4.8	4.1[1]	23	9[1]	2	1	3	22	101	0.845	0.106	24	408
Latrobe R, Kilmany South	UVJ	0.65 (B)	0.33[1] (C)	N/A	5.1	4.7[1]	20	11[1]	4	3	2	29*	112	0.935	0.230	31	428
Nambrock Ck, Nambrock-Maffra Rd	UAB	0.62 (B)	N/A	N/A	5.0	N/A	22	22	N/A	2	N/A	N/A	N/A	3.06	0.570	71	511
Macalister R, Bellbird Corner	VAB	0.59 (B)	N/A	N/A	5.6	N/A	21	N/A	3	N/A	7	26	97	0.315	0.028	6	75
Thomson R, Wandocka	VXE	0.73 (B)	N/A	N/A	5.8	N/A	25	N/A	10	N/A	2	25	N/A	0.374	0.040	12	106
Thomson R, Bundalaguah	VXF	0.76 (B)	N/A	N/A	5.0	N/A	19	N/A	4	N/A	1	21*	N/A	0.438	0.100	18	118
Newry Ck, Lower Newry Rd	VAC	0.72 (B)	N/A	N/A	4.5	N/A	22	N/A	3	N/A	N/A	N/A	83	1.22	0.225	20	656
Newry Ck, Boisdale	VAD	0.55 (B)	N/A	N/A	5.0	N/A	21	N/A	0	N/A	N/A	N/A	85	1.45	0.335	11	376
Newry Ck, Upper Maffra Rd	VAE	0.40 (C)	N/A	N/A	4.6	N/A	12	N/A	0	N/A	N/A	N/A	92	1.19	0.200	22	388
Carter Ck, Sellings Rd	VYD	0.53 (C)	N/A	N/A	5.3	N/A	26	N/A	2	N/A	N/A	N/A	112	0.866	0.280	9	119
Boggy Ck, McKinnons Rd	VXY	0.47 (C)	N/A	N/A	4.5	N/A	14	N/A	0	N/A	16	18*	69	3.60	1.10	8	342
Boggy Ck, Kingscotts Lane	VXU	0.40 (C)	N/A	N/A	4.5	N/A	14	N/A	1	N/A	16	18*	65	1.32	0.375	10	368
Wickham Ck, Kingscotts Lane	VYC	0.55 (B)	N/A	N/A	4.5	N/A	15	N/A	0	N/A	N/A	N/A	76	5.06	1.75	6	464
Bundalaguah R, Bongadina	VAA	0.56 (B)	N/A	N/A	5.1	N/A	17	N/A	3	N/A	N/A	N/A	55	1.76	0.390	57	541
Avon R, Stratford	VXV	0.83 (B)	O/S	N/A	5.0	5.33	21	23	5	8	19	34*	89	0.505	0.013	17	283
Perry R, u/s Perry Bridge	VXZ	0.74 (B)	N/A	N/A	5.15	N/A	35	N/A	5	N/A	23	44*	133	0.695	0.045	3	2134
Blackall Ck, Llowalang Road	VXW	0.79 (B)	N/A	N/A	5.26	N/A	24	N/A	4	N/A	26	38*	111	0.729	0.016	17	725
Nuntin Ck, Nordens Lane	VXT	0.60 (B)	N/A	N/A	4.72	N/A	20	N/A	13	N/A	N/A	N/A	94	1.54	0.285	10	663
Nuntin Ck, Settlement Road	VYA	0.66 (B)	N/A	N/A	5.10	N/A	20	N/A	5	N/A	N/A	N/A	105	1.76	0.56	7	712

Draft SEPP Biological Objectives

MEETS DRAFT BIOLOGICAL OBJECTIVE

DOES NOT MEET DRAFT BIOLOGICAL OBJECTIVE

[1] single season – autumn

[2] single season – spring

O/S = outside the experience of the model

N/A = not available

* = Some subindices were estimated

ISC/RHA rating

Excellent

Good

Marginal

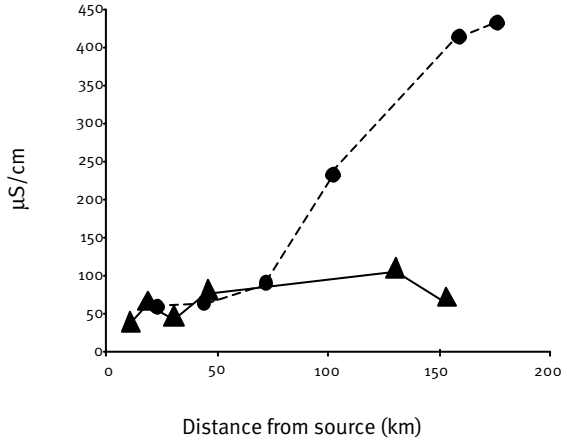
Poor

Very poor

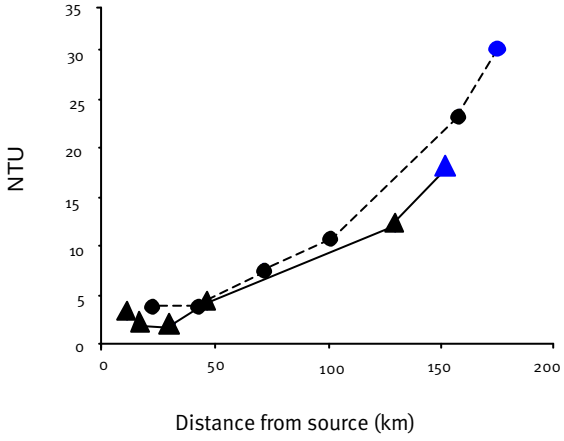
Water quality assessment

Greater than the 50th percentile SEPP objective

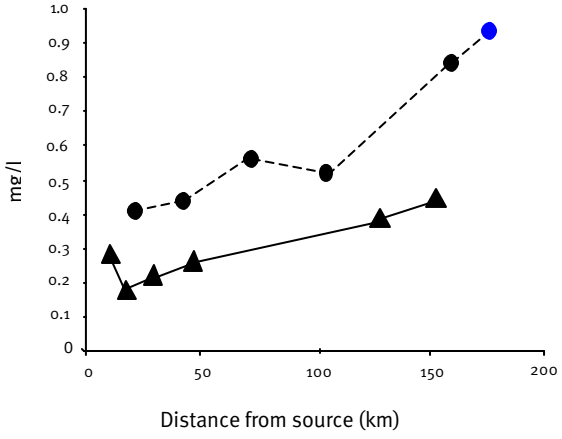
Greater than the 90th percentile SEPP objective



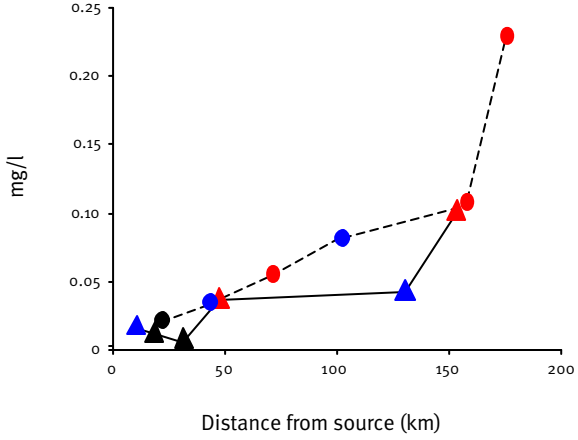
Electrical Conductivity (µS/cm)



Turbidity (NTU)

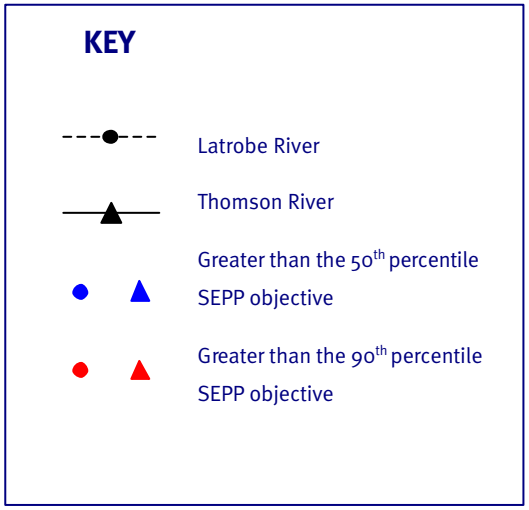


Total Nitrogen (mg/L)



Total Phosphorus (mg/L)

Figure 4: Water quality for sites on the Latrobe and Thomson rivers with increasing distance from headwaters



4 MAIN FACTORS INFLUENCING ENVIRONMENTAL CONDITION

In general, the ecological health of the Latrobe, Thomson and Avon river systems declines dramatically from their headwaters to Lake Wellington.

Three main contributing factors to poor ecological condition were identified: habitat degradation, changes to the natural flow regime and water quality degradation. All of these factors can have major impacts upon the ecology of a stream, and they rarely occur in isolation.

There are now a number of initiatives being implemented within the catchments to tackle these factors and drive long-term improvements in the health of the rivers in central Gippsland.

Habitat Degradation

The vegetation in the streamside zone is most important to the maintenance of healthy in-stream habitat. The quantity and quality of streamside vegetation has been reduced by land clearing and allowing stock access to the stream bank. This has resulted in erosion and a subsequent increase in suspended sediments, loss of shading, loss of in-stream woody debris essential for habitat, and invasion by exotic vegetation (especially willows and blackberry). Other practices such as removal of woody debris, channel straightening and changes to the flow regime also lead to increased erosion.

The West Gippsland Catchment Management Authority (WGCMA) currently invests approximately $1 million annually in willow removal, and has reinstated several meanders on the lower Latrobe River. Further activities planned by the CMA include restoration of indigenous native vegetation and in-stream woody debris, improved stock control, river bank and bed stabilisation, creation of in-stream fish habitat and reclamation/ restoration of wetlands.

Modified Flow Regimes

Alterations in the natural range of any of the components of flow regime can directly or indirectly influence the ecology of aquatic communities. River regulation, through the building of dams and weirs, and diversion of flow for off-stream uses, can have profound effects on the frequency and magnitude of floods, the duration and timing of high and low flow periods, and the rate of rise and fall of water level.

Sustained periods of low flow can lead to invasion and clogging by vegetation, particularly exotics such as willows. Removal of floods can lead to deterioration of billabongs and wetlands as a result of less frequent wetting. Rapid rises and falls in the river level can lead to bank collapse.

The flows in the Latrobe, Tanjil, Tyers, Thomson and Macalister rivers have all been significantly altered by regulation. In particular, the flows in the lower Thomson and Macalister rivers have reduced by approximately 50 per cent: the cumulative effect of which is significant deterioration of the in-stream ecological and physical condition of these rivers.

The five-year Thomson River Stressed Stream Project Rehabilitation Plan[8] focuses on restoring the lower Thomson River. Planned activities include upgrading water allocations and possible removal of levee banks, as well as a large range of habitat rehabilitation activities in both the streamside zone and in-stream environment.

Water Quality Degradation

Deterioration in water quality influences the health and composition of aquatic communities. Elevated nutrient levels lead to nuisance growth of algae and subsequent lowering of dissolved oxygen concentration. Increased salinity can cause the loss of saline sensitive species, and high turbidity results in low light levels in the water.

Water quality generally declines with increasing distance downstream from the rivers' headwaters (Figure 4). Impacts are particularly evident in the lowland reaches of the Latrobe and Thomson and Macalister rivers. Excessive levels of nutrients are the main water quality issue, but there are also elevated turbidity levels in the rivers.

The main factors contributing to poor water quality in the lower Latrobe catchment are irrigation drainage, STP discharges, runoff from intensively farmed areas, urbanisation and erosion. In the lower Thomson, irrigation drainage and erosion are key contributors, while the Avon catchment appears to be primarily influenced by erosion.

To assist the delivery of the SEPP target of a 40 per cent reduction in phosphorus inputs from the MID by 2005, Southern Rural Water (SRW) and the Department of Natural Resources and Environment (NRE) prepared the Macalister Irrigation District Nutrient Reduction Plan. An expanded MID monitoring program also allows SRW to more accurately estimate nutrient loads from the irrigation drains. NRE has developed a nutrient runoff model for the MID, enabling exploration of various management scenarios for the reduction of nutrients, and NRE's research farms at Ellinbank and Macalister are investigating how farming practices affect nutrient runoff. Associated with these activities are extension and incentive programs for farmers, supported by the Government's Gippsland Lakes Rescue Package and Water for Growth Program.

Gippsland Water is currently upgrading all of its STPs with the aim of reducing phosphorus loads by 80 per cent. Additionally, some small townships have recently been connected to sewer and one STP has moved to complete re-use of effluent.

5 DIRECTIONS IN MANAGEMENT AND MONITORING

There have been a number of studies and programs undertaken in recent years to identify impacts and improve habitat condition, flow regimes and water quality across the catchments. In this assessment, these have been used to relate observed environmental quality and impacts to likely sources and catchment issues. While not the focus of this study, a number of issues were highlighted that are

[8] WGCMA, *Thomson River Stressed Stream Project Rehabilitation Plan.* West Gippsland Catchment Management Authority, 2000.

relevant to consider in current and future management and monitoring programs.

- Degradation in water quality and habitat and reduction in natural flow regimes all contribute to poor ecological and physical condition in rivers, and rarely occur in isolation. Generally, two or more of these factors are influencing the condition of many rivers in the Latrobe, Thomson and Avon catchments. Management programs should consider all relevant contributors to ensure improved river condition outcomes.
- Existing rehabilitation and restoration programs involve a considerable investment of resources. If support for these programs is to be maintained, their effectiveness needs to be demonstrated. The current level of monitoring is not sufficient and increased investment in program monitoring would provide feedback essential for demonstrating the value of programs, improving current programs and adapting to new challenges.
- The current monitoring of the lower reaches of the lower Latrobe and Morwell rivers, in particular, is inadequate considering the level of disturbance and activities in these reaches. There is potential for coordination of industrial and STP discharge monitoring programs with the VWQMN, to provide a more complete picture of environmental condition.
- While urban waterways were only briefly touched on in the study, indications are that they are in very poor condition. An assessment of waterways affected by urbanisation, especially those in the central Latrobe Valley, to identify the causes of degradation will enable the identification of opportunities for restoration.
- The need for some further development of the models used to assess biological condition is evident from this study. In particular, the lower than expected AUSRIVAS rating for a significant proportion of apparently healthy alpine sites indicates that the State-wide model is unsuitable for these types of streams. The development of a regional alpine model would recognise the differences in factors such as climate, geology and topography inherent in alpine systems, and provide a more accurate picture of the environmental condition.
- There were also a few sites that, while no apparent stress factors could be readily identified, appear to be ecologically degraded. Freestone Creek at Blue Pools, and some sites on the upper Tyers and Latrobe rivers require further investigation to determine whether they are degraded or, in fact, represent unusual natural systems that do not 'fit' the current regional models and biological objectives developed by EPA.