Victorian Water Quality Analysis 2022 Time Series Report





Author

Robert Sargent, Department of Civil Engineering, Monash University Danlu Guo, School of Engineering, College of Engineering, Computing & Cybernetics, Australian National University Anna Lintern, Department of Civil Engineering, Monash University Andrew W. Western, Department of Infrastructure Engineering, The University of Melbourne Judy M. Hagan, Department of Energy, Environment and Climate Action Paul Wilson, Department of Energy, Environment and Climate Action

Photo credit

Erskine River, 2010. © Alison Pouliot



© The State of Victoria Department of Energy, Environment and Climate Action October 2023

Creative Commons

This work is licensed under a Creative Commons Attribution 4.0 International licence, visit the Creative Commons website (http://creativecommons.org/licenses/by/4.0/).

You are free to re-use the work under that licence, on the condition that you credit the State of Victoria as author. The licence does not apply to any images, photographs or branding, including the Victorian Coat of Arms, and the Victorian Government and Department logos.

ISBN 978-1-76136-476-1 (pdf)

Disclaimer

This publication may be of assistance to you but the State of Victoria and its employees do not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for any error, loss or other consequence which may arise from you relying on any information in this publication.

Accessibility

To receive this document in an alternative format, phone the Customer Service Centre on 136 186, email customer.service@delwp.vic.gov.au, or contact National Relay Service on 133 677. Available at DEECA website (www.deeca.vic.gov.au).

Contents

Introduction	2
Description of water quality time series plots	2
Presentation of water quality time series for each site	2
Part 1 – Individual sample values	
Part 2 – Attainment of the water quality ERS	.2
Water quality monitoring sites	4
Water quality time series by basin	9
East Gippsland Basin1	0
Snowy Basin 1	8
Tambo Basin2	2
Mitchell Basin	8
Thomson Basin	4
Latrobe Basin	0
South Gippsland Basin	4
Bunyip Basin5	4
Yarra Basin5	8
Maribyrnong Basin	6
Werribee River	6
Moorabool Basin	2
Barwon Basin10	0
Lake Corangamite11	2
Otway Coast Basin 11	6
Hopkins Basin	8
Portland Coast Basin	4
Glenelg Basin	8
Upper Murray Basin	4
Kiewa Basin 17	8
Ovens Basin	8
Broken Basin	6
Goulburn Basin	6
Campaspe Basin	-2
Loddon Basin	2
Avoca Basin	6
Wimmera Avon Basin	2

Introduction

This report is part of a series delivered by the Victorian Department of Energy, Environment and Climate Action (DEECA), under s. 22 of the Water Act (1989).

The Victorian Water Quality Analysis 2022 answers key questions related to surface water quality they are:

Overarching questions

- 1. What is the overall status of water quality in Victoria?
- 2. How and why does water quality vary across Victoria?
- 3. How and why has water quality varied over recent decades?

Targeted questions

- 4. How has, and how will, long-term climate variability and change impact water quality?
- 5. How do bushfires affect water quality?
- 6. How are BGA blooms changing?
- 7. How can continuous water quality data be used to understand water quality events?

This report complements the Victorian Water Quality Analysis 2022 Technical Report, by presenting time series plots of water quality and streamflow at 137 sites used in the core analysis of the Victorian Water Quality Report 2022 (Chapters 3 and 4).

These time series plots provide additional detail, and visual reference to the findings of the Technical Report.

Description of water quality time series plots

Presentation of water quality time series for each site

For each site, individual sample values, as well as attainment of the Environmental Reference Standard ERS) objectives for water quality are presented across two multi-panel graphics.

Part 1 - Individual sample values

The first plot presents, where available, the values of six selected water selected quality constituents measured in all samples collected during the period 1991-2021 (inclusive), in addition to the mean flow on the day of sampling. From top to bottom in each plot, the panels present the following data:

- Average streamflow (Q) on the day of sampling, expressed in units of megalitres per day (ML/day)
 plotted with logarithmic scale on the y-axis.
- Electrical Conductivity (EC), a measurement of salinity, expressed in units of micro siemens per centimetre (µS/cm)
- Turbidity, a measurement of the light scattering characteristics, expressed in Nephelometric Turbidity Unit (NTU).
- Total nitrogen (TN), expressed in units of milligrams of nitrogen per litre (mg/L)
- Total nitrogen (TN), expressed in units of milligrams of phosphorus per litre (mg/L)
- pH, a measure of acidity/alkalinity, expressed in pH units.
- Dissolved Oxygen (DO), expressed in units of milligrams of dissolved oxygen per litre (mg/L).

The median value of each constituent within each calendar year is also presented.

Part 2 – Attainment of the water quality ERS

This plot presents attainment of the Environmental Reference Standard (ERS) objectives at the site, assessed for each calendar year during the period 1991-2021, for the six selected water quality constituents. ERS attainment is assessed by comparing a calculated statistic (either the 75th or 25th percentile value) with an objective value. Calculated percentiles are only assessed against the ERS objective during a calendar

year if at least 11 out of 12 monthly samples were available. If fewer than 11 samples were collected, calculated percentiles are not displayed. Total discharge in each calendar year is also presented.

From top to bottom in each plot, the panels present the following data:

- Total streamflow in each calendar year, expressed in gigalitres per year (GL/year). Total streamflow is presented if at least 90% of all daily flow observations are available for that year.
- The annual 75th percentile of electrical conductivity measurements. 75th percentile values that lie below the ERS objective attain of the objective.
- Annual 75th percentile of turbidity measurements. 75th percentile values that lie below the ERS objective attain of the objective.
- Annual 75th percentile of total phosphorus measurements. 75th percentile values that lie below the ERS objective attain of the objective.
- Annual 75th percentile of total nitrogen measurements. 75th percentile values that lie below the ERS objective attain of the objective.
- Annual 25th and 75th percentile of pH measurements. The ERS is attained if the 25th percentile lies above the lower ERS objective, and the 75th percentile lies below the upper ERS objective.
- Annual 25th percentile of dissolved oxygen values, expressed as a percent of the saturation concentration. The ERS is attained if the 25th percentile lies above the ERS objective.

The ERS objective value for each parameter is indicated by the red dashed line. If a calculated percentile lies within the pink shaded region, this indicates that the ERS objective was not attained for that year.

As sites are not assessed for attainment of the ERS objectives if fewer than 11 samples were collected in a given year, sites with non-perennial flow behaviour may not assessed against the ERS during some years, as samples can only collected when water is present.

In both plots, year labels on the x-axis are aligned with July 1st, as are the calculated summary statistics (annual median, 25th and 75th percentile, and total streamflow).

Water quality monitoring sites



Figure 1: Location and 6-digit site IDs of 137 sites presented in this report. Full site names corresponding to 6-digit site IDs provided in Table 1. The numbers on the dots indicate the index of sites, which are detailed in Table 1.

Table 1: List of the 137 sites presented in this report, listed by basin, with rivers listed east to west, and upstream to downstream.

Basin	Index	Site ID	Site name
East Gippsland Basin	1	221208	Wingan River @ Wingan Inlet National Park
	2	221201	Cann River (West Branch) @ Weeragua
	3	221211	Combienbar River @ Combienbar
	4	221212	Bemm River @ Princes Highway
Snowy	5	222202	Brodribb River @ Sardine Creek
Basin	6	222217	Rodger River @ Jacksons Crossing
Tambo	7	223202	Tambo River @ Swifts Creek
Basin	8	223214	Tambo River @ U/S of Smith Creek
	9	223204	Nicholson River @ Deptford
Mitchell	10	224203	Mitchell River @ Glenaladale
Basin	11	224213	Dargo River @ Lower Dargo Road
	12	224206	Wonnangatta River @ Crooked River
Thomson	13	225201	Avon River @ Stratford
Basin	14	225114	Thomson River @ D/S Whitelaws Creek
	15	225210	Thomson River @ The Narrows
Latrobe	16	226228	Latrobe River @ Rosedale (Main Stream)
Basin	17	226226	Tanjil River @ Tanjil Junction
South	18	227200	Tarra River @ Yarram
Gippsland Basin	19	227211	Agnes River @ Toora
	20	227237	Franklin River @ Toora
	21	227202	Tarwin River @ Meeniyan
	22	227231	Bass River @ Mcgrath Road
Bunyip	23	228248	Tarago River @ Labertouche (Morrisons Road)
Basin	24	228217	Toomuc Creek @ Pakenham
	25	228250	Watsons Creek @ Somerville
Yarra Basin	26	229144	Watts River @ Healesville Racecourse
	27	229232	Yarra River @ Healesville (Maxwell Bridge)
	28	229252	Brushy Creek @ Lower Homestead Road Wonga Park
	29	229608	Watsons Creek @ Henley Road
	30	229250	Andersons Creek @ Warrandyte (Everard Drive)
	31	229229	Koonung Creek @ Bulleen
	32	229231	Gardiners Creek @ Glenferrie Road Hawthorn
	33	229643	Moonee Ponds Creek @ Racecourse Road, Flemington
	34	230105	Maribyrnong River @ Keilor (Brimbank Park Ford)
Maribyrnong Basin	35	230235	Maribyrnong River @ Avondale Heights (Canning St. Ford)
Basin	36	230232	Deep Creek @ Bolinda
	37	230205	Deep Creek @ Bulla (D/S of Emu Creek Junction)

Basin	Index	Site ID	Site name
	38	230209	Barringo Creek @ Barringo (U/S of Diversion)
Werribee Basin	39	231108	Skeleton Creek At Point Cook Road Laverton
	40	231204	Werribee River @ Werribee (U/S Riversdale Rd. Weir)
	41	231231	Toolern Creek @ Melton South
Moorabool	42	232200	Little River @ Little River (You Yangs Road)
Basin	43	232202	Moorabool River @ Batesford
	44	232204	Moorabool River @ Morrisons
	45	232210	Moorabool River West Branch @ Lal Lal
Barwon	46	233200	Barwon River @ Pollocksford
Basin	47	233214	Barwon River East Branch @ Forrest
	48	233218	Barwon River @ Inverleigh
	49	233224	Barwon River @ Ricketts Marsh
	50	233215	Leigh River @ Mount Mercer
	51	233228	Boundary Creek @ Yeodene
Lake	52	234201	Woady Yaloak River @ Cressy (Yarima)
Corangamite	53	234203	Pirron Yallock Creek @ Pirron Yallock (Above H'wy Br.)
Otway Coast	54	235216	Cumberland River @ Lorne
Basin	55	235202	Gellibrand River @ Upper Gellibrand
	56	235224	Gellibrand River @ Burrupa
	57	235227	Gellibrand River @ Bunkers Hill
	58	235209	Aire River @ Beech Forest
	59	235234	Love Creek @ Gellibrand
	60	235204	Little Aire Creek @ Beech Forest
	61	235205	Arkins Creek West Branch @ Wyelangta
	62	235211	Kennedys Creek @ Kennedys Creek
	63	235237	Scotts Creek @ Curdie (Digneys Bridge)
	64	235203	Curdies River @ Curdie
Hopkins	65	236215	Burrumbeet Creek @ Lake Burrumbeet
Basin	66	236216	Mount Emu Creek @ Taroon (Ayrford Road Bridge)
	67	236209	Hopkins River @ Hopkins Falls
Portland	68	237200	Moyne River @ Toolong
Coast Basin	69	237207	Surry River @ Heathmere
Glenelg	70	238208	Jimmy Creek @ Jimmy Creek
Basin	71	238202	Glenelg River @ Sandford
	72	238205	Glenelg River @ Rocklands Reservoir
	73	238206	Glenelg River @ Dartmoor
	74	238231	Glenelg River @ Big Cord
	75	238204	Wannon River @ Dunkeld
	76	238228	Wannon River @ Henty

Basin	Index	Site ID	Site name
	77	238223	Wando River @ Wando Vale
Upper	78	401212	Nariel Creek @ Upper Nariel
Murray Basin	79	401215	Morass Creek @ Uplands
	80	401203	Mitta Mitta River @ Hinnomunjie
	81	401204	Mitta Mitta River @ Tallandoon
	82	401211	Mitta Mitta River @ Colemans
	83	401216	Big River @ Jokers Creek
	84	401226	Victoria River @ Victoria Falls
Kiewa Basin	85	402203	Kiewa River @ Mongans Bridge
	86	402205	Kiewa River @ Bandiana
	87	402222	Kiewa River @ Kiewa (Main Stream)
	88	402223	Kiewa River West Branch @ U/S of Offtake
	89	402204	Yackandandah Creek @ Osbornes Flat
Ovens Basin	90	403205	Ovens Rivers @ Bright
	91	403210	Ovens River @ Myrtleford
	92	403230	Ovens River @ Rocky Point
	93	403241	Ovens River @ Peechelba
	94	403244	Ovens River @ Harrietville
	95	403217	Rose River @ Matong North
	96	403223	King River @ Docker Road Bridge
	97	403228	King River @ Lake William Hovell T.G.
	98	403213	Fifteen Mile Creek @ Greta South
Broken	99	404207	Holland Creek @ Kelfeera
Basin	100	404210	Broken Creek @ Rices Weir
	101	404214	Broken Creek @ Katamatite
	102	404216	Broken River @ Goorambat (Casey Weir H. Gauge)
	103	404224	Broken River @ Gowangardie
Goulburn	104	405200	Goulburn River @ Murchison (Mcphee's Rest)
Basin	105	405203	Goulburn River @ Eildon
	106	405204	Goulburn River @ Shepparton
	107	405219	Goulburn River @ Dohertys
	108	405232	Goulburn River @ Mccoys Bridge
	109	405214	Delatite River @ Tonga Bridge
	110	405264	Big River @ D/S of Frenchman Creek Junction
	111	405251	Brankeet Creek @ Ancona
	112	405209	Acheron River @ Taggerty
	113	405234	Seven Creeks @ D/S of Polly Mcquinn Weir
	114	405205	Murrindindi River @ Murrindindi Above Colwells
	115	405231	King Parrot Creek @ Flowerdale

Basin	Index	Site ID	Site name
	116	405212	Sunday Creek @ Tallarook
Campaspe Basin	117	406202	Campaspe River @ Rochester D/S Waranga Western Ch Syphn
	118	406207	Campaspe River @ Eppalock
	119	406213	Campaspe River @ Redesdale
	120	406235	Wild Duck Creek @ U/S of Heathcote-Mia Mia Road
	121	406214	Axe Creek @ Longlea
Loddon	122	407255	Bendigo Creek @ Huntly
Basin	123	407209	Gunbower Creek @ Koondrook
	124	407202	Loddon River @ Kerang
	125	407203	Loddon River @ Laanecoorie
	126	407215	Loddon River @ Newstead
	127	407229	Loddon River @ Serpentine Weir
	128	407214	Creswick Creek @ Clunes
Avoca Basin	129	408200	Avoca River @ Coonooer
	130	408202	Avoca River @ Amphitheatre
	131	408203	Avoca River @ Quambatook
Wimmera	132	415200	Wimmera River @ Horsham
Avon Basin	133	415207	Wimmera River @ Eversley
	134	415246	Wimmera River @ Lochiel Railway Bridge
	135	415257	Richardson River @ Donald
	136	415203	Mount William Creek @ Lake Lonsdale (Tail Gauge)
	137	415251	Mackenzie River @ Mckenzie Creek

Water quality time series by basin

East Gippsland Basin

















Snowy Basin









Tambo Basin













Mitchell Basin













Thomson Basin










38 Title



Latrobe Basin









South Gippsland Basin





















Bunyip Basin









Yarra Basin




































Maribyrnong Basin





















Werribee River













Moorabool Basin

















Barwon Basin
























Lake Corangamite









Otway Coast Basin













































Hopkins Basin












Portland Coast Basin









Glenelg Basin



































