

West Gippsland Waterwatch
Data Confidence Plan



(Version 4 - January 2010)



*West Gippsland Waterwatch
Data Confidence Plan*

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1 West Gippsland Waterwatch Community Water Quality Monitoring Overview

Waterwatch is a national community based, water quality monitoring and awareness program. Waterwatch has programs at the national, state, and regional levels. At the regional level West Gippsland Waterwatch functions as an independent organisation within the West Gippsland Catchment Management Authority (WGCMA).

This plan is only concerned with the Community water quality monitoring aspect of the West Gippsland Waterwatch program, for more detailed information see the West Gippsland Waterwatch: Strategic Plan 2007-2012, Annual Action Plan 2007-08, and Monitoring Evaluation and Learning Framework. Click on the link below or ask the Waterwatch Regional Coordinator, to view all three aspects of program management.

[WGCMA-23364 West Gippsland Waterwatch Strategic Plan 2007 - 2012](#)

Broadly speaking, the West Gippsland Waterwatch program runs a community water quality monitoring program for three main purposes:

- to educate the local community and schools about local waterways and catchment issues;
- to collect meaningful data for improved catchment management, and
- to involve the community in decision making processes for catchment management.

The West Gippsland Waterwatch Program operates within the West Gippsland Catchment Management Authority (WGCMA) boundaries and is managed as two subregions. The Baw Baw, Latrobe and Sale regions are grouped together as one subregion with South Gippsland being the second subregion. A Waterwatch facilitator coordinates activities within each subregion and reports to the Waterwatch Regional Coordinator. The Regional Coordinator reports to the WGCMA Water Unit Manager.

Waterwatch community (volunteer) monitors, from the first point of contact with Waterwatch, undergo a detailed registration process which begins with an interview between the facilitator and the volunteer to learn about monitoring/volunteering needs. This leads to the development of a monitoring plan which the volunteer and facilitator can refer to regularly to ensure monitoring objectives are achieved. After site orientation, initial training and completion of a Job Safety Analysis, facilitators continue to support volunteers in data collection and verification throughout the monitoring lifecycle.

Water quality data for local rivers, creeks, coastal areas, estuaries, wetlands and groundwater systems is passed on from volunteers to facilitators for recording on the subregional database. Therefore, each Waterwatch facilitator is responsible for ensuring a database is updated and accurate.

Data is presented to the community, sponsors, stakeholders and data users in a number of formats including community flyers, newsletters, annual data reports and spreadsheets of raw data. Data users who have used Waterwatch community collected data in recent years include:

- **Government agencies:** WGCMA, Gippsland Regional Water Monitoring Partnership, Southern Rural Water, South Gippsland Water, Gippsland Water, DPI/DSE, EPA, CSIRO, Parks Victoria and Latrobe City Council
- **Community groups:** Field Naturalists Sale, Field & Game Sale, various Landcare groups.
- **Private Business:** GHD, Sinclair Knight & Mertz , Esso/BHP Billiton, and HVP.

Waterwatch data has been used for regional planning activities, such as in the development of:

- Regional Catchment Strategy
- West Gippsland River Health Strategy
- West Gippsland Water Quality Plan
- Gippsland Lakes Future Directions and Actions Plan
- South Gippsland, Baw Baw, Wellington, Latrobe and Bass Coast shire council Stormwater Management Plans
- Gippsland Lakes Coastal Action Plan
- Victorian Coastal Strategy 2002
- Catchment Condition Report Latrobe & Corner Inlet Catchment Ecosystems 2009

The West Gippsland Waterwatch program has an interest in filling monitoring gaps across the region and developing a strategic monitoring approach.

2 Objectives of the Data Confidence (DC) Plan

What is the DC Plan?

The West Gippsland Waterwatch DC Plan is a guiding document outlining minimum data confidence requirements for a range of volunteer monitoring purposes. The plan was developed in consultation with Waterwatch Victoria and the West Gippsland Waterwatch Steering Committee, and aims to demonstrate the competencies of the program with respect to monitoring objectives, resource availability and expertise.

Objectives of the DC Plan:

1. Demonstrate the quality of monitoring data to all data users e.g. government agencies and community groups;
2. Promote consistent monitoring approaches across the region;
3. Promote the professionalism, skills and experience of the Waterwatch program;
4. Identify clear directions for monitoring outcomes;
5. Increase satisfaction for volunteers by clearly highlighting the value of their data;
6. Benchmark current practices through the documentation of procedures, to ensure continuity of program delivery.

Note from WWVic: Regional Data Confidence Plans currently only address the monitoring of physical – chemical parameters. The Statewide DC Framework and Guidelines have to date only been developed for core Waterwatch parameters (e.g. pH, EC, temp, reactive phosphorus, turbidity and dissolved oxygen), therefore the regional DC plan does not include monitoring for biological characters such as macroinvertebrates.

Why was the DC Plan developed?

The DC Plan was developed as a strategy for meeting one of the overall objectives of the Waterwatch program to:

'... collect data which is creditable, accepted and used'

Credible data is data of a known quality that can be communicated and demonstrated to potential/actual data users. In the context of the data confidence framework, Standard 3 and 4 monitors are required to meet minimum requirements and record-keeping to help demonstrate the credibility of data. Minimum requirements include things such as

orientation and training in procedures, and audits to ensure correct procedures are being used. Data is credible when it is believed to be an accurate reflection of water quality.

Accepted data is data accepted by data users and/or key stakeholders as being credible and appropriate for different end users purposes. 'Accepted' data is a measure of how confident data users/key stakeholders are in Waterwatch data and the processes that support the collection, analysis and management of this data, making it 'fit for purpose'.

Used data is data which has been requested for use from the regional Waterwatch program for a particular purpose. Data requests may be for raw or interpreted data and purposes may be varied.

3 Roles and Responsibilities (at September 2007)

Name	Position Title
Kylie Debono	Water Unit Manager – West Gippsland CMA
Michelle Dickson	River Health Team Leader – West Gippsland CMA
Marni Speed	Waterwatch Facilitator (.5 FTE)
Nicole Russell	Latrobe / Sale Waterwatch Facilitator (1 FTE)
Tanya Cowell	South Gippsland Waterwatch Facilitator (1 FTE)

Roles and responsibilities of the people listed in the table, specific to data confidence, include:

Water Unit Manager

- Review the management of the program, ensuring the program is working in partnership with the WGCMA. The Water Unit manager also provides feedback on data confidence issues, documents and annual data reports.

River Health Team Leader

- Review the implementation and effectiveness of the DC plan to ensure it reflects on-ground monitoring activities and the achievement of objectives. This is important for the following reasons:
 - Consistent monitoring approaches across the region are important for maintaining a consistent reputation for the entire program. All stakeholders should have the same level of confidence in Waterwatch data and the same understanding of where the value lies in terms of the strengths and weaknesses of the data.
 - If the objectives of the DC plan are not being achieved, it could be due to a lack of implementation or implementation of ineffective methods. Specific actions may need to be identified and undertaken to ensure the objectives of the plan are achieved.
- Prepare annual budget and prepare funding bids for the program.
- Purchase equipment stock and maintain a log of equipment identification numbers.
- Identify training needs and facilitate training of staff.
- Regional storage of each facilitator's database.
- Responsible for publication & editing of annual data reports.
- Co-ordinate annual program of volunteer QA/QC activities including refresher training sessions, mystery sample determinations, and equipment servicing.

Waterwatch Facilitators

- Purchase equipment stock (with approval of RC) and maintain a log of equipment identification numbers. [WGCMA-14618 Equipment Purchasing and Record Keeping](#)
- Validation and maintenance of water quality data and volunteer details on their Waterwatch database.
- Responsible for supply of subregional information to RC for production of annual data reports.
- Preparation of other reports (this may include data interpretation, project management, meeting minutes and/or notes).

- Maintain a register of site codes to ensure codes are not duplicated between sub regions [WGCMA-28427 Waterwatch Site Code Register](#)
- Co-ordinate and deliver annual program of volunteer QA/QC activities including refresher training sessions, mystery sample determinations, and equipment servicing.
- Recruitment, orientation, training and ongoing support for volunteers in field sampling and monitoring, calibration and regular equipment maintenance.
- Maintenance of local equipment (routine cleaning, servicing, repairs, calibration), including consumables (calibration solutions, reagents).
- Maintenance of volunteer records, including contact and training details.
- Filing of hardcopy records/archives (datasheets/volunteers records/logs).
- Coordination and supervision of specialised activities including snapshot events and local projects.
- Annual stock take of equipment.
- Collection of NCI project water samples from volunteers.
- Assist South Gippsland facilitator with training volunteers on correct collection methods, where required.
- Analysis of all NCI project water samples.
- Maintenance of NCI project equipment method sheets.
- Maintenance of NCI project equipment (routine cleaning, servicing, repairs, calibration), including consumables (calibration solutions, reagents).
- Maintenance of quality control logs.
- Preparation of reports (this may include data interpretation, project management, meeting minutes and/or notes).
- Validation and maintenance of NCI water quality data on the Waterwatch database.
- Annual stocktake of equipment.

4 Monitoring site selection and coding

Monitoring site selection

West Gippsland Waterwatch monitoring sites have been selected based on one or more of the following:

- strategic location
- local interest by community members/private land owners
- site access
- specific project monitoring

All sites are allocated a site code, which consists of a 3 letter and 3 digit number sequence. The three letters commonly refer to the name of the waterway where the monitoring site is located.

Historically, there are inconsistencies in the naming of site codes across West Gippsland. This came about due to staff changes over time and the lack of documentation and understanding of how to name a site. Some sites also had their code changed in 2005 when

an effort was made by Waterwatch facilitators to ensure each site across West Gippsland had a unique code.

NOTE: Waterwatch facilitators now have a log to complete for new site codes to ensure there is no double up. The register can be found in 80/20 at [WGCMA-28427 Waterwatch Site Code Register](#) . It is the responsibility of facilitators to ensure this register is maintained.

Procedure for site code allocation

Since the development and implementation of the Data Confidence Plan, the procedure for allocating a code to a site is as follows:

Rivers, streams and creeks: A 3 letter prefix will reflect the first 3 letters of the waterway's name and a 3 digit number sequence will reflect where in the catchment the sample is taken eg: Latrobe River headwaters LAT 001. Upstream sites have low site code numbers (eg from 001) and downstream sites have high site code numbers (eg to 999).

Estuaries: will be named according to the 3 letter prefix rules for rivers, streams & creeks, however, the number sequence will start with the prefix 9 to reflect the estuarine influences with the remaining digits reflecting the number of sites tested eg: Screw Creek SCR 906.

Wetlands: A 3 letter prefix will reflect W for Wetlands and the first 2 letters of the wetlands name and a 3 digit number sequence will reflect the number of sites in the wetland eg: Heyfield wetlands WHE 001.

Lakes: A 3 letter prefix will reflect L for Lake and the first 2 letters of the lakes name and a 3 digit number sequence will reflect the number of sites in the lake eg: Lake Hyland LHY 001.

Groundwater: A 3 letter prefix will reflect G for Groundwater and the first 2 letters of the closest town's name and a 3 digit number sequence to reflect how many sites are collected from in this area eg: Groundwater Golden Beach GGO 001.

Drains: A 3 letter prefix will reflect D for drain and the first 2 letters of the closest town's name and a 3 digit number sequence to reflect the number of sites on the drain eg: Wonthaggi Drain DWO 001.

Historically all site coordinates (eastings/northings) were identified from a 1:100 000 map. In most instances, sites coordinates have been confirmed and updated using the desktop Geographical Information System (GIS) or a Global Positioning System (GPS) which reads GDA94/MGA94 coordinates. A site description and photos are also recorded on each facilitator's database and in their electronic filing system.

All past and present monitoring sites are listed on regional databases, whether they are actively being monitored by volunteers or not.

5 Parameters monitored

The following water quality parameters are, or have been monitored across the West Gippsland Waterwatch program:

	pH	EC	Turbidity	Temp (water)	Temp (air)	Reactive Phosphorus	Total P	DO	Gauge Board levels	Flow
South Gippsland	✓	✓	✓	✓	✓	✓	✓	✓		
Latrobe	✓	✓	✓	✓	✓	✓		✓		
Sale	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

NOTE:

Not all sites are monitored for all of the above parameters and the frequencies vary (randomly, weekly, monthly, quarterly & yearly).

Habitat surveys will be completed at the commencement of a new monitoring site. They are entered into the Waterwatch database and then kept with the site file at the facilitator's office.

Macroinvertebrates have been monitored at some sites, predominantly as an awareness exercise with the community and school groups.

6 Instrumentation

Monitoring equipment across the West Gippsland region is relatively consistent except in instances where volunteers may be trialling different equipment or have purchased different equipment for their specific project needs, although this is rare. Table 1 below includes equipment used for monitoring of all physical-chemical parameters in West Gippsland and the equipment specifications.

New monitoring instruments are inscribed/labelled with serial numbers on arrival at the Traralgon office, for identification and tracking purposes. In some instances the manufacturers unique serial number can be used. A log of equipment is maintained (see section 12), and it is the responsibility of facilitators to ensure the equipment is tracked, by using the code to identify who has possession of the item of equipment at anyone time. [WGCMA-14618 Equipment Purchasing and Record Keeping](#)

Table 1 Parameters monitored & instrumentation used in West Gippsland

Parameters monitored	Area	Instrument type and model (eg. Hanna Combo LR)	Unit of measurement (pH units)	Range (eg. 0 - 14 pH)	Resolution (eg. 0.01 pH)	Accuracy (eg. ± 0.05 pH)	Distributor name and contact details for repairs/servicing/enquiries
Temperature	Sale region South Gippsland Latrobe region	Eutech ECScan (ECTEST11) High/Low/Dual range Waterproof meter	$^{\circ}\text{C}$	0 - 50 $^{\circ}\text{C}$	0.1 - 50.0 $^{\circ}\text{C}$	$\pm 0.1^{\circ}\text{C}$	Westlab
Temperature	Sale region South Gippsland Latrobe region	Oakton Min/Max digital Thermometer	$^{\circ}\text{C}$	-10 - 200 $^{\circ}\text{C}$	0.1 to 199.9 $^{\circ}\text{C}$	$\pm 1.0^{\circ}\text{C}$	Merck 207 Colchester Rd Kilsyth 3137 03 9728 1351
Temperature	Sale region South Gippsland Latrobe region	Bulb thermometer	$^{\circ}\text{C}$	-10 - 110 $^{\circ}\text{C}$	1 $^{\circ}\text{C}$	$\pm 1.0^{\circ}\text{C}$	Zeal - Total immersion (not known where purchased)
Electrical Conductivity	NCI Project	WTW pH/cond 340i using a WTW TetraCon 325 Conductivity cell.	$\mu\text{S}/\text{cm}$	0 -1999 $\mu\text{S}/\text{cm}$ 500mS/cm	1 $\mu\text{S}/\text{cm}$ 1ms/cm	$\pm 0.5 \%$	Merck services
Electrical Conductivity	Sale region South Gippsland Latrobe region	Eutech ECScan (ECTEST11) Dual range Waterproof meter	$\mu\text{S}/\text{cm}$	2000 $\mu\text{S}/\text{cm}$ - 20.0mS/cm	10 $\mu\text{S}/\text{cm}$ 0.10mS/cm	$\pm 1.0\%$ Full scale	West lab
Electrical Conductivity	Sale region South Gippsland Latrobe region	Eutech ECScan Low Waterproof meter	$\mu\text{S}/\text{cm}$	0 - 1990 μS	10 $\mu\text{S}/\text{cm}$	+/-2% F.S	West lab
Electrical Conductivity	Sale region South Gippsland Latrobe region	Eutech ECScan High Waterproof meter	$\mu\text{S}/\text{cm}$	0 - 19900 μS	10 $\mu\text{S}/\text{cm}$	+/-2% F.S	West lab
pH	Sale region South Gippsland Latrobe region	pH strips	pH	0 - 14	1	Not available	Merck 207 Colchester Rd Kilsyth 3137 03 9728 1351
pH	NCI Project	WTW pH/cond 340i using a WTW pH electrode SenTix 41-3	pH	0 - 14	0.01 pH	± 0.01	Merck services
pH	Sale region South Gippsland Latrobe region	Eutech pHScan (pHTestr10) Waterproof meter	$^{\circ}\text{C}$	-1.0 - 15.0 pH	0.1 pH	0.1 pH	Westlab
pH	South Gippsland	pH Scan 2	pH	-1.0 - 15.0 pH	0.1 pH	+/- 0.1	Eutech Instruments - contact Merck

Dissolved Oxygen	South Gippsland Latrobe region	Oxygen Aquamerck test kit (Merck)	mg/l	1 - 12mg/l (ppm)	1		Merck 207 Colchester Rd Kilsyth 3137 03 9728 1351
Dissolved Oxygen	Sale region South Gippsland NCI Project	TPS Model MC-82	% Saturatio n	0 to 250 % Saturation	0.1 % Sat.	+/- 0.3 % Sat.	TPS -Ionode P.O. Box 272 Niddrie 3042 0412 140 055
Turbidity	Sale region, South Gippsland, Latrobe	Waterwatch Turbidity Tube	Tube NTUs	< ~ 400 Tube NTUs	Variable	variable	Waterwatch Victoria c/o Paul Puhar 03 9412 4072
Turbidity	Sale region, South Gippsland, Latrobe	Merck Turbiquant 1000 IR (ISO 7027 method)	NTU	0.01 - 1100 NTU	0.01 NTU (range 0.01- 99.99 NTU) or 0.1 NTU (range 100 - 1100 NTU)	+/- 2% (0-500 NTU) +/- 3% (500-1100 NTU)	Merck 207 Colchester Rd Kilsyth 3137 03 9728 1351
Turbidity	NCI Project	Hach 2100P Portable Turbidimeter (ISO 7027 method)	NTUs	0.01 - 1000 NTUs	0.01 NTUs	+/- 2%	Hach from Selby-Biolab 2 Clayton Rd Clayton 3168 03 9562 9840
Reactive P	Sale region South Gippsland Latrobe region	Phosphorus Aquaquant test kit (Merck)	mg/l PO4-P	0.015 - 0.14 mg/l P (variable increments - 0.015- 0.03- 0.045- 0.06- 0.08- 0.11- 0.14 mg/L P)	0.015 - 0.03	Not available	Merck 207 Colchester Rd Kilsyth 3137 03 9728 1351
Reactive P	NCI Project	Spectroquant Nova 60 Colourimeter	mg/l PO4-P	-0.300 A bis 3.200 A	0.001 A	0.001 A at 1.000 A	Merck
Total P	Sale region South Gippsland	Phosphorus Oxisolve/ Aquaquant test kit (Merck)	mg/l PO4-P	0.015 - 0.14 mg/l P (variable increments - 0.015- 0.03- 0.045- 0.06- 0.08- 0.11- 0.14 mg/L P)	0.015 - 0.03	Not available	Merck 207 Colchester Rd Kilsyth 3137 03 9728 1351
Total P	NCI Project	Spectroquant Nova 60	mg/l	-0.300 A bis	0.001 A	0.001 A at 1.000 A	Merck

		Colourimeter and a TR320 thermoreactor for digesting samples	PO4-P	3.200 A 100 °C, 120 °C, 148 °C, 150 °C		± 1 °C ± 1 Digit	
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7 Regional Data Confidence Framework

Waterwatch Victoria developed a state Data Confidence Framework and Guidelines, identifying minimum data confidence standards for a range of monitoring purposes (Standards 1, 2, 3, 4). West Gippsland Waterwatch has adapted the framework to suit regional requirements whilst maintaining the minimum standards outlined by Waterwatch Victoria (Table 2). Table 2 summarises the four standards which volunteers can monitor to and outlines the necessary equipment, calibration, monitoring frequency and training required.

The standard (1, 2, 3 or 4) which a group/volunteer follows is identified during the facilitator's interview with the volunteer to determine the monitoring plan and goals of the group/volunteer. The data collected by this group or individual is then 'tagged' as a known standard by recording the standard in the Waterwatch database and the group / volunteer file.

If a group / volunteer does not meet the minimum requirements of their chosen data confidence level the facilitator will tag the data as the standard that is met.

Table 2 West Gippsland Waterwatch Regional Data Confidence Framework

Standard & Purpose	Parameters monitored	Equipment type & model	Calibration frequency	Monitoring frequency	Data storage	Training & quality control	Equipment Servicing (min)
1 – Awareness & Education focus	Turbidity EC pH Reactive phosphorous Temperature Dissolved Oxygen	Turbidity Tube Eutech Meter pH strips / Eutech meter Aquaquant test kit (Merck) Bulb thermometer DO test kit (Merck)	n/a n/a n/a n/a n/a	Random	Not recorded	Training prior to initial use in field	As needs, determined by facilitator
2 – Education and Monitoring focus	Turbidity EC pH Reactive phosphorous Temperature Dissolved Oxygen	Turbidity Tube EutechECScan Low/High/Dual TPS MC81 pH strips Aquaquant test kit (Merck) Bulbthermometer/Hanna combo, Oakton digital DO test kit (Merck),	Check against meter Annually (min) Annually (min) n/a Annually (min) n/a n/a n/a	Strategic yearly (minimum) / optional event monitoring	Regional database	Training prior to initial use in field Participate in regional phys/chem. refresher training & mystery sampling annually.	Annually
3 – Monitoring and Education focus	Turbidity EC pH Reactive phosphorous Temperature Dissolved Oxygen	Turbidity Tube EutechECScan Low/High/dual Eutech pH pH Scan 2 Aquaquant test kit (Merck), Bulbthermometer/Eutechmeter /Oakton digital DO test kit (Merck)	Check against meter Before every use Before every use Before every use n/a Annually n/a n/a	Quarterly (minimum) / optional event monitoring	Regional database and Victorian Data Warehouse	Training prior to initial use in field Participate in 2 regional and/or statewide phys/chem refresher training & mystery sampling annually.	Twice annually
4 – Monitoring focus	Turbidity EC pH Reactive/Total phosphorous Temperature Dissolved Oxygen	Turbiquant 1000 IR, Hach 2100P EutechECScan Low/High/Dual Eutech pHTestr10 pH Scan 2 Aquaquant test kit (Merck) Eutech meter/Oakton digital DO test kit (Merck)	Every 3 months (min) Every 2 wks (min) Before every use Before every use Before every use n/a n/a Before every use	Monthly (minimum) /optional event monitoring	Regional database and Victorian Data Warehouse	Training prior to initial use in field Participate in 2 regional and/or statewide phys/chem refresher training & mystery sampling annually.	Twice annually

8 Standard Operating Procedures (SOP)

A Standard Operating Procedures Manual exists which contains the methods for each type of monitoring instrument used by the West Gippsland Waterwatch program. The manual contains:

- Background information on the parameters monitored
- Field use of equipment
- Calibration procedures including maintenance and storage of calibration solutions
- Equipment maintenance

SOP's for instruments have been developed using the following sources of information:

- Waterwatch Victoria Methods Manual (1999).
- Instrument user manual/instructions.

A copy of the West Gippsland Standard Operating Procedures Manual is kept by all facilitators and the regional coordinator and is given to each monitoring group.

The manual is updated as new equipment and procedures are adopted by West Gippsland Waterwatch.

9 Repairs and Servicing Procedures

Repairs and servicing history is kept for each instrument. This ensures that any servicing that is covered under warranty is recorded, and allows coordinators to gauge the life of different types of equipment. Repair and servicing details are recorded on the equipment/calibration log located at [WGCMA-14618 Equipment Purchasing and Record Keeping](#).

Facilitators are responsible for sending faulty equipment back to manufacturers for repair/servicing and for recording any actions.

Instruments are repaired on an as needs basis and serviced according to the manufacturers recommendations.

The frequency of servicing and standard techniques is dependant on the data confidence standard the monitor is operating to (**see Table 2**).

10 Personnel Training

Waterwatch staff training

Training for staff is organised either by the regional coordinator or the Waterwatch Victoria state office. Training workshops offered by Waterwatch Victoria include:

- physical-chemical water quality monitoring training
- macro-invertebrate training
- QA/QC training
- database training
- other time-critical training

The West Gippsland Catchment Management Authority maintains a log of all staff training for personal and professional development, such as:

- First aid training
- OH & S training
- Seminars/conferences attended

The frequency of staff training is assessed on a yearly basis in conjunction with the state training program and the current Waterwatch budget.

Volunteer monitor training

Prior to the initial visit by the facilitator, a monitoring plan is established to determine the purpose, frequency and standard of monitoring to be undertaken and a discussion of site selection. Please refer to the facilitator guidelines for detail on the training process [WGCMA-27757 Waterwatch Facilitator Guidelines 2007](#).

At the initial visit to the site with the new volunteer monitor:

- The new monitor will receive an induction kit including their monitoring equipment and undergo induction with the facilitator.
- The new monitor receives a copy of the West Gippsland Waterwatch Standard Operating Procedures (SOP's) relevant to the parameters they are monitoring.
- The new volunteer is trained by the facilitator to a level of competency appropriate for their monitoring aims (as per regional data confidence framework).

Skills that new volunteer monitors are trained in include:

- Field safety
- Correct sampling procedures
- Recording data onto datasheets
- Storage of samples (if necessary)
- Correct use of equipment
- Calibration of equipment
- Limitations and effectiveness of equipment
- Cleaning/maintenance and storage of equipment

A log of when volunteer monitors are trained/retrained is recorded on local databases and kept on file (comments section). Re-training frequency varies with the level of data confidence – see Table 2. This information is also included in the SOP's Manual.

11 Quality Control Mechanisms and Record Documentation

Purchased equipment log (also refer to Section 6)

Records are kept including:

- when equipment was ordered
- when it arrived at the Traralgon office
- which facilitator it was issued to
- the serial number it was given, for tracing purposes.

The equipment log is located at [WGCMA-14618 Equipment Purchasing and Record Keeping](#).

It is the responsibility of the person ordering the equipment (approval to purchase equipment must be sort from the Regional Coordinator) to update the log, however facilitators must always record which monitor has received which piece of equipment, using the serial number allocated.

Equipment maintenance/service history logs including Calibration logs (also refer to Sections 8 and 9)

Equipment maintenance logs enable facilitators to keep track of equipment maintenance including serial number, warranties and repairs. Routine cleaning, replacement of parts and/or any other servicing actions can be recorded here. [WGCMA-14618 Equipment Purchasing and Record Keeping](#).

Calibration logs are included on the equipment maintenance log and are maintained for those instruments calibrated against a known calibration buffer or standard. These logs are a record of both the frequency of calibration, as well as a mechanism of checking whether or not the calibration has drifted. Pre and post calibration values are recorded for each parameter where required.

Calibration solutions (EC: 1413 $\mu\text{S}/\text{cm}$, 12,800 $\mu\text{S}/\text{cm}$ and 2,760 $\mu\text{S}/\text{cm}$, pH: 7 and 4) are made up by SGS environmental services or ordered from equipment suppliers. The date each solution is prepared is recorded on the label. Facilitators transfer solution to smaller containers for volunteers & record on a label when the solution should be disposed (refer to West Gippsland Waterwatch SOP's for maintenance of calibration solutions). Failing this, facilitators should change monitors' solutions every three months. Facilitators should also record when monitors' are due for new solutions and follow up on this.

Waterwatch Mystery Sample Logs (refer to Section 15)

Waterwatch Shadow Testing Logs (refer to Section 15)

12 Data Validation & Management

Waterwatch Database Management

In West Gippsland, each facilitator manages a database for their subregion. For each database, the Application file sits on the facilitators C Drive and the Data file sits on the M Drive at [M:\GIS\Points\Waterwatch DB](#). The M Drive is a shared network that is backed-up everyday. It is very important that these files are not moved or duplicated to prevent confusion about which datafile is the correct one to use, therefore preventing the loss of data.

Data Validation

Before collecting data, monitoring groups should have completed a monitoring plan and have been assigned a six-digit/alphanumeric code for each site. Once the six-digit code has been produced, it should be recorded on any results produced so that data can be readily identified.

Volunteers should always double check their results, especially if a strange result occurs. Taking the average of three replicated samples is a good way to do this. Volunteers should also ensure they record their results correctly and neatly on the data sheet and in the correct units.

A copy of the data sheet is then forwarded to the facilitator for screening and validation before being entered into the regional database. This should occur as soon as possible so that if there are any strange or questionable results, the facilitator may contact the volunteer in a timely manner and then decide whether the information is included in the database and if external agencies such as the EPA need to be notified of the results.

The facilitator enters volunteer data onto the database, where its level of confidence is recorded through a QA/QC tag.

From a quality control point of view, the database is able to identify any unusual data via the setting of soft & hard limits for phys/chem. results. Data falling outside of local SOFT limits are highlighted in the database upon entry, and require manual verification by coordinators if deemed valid. Regional soft and hard limits are included in Appendix 1.

Once data has been screened, verified, and stored on the appropriate database it becomes available for other data users e.g. local government, schools, universities, consultants etc. via request to the relevant facilitator. The available data can then be used to generate interpretation reports.

13 Data Reports

In 2003, data report books were produced for each of the Waterwatch regions (Latrobe, South Gippsland and Sale), summarising all water monitoring data collected within each catchment between 1993 and 2002, this was a first for the West Gippsland Waterwatch program. Information summarised for each site included the number of data points, minimum/maximum values, median values, 10th and 90th percentiles. Copies of these reports can be obtained from the Regional Coordinator.

In 2004, data reports were produced to summarise all data collected in 2003 (January to December). Information included: graphs of each parameter tested, interpretation, rainfall data, photo of the site and comparison where possible with State Environmental Protection Policy (SEPP) values.

In 2006 and 2007, data reports were produced to summarise all data collected in 2004, 2005, 2006 and 2007 separately (January to December). Information included: graphs of each parameter tested, interpretation, photo of the site and volunteer monitor, anecdotal information about the site, and comparison where possible with State Environmental Protection Policy (SEPP) values.

Data collected across the region is interpreted and reported via a number of other avenues also:

- quarterly newsletters
- annual reports
- PowerPoint presentations (for specific issues & needs)
- NCI annual data report
- Regional Waterwatch data report booklet
- WGCMA website (in the future)
- Data flyers to CMA implementation committees
- Specifically requested information by WGCMA, DPI, Parks, and Universities (this varies from region to region).

14 Performance Evaluation and Review

Waterwatch Victoria QA/QC week

Waterwatch Victoria conducts an annual QA/QC week, where Waterwatch staff are required to measure solutions of known value as a means of checking instrument and user accuracy. All available level 3-4 and selected volunteer monitors also participate in this activity. The results are reported in an annual report by Waterwatch Victoria. Regions are encouraged to use the results to self-assess regional monitoring programs.

Regional QA/QC activities

At the regional level, a mystery QA/QC sample activity (based on the same procedure as the state mystery sample activities) is conducted for both Waterwatch facilitators and volunteer monitors at standard 3 & 4. This activity will check that instruments and monitoring methods are sufficiently accurate (through calibration and maintenance) for their required level of data confidence. This will occur 6 months after the state mystery sample activities.

Regional Mystery sample QA/QC logs will be developed and maintained at a local and regional level. These logs will form the basis for continual improvement across the network.

Shadow-testing - QA/QC

Shadow (or parallel) testing involves the monitoring of a local waterway by a volunteer and a secondary party. The secondary party may be another organisation undertaking monitoring (e.g. within the Gippsland monitoring partnership) or a Waterwatch facilitator/coordinator from a different region. This is an opportunity to check both the accuracy and precision of Waterwatch equipment. Shadow testing in local waterways is advantageous as instruments may respond differently to natural waters than they do to lab-prepared mystery solutions.

15 Review of Data Confidence Plan

A review of the West Gippsland Data Confidence Plan and its implementation will be undertaken biannually by the West Gippsland Waterwatch team in association with the WGCMA and Waterwatch Victoria. This is an opportunity to re-evaluate the monitoring competencies of groups and to review whether or not monitoring standards (particularly 3&4) are being maintained.

Appendix 1: Upper & Lower SOFT Limits established for West Gippsland Waterwatch

1. Sale Region:

Parameter	Water Type	Upper	Lower
% Sat Oxygen	Inlet/Bay	120	50
	Pond/Wetland	150	20
	River	120	40
	Creek	120	10
pH	Inlet/Bay	12	2
	Estuary	9	6
	Drain	9	5
	Pond/Wetland	10	2.5
	River	9	6
	Creek	8.5	5
EC	Inlet/Bay	60000	4000
	Estuary	55000	100
	Drain	7000	0
	Lake/Reservoir	800	20
	Pond/Wetland	10000	10
	River	55000	100
	Creek	7000	25
	Peizometer/Bore	25000	50
Temperature	Inlet/Bay	30	0
	Estuary	28	5
	Drain	35	5
	Lake/Reservoir	30	5
	Pond/Wetland	35	5
	River	28	5
	Creek	30	4
Air Temp	Inlet/Bay	35	5
	Pond/Wetland	35	5
	River	35	5
Depth	Inlet/Bay	1	0
	Pond/Wetland	1.2	0
	Peizometer/Bore	2.5	0
Total P	Inlet/Bay	0.3	0
	Estuary	0.5	0
	Drain	7	0
	Pond/Wetland	2.5	0.015
	River	0.5	0.03
React P	Inlet/Bay	0.25	0
	Estuary	0.25	0
	Drain	5	0
	Lake/Reservoir	0.1	0

	River	0.25	0
	Creek	0.5	0
	Dam	15	0.1
Turb	Inlet/Bay	100	1
	Estuary	80	0
	Drain	400	0
	Lake/Reservoir	100	0
	Pond/Wetland	400	10
	River	80	0
	Creek	350	0
	Dam	400	30
Gauge Board	Drain	1	-0.1
	Pond/Wetland	1	-0.3
	River	0.8	-0.1
	Creek	1	-0.1
Flow	Drain	1000	0
	Creek	1000	0
	River	8000	0

2. Latrobe Region

Parameter	Water Type	Upper	Lower
% Sat Oxygen	Pond/Wetland		
	d	120	20
	River	100	60
	Creek	100	40
pH	Drain	9	5
	Pond/Wetland		
	d	9	4
	River	8	5
	Creek	8	5
EC	Drain	7000	10
	Lake/Reservoir		
	r	800	20
	Pond/Wetland		
	d	2000	10
	River	1500	10
Creek	1500	10	
Temperature	Drain	30	5
	Lake/Reservoir		
	r	30	5
	Pond/Wetland		
	d	30	5
	River	28	5
Creek	28	4	
Air Temp	Pond/Wetland		
	d	35	5

	River	35	5
Depth	Pond/Wetland	2	0
React P	Drain	0.5	0
	Lake/Reservoir	0.5	0
	River	0.28	0
	Creek	0.08	0
	Dam	0.5	0
Turb	Drain	400	10
	Lake/Reservoir	100	10
	Pond/Wetland	400	10
	River	100	10
	Creek	80	10
	Dam	400	10

3. South Gippsland Region

Parameter	Water Type	Upper	Lower
% Sat Oxygen	Pond/Wetland	120	20
	River	100	60
	Creek	100	40
	estuary	100	10
pH	Drain	9	5
	Pond/Wetland	9	4
	River	9	5
	Creek	8	5
	estuary	9	5
EC	Drain	7000	10
	Lake/Reservoir	800	20
	Pond/Wetland	2000	10
	River	900	10
	Creek	900	10
	estuary	500	16000
Temperature	Drain	30	5
	Lake/Reservoir	30	5
	Pond/Wetland	30	5
	River	30	1
	Creek	30	1
	estuary	30	4
Air Temp	Pond/Wetland	35	5

	d		
	River	40	0
	estuary	40	0
Depth	Pond/Wetland		
	d	2	0
React P	Drain	0.5	0
	Lake/Reservoir		
	r	0.5	0
	River	0.28	0
	Creek	0.08	0
	Dam	0.5	0
	estuary	0.3	0
Total P	Drain	0.3	0
	Lake/Reservoir		
	r	0.3	0
	River	0.3	0
	Creek	0.3	0
	Dam	0.4	0
	estuary	0.2	0
Turb	Drain	400	10
	Lake/Reservoir		
	r	100	10
	Pond/Wetland		
	d	400	10
	River	100	10
	Creek	80	10
	Dam	400	10
	estuary	100	10
rainfall	Drain	40	0
	Lake/Reservoir		
	r	40	0
	Pond/Wetland		
	d	40	0
	River	40	0
	Creek	40	0
	Dam	40	0
	estuary	40	0