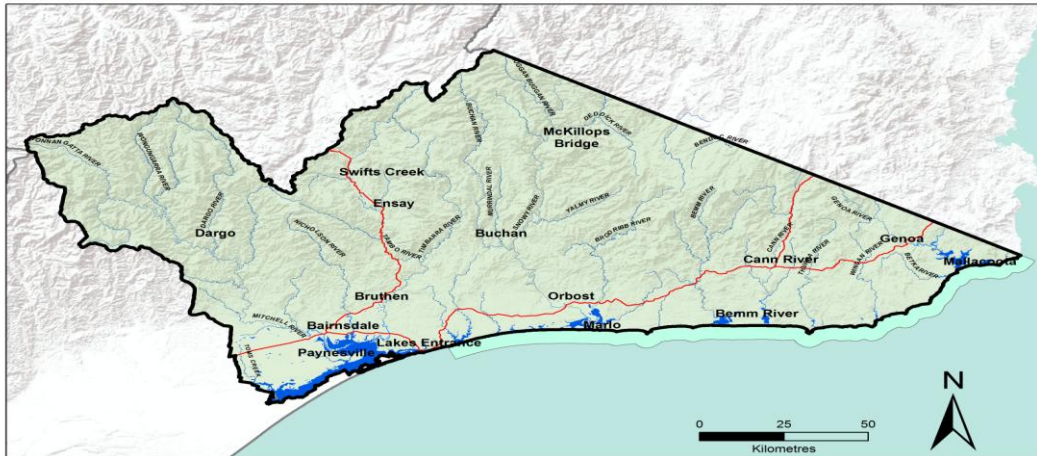


INTRODUCTION

East Gippsland Regional Overview



The East Gippsland Catchment Management region covers 2.2 million hectares of land, lakes and coastal waters in eastern Victoria. The region covers about ten per cent of Victoria.

The region is entirely south of the Great Dividing Range and includes the catchments of streams from the Mitchell River eastwards to the Victoria-New South Wales border.

The northern boundary is formed by the Great Dividing Range where mountains rise to elevations of 1500 metres. The southern boundary is located three nautical miles (5.5km) off the coast.

Rivers generally run from north to south, rising in the alpine reaches and progressing through lowland forests to coastal estuaries in the south.

About 83 percent of the land is in public ownership, mainly as state forests, national and coastal parks, and marine national parks. The region contains a number of significant natural assets including 'heritage rivers', Ramsar listed wetlands and many national parks and reserves.

Overall, the region is in good condition and rates highly when compared with the rest of Victoria in terms of native vegetation, forests and parks, biodiversity, soils, rivers and streams, groundwater, lakes and wetlands, and estuaries and coasts.

Agricultural land covers 17 per cent of the region. Grazing occupies the largest area and there are productive areas of irrigated horticulture and dairying on the floodplains of the Snowy and Mitchell rivers. Variability of rainfall is a notable feature of the region. Large rain events are often associated with an east coast low pressure system. Annual rainfall can be highly variable, giving rise to droughts and floods that have an effect on waterway health, fire and land management

From: East Gippsland Regional Catchment Strategy 2012-2018

EAST GIPPSLAND WATERWATCH PROGRAM

The East Gippsland Waterwatch Program is administered and supported by the EGCMA Water Team.

The vision East Gippsland Waterwatch maintains is;

‘To bring about an improvement and awareness in water quality and river health in the East Gippsland region’

Waterwatch is one of several organisations undertaking water quality monitoring in the East Gippsland Catchment. East Gippsland Water undertakes regular monitoring of drinking water and DSE target project-specific monitoring e.g. bushfire recovery monitoring.

Through water quality monitoring East Gippsland Waterwatch currently engages a broad sector of the community in catchment health issues. Waterwatch monitoring participants are varied and undertake water quality monitoring for a range of purposes. East Gippsland Waterwatch has monitored water quality at approximately 320 sites around the region since 1995.

Waterwatch monitors a diverse range of water systems found in the East Gippsland region. These include:

- Freshwater
- Estuarine
- Wetlands
- Groundwater
- Stormwater

Monitoring is undertaken on a monthly basis by the individual or group with the monitoring data entered directly into the Waterwatch Database or forwarded to the EGCMA Water Team.

Due to the region’s water quality being traditionally in such good condition compared with other regions of Victoria, maintaining interest in water quality monitoring has been difficult. Without observing change, few volunteers maintain the enthusiasm to undertake regular, long term monitoring. Biological monitoring (macroinvertebrates) is one means of maintaining enthusiasm. Other activities such as the annual QA/QC day and biodiversity workshops also enhance the interest of our volunteers.

A number of organisations have expressed interest in data collected by the East Gippsland Waterwatch program, they include; EGCMA, DSE, DPI, Advance TAFE, Parks Victoria, consultants, community groups, schools, students and individuals.

Schools Program

The schools program is well established with many of the schools and students taking part in a variety of activities. Activities are currently run by the teachers with support provided by the EGCMA Water Team. These activities include The Kinder Catchment Crusader, water quality monitoring and macroinvertebrate sampling and identification. The program also extends to Advance TAFE with Diploma in Conservation and Land Management students participating in water quality sampling and testing, macroinvertebrate sampling and identification and habitat surveys.



OBJECTIVES

Guiding Principles

- To develop community awareness and "ownership" of water quality issues;
- To assist in the collection of water quality data that can be used to gauge trends and improvements in water quality in streams.

As a result of this increased community awareness and "ownership", communities are encouraged to take remedial actions to improve the water quality in our waterways.

East Gippsland Waterwatch believes that where data is collected by well-trained staff and monitors from significant locations across the region according to a whole of catchment monitoring plan, the value of Waterwatch data to monitoring groups and to water managers is greatly enhanced.

Aims of the Data Confidence Plan

- Produce credible data of known quality, consistent with the State Waterwatch Victoria Data Confidence Framework.
- Promote the professionalism, skills and achievements of the Waterwatch water monitoring program.
- Demonstrate data quality to program stakeholders, (data users, sponsors – actual and potential, community monitoring network, East Gippsland Catchment Management Authority and other agencies).
- Give satisfaction back to volunteers by clearly highlighting the value of their data.
- Benchmark current practices, through the documentation of procedures to ensure continuity of program delivery.

Future Aims of the East Gippsland Waterwatch Monitoring Program include:

- increase both monitors and monitoring sites
- improve the strategic placement of sites
- increase project based monitoring
- increase pre and post event monitoring
- look at the tests undertaken and review whether or not all parameters are key parameters for long term data, and
- target stormwater, dairy/agriculture industry monitoring and fire recovery

PARAMETERS

East Gippsland Waterwatch measures a number of water quality parameters in the region. These include:

- Temperature – Water and Air (°C)
- Electrical conductivity (µs/cm)
- pH (pH units)
- Turbidity (NTU)
- Dissolved Oxygen (mg/L & %)
- Phosphorus (reactive) (mg/L P) and (ppm)
- Habitat surveys
- Macroinvertebrates

NOTE: Not all sites are monitored for all of the above parameters.

NOTE: all parameters are measured on site or within 24 hours of sample being taken.

INSTRUMENTATION

The Waterwatch program in the East Gippsland region uses different types of monitoring equipment. The following list includes equipment used for monitoring physical/chemical parameters. Instrument specifications (instrument type/model, range, resolution and accuracy), parameters monitored (including units), and distributor/manufacture details (company name, contact name, address and phone number) are noted.

Table 1. Instrumentation used in the monitoring program

Parameters monitored	Instrument type and model	Unit of measurement (pH units)	Range (e.g. 0 – 14 pH)	Resolution (e.g. 0.01 pH)	Accuracy (e.g. ± 0.05 pH)	Distributor name and contact details for repairs/servicing/enquiries
Electrical Conductivity	YSI Model 85	uS/cm mS/cm	0 to 499.9 uS/cm 0 to 4999 uS/cm 0 to 49.99 mS/cm 0 to 200.0 mS/cm	0.1uS/cm 1.0uS/cm .01 mS/cm 0.1mS/cm	$\pm .5\%$ FS $\pm .5\%$ FS $\pm .5\%$ FS $\pm .5\%$ FS	John Morris Scientific Pty Ltd P.O. Box 447 Willoughby NSW 2068 02 9417 8877
Electrical Conductivity	Cyberscan PCD650	uS/cm mS/cm	.. to 500 mS/cm	0.05% FS	$\pm 1\%$ FS + 1 LSD	Westlab 122 Fussell Street Ballarat Vic 3350 03 5333 2941
Electrical Conductivity	LaMotte Tracer Pocketester (Multi & EC)	μ S/cm mS/cm	0-199.9 μ S/cm, 200-1999 μ S/cm 2.00-19.99 mS/cm	0.1 μ S/cm 1 μ S/cm 0.01 mS/cm	$\pm 2\%$ FS	Vendart Pty Ltd PO Box 451 Pymble NSW 2073 02 9450 0466
Electrical Conductivity	Eutech PCTestr 35	μ S/cm mS/cm	0-199.9 μ S/cm, 200-1999 μ S/cm 2.00-20.00 mS/cm	0.1 μ S/cm 1 μ S/cm 0.01 mS/cm	$\pm 1\%$ FS	Vendart Pty Ltd PO Box 451 Pymble NSW 2073 02 9450 0466
pH	Cyberscan PCD650	pH	-2.000 to 20.000 pH	0.1/0.01/0.001 pH	± 0.002 pH	Westlab 122 Fussell Street Ballarat Vic 3350 03 5333 2941

pH	LaMotte Tracer Pocketester (Multi)	pH	-1.0 – 15.0 pH	0.1 pH	± 0.1 pH	Westlab 122 Fussell Street Ballarat Vic 3350 03 5333 2941
pH	Eutech PCTestr 35	pH	0.00 to 14.00 pH	0.01 pH	0.01 pH	Westlab 122 Fussell Street Ballarat Vic 3350 03 5333 2941
pH	Eutech pHTestr 2	pH	-1.0 – 15.0 pH	0.1 pH	± 0.1 pH	Vendart Pty Ltd PO Box 451 Pymble NSW 2073 02 9450 0466
Dissolved Oxygen	YSI Model 85	% mg/L	0 to 200 % Air Sat. 0 to 20 mg/L	0.1% Air Sat. 0.01 mg/L	± 2% Air Sat. ± 0.3 mg/L	John Morris Scientific Pty Ltd P.O. Box 447 Willoughby NSW 2068 02 9417 8877
Dissolved Oxygen	Cyberscan PCD650	% mg/L	0 to 90.00 mg/L or ppm / 0 to 600%	0.01 mg/L or ppm	± 0.2%. ± 0.2 mg/L	Westlab 122 Fussell Street Ballarat Vic 3350 03 5333 2941
Dissolved Oxygen	LaMotte Oxygen Tracer Pocketester	% mg/L	1 – 12mg/l (ppm)	0.2mg/L	Not available	Vendart Pty Ltd PO Box 451 Pymble NSW 2073 02 9450 0466
Temperature – Water & Air	Cyberscan PCD650	°C	-10.0 to 110.0 °C	0.1°C	± 0.5 °C	Westlab 122 Fussell Street Ballarat Vic 3350
Temperature – Water	YSI Model 85	°C	-5 to +65°C 0.0 -65 °C	0.1°C	±0.1°C (±1 1sd)	John Morris Scientific Pty Ltd P.O. Box 447 Willoughby NSW 2068 02 9417 8877
Temperature – Water & Air	LaMotte Tracer Pocketester (Multi & EC) Eutech PCTestr 35	°C	0.0 -65 °C	0.1°C	± 1 °C	Vendart Pty Ltd PO Box 451 Pymble NSW 2073 02 9450 0466

Turbidity	Turbidity Tube	Tube NTUs	< ~ 400 Tube NTUs	Variable increments – varying from 5 to 100 tube NTUs	NTU scale on side of tube used as an approximation of true NTU only.	Vendart Pty Ltd PO Box 451 Pymble NSW 2073 02 9450 0466
Reactive Phosphorous	Phosphorus 1200 Colorimeter LaMotte Phosphate in Water Test Kit	mg/l P ppm	0.00 – 0.30 mg/l P 0.5 – 100 ppm	Variable increments, from 0.015 to 0.03 mg/L P	Not available	Vendart Pty Ltd PO Box 451 Pymble NSW 2073 02 9450 0466

MONITORING SITES

East Gippsland Waterwatch monitoring sites listed on the Waterwatch database include a number of active and inactive sites. Individuals and/or community groups choose most sites based on local interest or custodial connection with the site. Many of the strategic sites are located near the end of streams to compare data with upstream data. Sites readily visible to the public (e.g. near bridges) are also selected. All sites are given a unique 6-digit alphanumeric site code (3 letters and a 3 digit number sequence).

The location of all monitoring sites (easting/northing coordinates) is documented in the database. Handheld GPS is used to pinpoint easting/northing coordinates. A complete site code list can be exported from the database. In the not too distant future easting/northing will be replaced by longitude/latitude.

DATA MONITORING FORMS

Data Monitoring Forms are issued to each individual or group in the East Gippsland Waterwatch program. These forms have information relating to the monitor, site/s, site codes, parameters monitored, weather information and other site appropriate information.

DATA CONFIDENCE FRAMEWORK

Waterwatch Victoria has implemented the Statewide Data Confidence (DC) framework and guidelines, identifying minimum data confidence standards for a range of monitoring purposes. Consistent with this framework, East Gippsland Waterwatch has identified where local Waterwatch monitoring individuals/groups fit within this framework. Individual and group standards are identified through the parameters tested, type of equipment and self use of the Waterwatch Database.

Table 2. Regional adaptation of the Waterwatch Victoria Data Confidence Framework

	Training	Quality Control	Monitoring Frequency	Recommended Equipment	Data Management
Standard 1 Monitors (Education /Awareness)	Training prior to use in the field Participate in a single educational session on physical and chemical tests	No QC checks	Random	<ul style="list-style-type: none"> • Turbidity tube • Phosphate in Water Test kit • Multi parameter Pocketester 	<ul style="list-style-type: none"> • Spreadsheets
Standard 2 Monitors (Education focus, data collation)	Training prior to use in the field Participate in annual physical and chemical water quality testing	<ul style="list-style-type: none"> • Participate in annual QA/QC checks 	Range from fortnightly to yearly	<ul style="list-style-type: none"> • Turbidity tube • Phosphate 1200 Colorimeter • Phosphate in Water Test Kit • Multi parameter Pocketester 	<ul style="list-style-type: none"> • Waterwatch Database
Standard 3 Monitors (Data collection focus, education)	Training prior to use in the field Participate in annual physical and chemical water quality testing	<ul style="list-style-type: none"> • Undertake regular calibration techniques on equipment • Participate in annual QA/QC checks 	Monthly	<ul style="list-style-type: none"> • Turbidity tube • Phosphate 1200 Colorimeter • Phosphate in Water Test Kit • Multi parameter Pocketester • Dissolved Oxygen TRACER Pocketester(LaMotte) 	<ul style="list-style-type: none"> • Waterwatch Database
Standard 4 Monitors (Data collection)	Training prior to use in the field Participate in annual physical and chemical water quality testing	<ul style="list-style-type: none"> • Undertake regular calibration techniques on equipment. • Participate in annual QA/QC checks 	Minimum monthly	<ul style="list-style-type: none"> • Turbidity tube • Phosphate 1200 Colorimeter • Multi Parameter pH & EC (LaMotte) • TRACER pocketester (LaMotte) • Dissolved Oxygen TRACER pocketester (LaMotte) • YSI meter 85 • Cyberscan PCD650 	<ul style="list-style-type: none"> • Waterwatch Database

CALIBRATION, MAINTENANCE AND SERVICING

Community monitors are encouraged to maintain their equipment in good working order, and to regularly check for instrument deterioration before use. Calibration and maintenance is also undertaken by the monitor before the annual QA/QC checks. Instruments requiring repair or servicing are returned to EGCMA Water Team staff then to the distributor or manufacturer.

Table 3 Equipment Requirements Summary

Equipment	Calibration Frequency	Inspection Frequency	Type of Inspection
Turbidity Tube	N/A	Annually	Visual
EC Meters	Before use	6 monthly	Battery, cleanliness and electrode condition
Multi tracer pocketesters	Before use	6 monthly	Battery, cleanliness and electrode condition
Phosphorous 1200 Colorimeter	Not required	6 monthly	Acid, reagent, battery check and cleanliness
Phosphate in Water Test Kit	Not required		Acid, reagent and cleanliness
YSI Model 85 Meter	Before use	6 monthly	Battery, Cleanliness and Electrode condition
Cyberscan PCD650	Monthly, or more frequently if required	6 monthly	Battery, electrodes and cleanliness

WATERWATCH MONITOR TRAINING

All prospective community monitors in the Waterwatch Program are inducted and trained by the EGCMA Water Team. Each induction kit includes the following:

- Volunteer Registration Form
- Media Consent Form
- Waterwatch Database Instructions
- JSA
- MSDS's
- Monitoring Equipment including equipment manuals

Once the induction process is completed site visits are undertaken to train the new monitor in sampling and testing techniques and to take GPS coordinates and photo points for entry into the Waterwatch Database.

WATERWATCH DATABASE

Waterwatch Victoria has implemented this data management system for ease of use by all monitors. The program makes possible the electronic transfer of data from Waterwatch monitors (through the use of an Offline Data Entry Application or ODEA), to EGCMA Water Team staff. The data management system has a number of advanced data validation tools to minimise data transcription and/or entry error, as well as improved statistical analysis and reporting features.

From a quality control point of view, the database is able to identify any unusual data and also tag data according to its quality. It is this tagging system that will be used to export high quality Waterwatch data for inclusion on the Victorian Water Quality Data Warehouse.

Data Validation

All monitors use Data Monitoring Forms whilst in the field undertaking sampling and testing. They then use this information when they enter it into the relevant site on the Waterwatch Database.

All data is checked for accuracy by the EGCMA Water Team before it is finally confirmed and uploaded to the database. When data quality is questioned, groups are encouraged to re-test or the data is not included onto the database.

The expected data range for each parameter; (identified by high and low soft limits in the database) are indicated in the Appendix. High and low soft limits offer an additional screening tool for identifying unusual data, data transcription and/or data entry errors. Soft limits are set for each of the different water types monitored in East Gippsland by consulting historical datasets.

PERFORMANCE EVALUATION AND REVIEW

Quality Assurance (QA) is an integrated system of activities to ensure that data meets defined standards. These activities include quality planning, control, assessment, reporting and improvement.

Quality Control (QC) is the system of activities whose purpose is to measure and control the quality of data.

State Waterwatch QA/QC Week

Waterwatch Victoria conducts an annual QA/QC week, where Waterwatch Monitors are required to test solutions of known value as a means of checking instruments and user accuracy. These results are reported in an annual report by Waterwatch Victoria. Regions are encouraged to use the results to self-assess regional monitoring programs.

SITE ALLOCATION

Rules for site code allocation

All sites are given a unique 6-digit alphanumeric site code (3 letters and a 3 digit number sequence).

Rivers, creeks and wetlands

The three letter sequence reflects the name of the creek, river or wetland (SNO = Snowy River). The first number of the three number sequence is chiefly 0, followed by a number indicating the site's position along the stream (1 is the headwaters/top of the catchment, 9 is the river mouth or junction). The last number indicates whether the sample is taken at depth (0 = surface water, 1 = depth of 1 metre).

EG: SNO091 is a sample taken at the mouth of the Snowy River, at a depth of 1 metre.

If the three letters are already allocated for another river, creek or wetland then the first two letters are the same as the first two in the waterways name. The last letter in the code will be the last letter in the waterways' name. For example Wonnangatta River is already allocated the letters WON, therefore Wongungarra River will be allocated WOA.

If all the site position numbers from 1 to 9 are allocated for a waterway and a new site on the waterway is created then the first number in the sequence is used. This number depends on the location of this new site, the closer the distance to the subsequent (heading downstream) main site code the higher the number allocated. The middle site position number used is the same as the previous (upstream) main site code number.

For example the Mitchell River already has sites allocated to MIT030 and MIT040. To allocate a code for a sample halfway between these sites it would be MIT530, if it were closer to MIT040 then the code would be MIT630, MIT730, MIT830 or MIT930 depending on distance from MIT040. If the site was immediately after MIT040 then the site code would be MIT140.

Stormwater Drains

The first letter of the three letter sequence is the first letter of the towns' name. The last two letters are always SW (abbreviation for **stormwater**). If the first letter is already allocated for another town then the second, third, fourth and so on until a letter in the towns' name is used. The first two numbers in the sequence are used for numbering the sites, starting from 01 to 99 as sites arise. The last number indicates whether the sample is taken at depth as used in the rivers, creeks and wetlands system.

Lakes

The first letter of the three letter sequence is always L for '**L**ake'. The last two letters are always the first two letters of the lakes' name. For example, Lake Victoria – LVI. If the site is located in an arm of a lake then the site is allocated the first three letters of the 'Arm's' name. For example, Newland's Arm is part of Lake Victoria; the site code lettering allocated is NEW.

Groundwater

The first letter of the three letter sequence is the first letter of the towns' name. The last two letters are always GW (abbreviation for groundwater). If the first letter is already allocated for another town then the use of the second, third, fourth and so on until a letter in the towns' name is used. The first two numbers in the sequence are used for numbering the sites, starting from 01 to 99 as sites arise. The last number indicates whether the sample is taken at depth as used in the rivers, creeks and wetlands

Appendix 2

*High and Low Soft Limits for **Estuarine water** parameters in the East Gippsland Waterwatch Database*

Parameter	Estuarine water Set Limits	
	High Soft	Low Soft
Turbidity	80	10
Electrical Conductivity	50 000	1200
Water Temperature	30	10.0
Air Temperature	50	5.0
Reactive Phosphorus	0.22	0.015
Total Phosphorus	0.4	0.015
Nitrate	50	10
Nitrite	5	1
Dissolved Oxygen (%sat)	110	30
Dissolved Oxygen (mg/L)	9	3
PH	9.1	6

*High and Low Soft Limits for **Freshwater** parameters in the East Gippsland Waterwatch Database*

Parameter	Surface water Set Limits	
	High Soft	Low Soft
Turbidity	80	10
Electrical Conductivity	1000	40
Water Temperature	30	10.0
Air Temperature	50	5.0
Reactive Phosphorus	0.22	0.015
Total Phosphorus	0.4	0.015
Nitrate	50	10
Nitrite	5	1
Dissolved Oxygen (%sat)	110	30
Dissolved Oxygen (mg/L)	9	3
PH	8	5.5

*High and Low Soft Limits for **Wetlands** parameters in the East Gippsland Waterwatch Database*

Parameter	Wetlands Set Limits	
	High Soft	Low Soft
Turbidity	200	20
Electrical Conductivity	70	2000
Water Temperature	25	8
Air Temperature	40	5
Reactive Phosphorus	0.26	0.015
Total Phosphorus	0.40	0.015
pH	8.5	6.0

*High and Low Soft Limits for **Groundwater** parameters in the East Gippsland Waterwatch Database*

Parameter	Groundwater Set Limits	
	High Soft	Low Soft
Turbidity	20	<10
Electrical Conductivity	30000	100
Water Temperature	12	7
Air Temperature	40	5
Total Phosphorus	0.60	0.015

*High and Low Soft Limits for **Stormwater** parameters in the East Gippsland Waterwatch Database*

Parameter	Stormwater Set Limits	
	High Soft	Low Soft
Turbidity	300	40
Electrical Conductivity	300	60
Water Temperature	25	8
Air Temperature	40	5
Reactive Phosphorus	0.26	0.015
pH	7.5	6.0