



Mallee Waterwatch Data Confidence Plan

FINAL

May 2007



Data Confidence System Summary

The Mallee Waterwatch Data Confidence System consists of three components.

These include:

1. Data Confidence Plan
2. Mallee Waterwatch Community Monitoring Manual
3. Operational Record Documents

Contents

<u>1. WATERWATCH AND DATA CONFIDENCE</u>	4
<u>2. THE MALLEE REGION</u>	4
<u>3. MALLEE WATERWATCH OVERVIEW</u>	5
3.1 MALLEE WATERWATCH PROGRAM OVERVIEW	5
3.2 MALLEE WATERWATCH MONITORING	5
<u>4. OBJECTIVES AND AIMS OF THE DATA CONFIDENCE PLAN</u>	6
4.1 THE OBJECTIVES OF MALLEE WATERWATCH RELEVANT TO THE DATA CONFIDENCE PLAN ARE:	6
4.2 THE AIMS OF THE MALLEE WATERWATCH DATA CONFIDENCE PLAN ARE TO:	6
<u>5. WATERWATCH DATA CONFIDENCE SYSTEM:</u>	7
<u>6. ROLES AND RESPONSIBILITIES</u>	8
6.1 MANAGER RIVER AND WETLAND HEALTH	8
6.2 REGIONAL WATERWATCH COORDINATOR	8
6.3 WATERWATCH OFFICERS	8
6.4 WATER QUALITY COORDINATOR	9
6.5 WATER MONITORING COORDINATOR	9
6.6 STATE SCIENCE COORDINATOR	9
<u>7. WATER QUALITY PARAMETERS</u>	9
<u>8. INSTRUMENTATION</u>	10
<u>9. MONITORING SITES</u>	13
<u>10. MONITORING PLANS</u>	13
<u>11. REGIONAL DATA CONFIDENCE FRAMEWORK</u>	14

11.1 STANDARD 1	14
11.2 STANDARD 2	15
11.3 STANDARD 3	16
11.4 STANDARD 4	17
12. STANDARD OPERATING PROCEDURES	18
12.1 FIELD PROCEDURES	18
12.2 CALIBRATION PROCEDURES	18
12.3 PREVENTATIVE MAINTENANCE/REPAIR AND SERVICING PROCEDURES	18
13. MALLEE TRAINING PROGRAM	18
13.1 MALLEE WATERWATCH STAFF PROFESSIONAL DEVELOPMENT	19
13.2 MALLEE WATERWATCH MONITOR TRAINING	19
13.2.1 INITIAL TRAINING FOR NEW GROUPS	19
13.2.2 REFRESHER TRAINING FOR ESTABLISHED GROUPS	20
14. RECORD KEEPING	20
14.1 MALLEE WATERWATCH KIT INVENTORY SHEET (APPENDIX 4)	20
14.2 MALLEE WATERWATCH MONITORING REPAIR/SERVICING LOG (SEE SECTION 12.3 AND APPENDIX 7)	20
14.3 MALLEE WATERWATCH CALIBRATION RECORD (SEE SECTION 12.2 AND APPENDIX 6)	20
14.4 MALLEE WATERWATCH KIT(S) LOCATIONS (SEE SECTION 15.4)	21
14.5 SHADOW TESTING RECORD SHEETS (SEE SECTION 16.2 AND APPENDIX 8)	21
14.6 MALLEE WATERWATCH GROUP & STAFF TRAINING LOGS (SEE SECTION 13)	21
14.7 MALLEE WATERWATCH TRAINING CHECKLIST (SEE SECTION 13 AND APPENDIX 4)	21
14.8 EQUIPMENT REGISTER	21
15. DATA MANAGEMENT	21
15.1 WATERWATCH DATABASE	21
15.2 DATA VALIDATION AND ENTRY	22
15.3 ASSURANCE OF REGULAR DATA	22
15.4 DATA REPORTING	22
15.5 EXCEL SPREADSHEETS	22
16. PERFORMANCE EVALUATION AND REVIEW:	23
16.1 WATERWATCH VICTORIA QA/QC WEEK	23
16.2 REGIONAL QA/QC:	23
17. DATA CONFIDENCE PLAN REVIEW:	24

1. Waterwatch and Data Confidence

Waterwatch has been operating in the Mallee region since 1997. Since then numerous volunteers have spent time collecting valuable data from some of our most precious waterways. In many instances this is the only data collected at these particular sites. This information can be used by natural resource managers to help fill data gaps within the region. This document has been developed to ensure the data collected by monitors is credible.

The data confidence plan is a set of guidelines that aims to ensure Mallee Waterwatch produces credible data of a known quality, reducing beliefs that community collected data is of little scientific value. The data confidence plan will promote professionalism, skills and achievements of water monitors, encouraging a greater use of Mallee Waterwatch data.

2. The Mallee Region

The Victorian Mallee is a semi-arid region, located in Victoria's North West. The Mallee region occupies approximately 43,000 square kilometres, which is almost 20% of Victoria. Its most obvious natural features are its low annual rainfall (250-350mm), and the extent of wind blown sand clays that have formed on calcareous landforms. The River Murray is the principal source of permanent fresh water in the region. Potential evaporation in the region is up to seven times higher than the average rainfall.

These features have resulted in a unique environment that supports various primary industries. These include the state's largest cereal growing, citrus, wine grapes, dried fruits, and diversified irrigated horticulture. Flora and fauna populations within the Mallee are the state's most diverse.

Mallee Waterwatch is a unique Waterwatch program due to the dryness of the basin in which it is located. Unlike other parts of the state that have higher rainfall and less permeable soils, the concept of a surface catchment does not apply in the Mallee as there is no surface drainage pattern over much of the area. The majority of creeks and streams are ephemeral, with a large number of wetlands being dry for significant periods of time.

Water quality monitoring throughout the Mallee region has been very limited in the past. As such, there is very little data for which management decisions can be made. There is a great need to fill these gaps with a credible water quality monitoring program. The Mallee Waterwatch program will help fill some of these gaps through the development of a monitoring program for community monitors and Mallee CMA staff. The Mallee CMA have a number of projects taking place throughout the region

for which staff members have site visits on a number of occasions throughout the year.

3. Mallee Waterwatch Overview

3.1 Mallee Waterwatch Program Overview

Waterwatch is one of several organisations undertaking water quality monitoring in the Mallee Catchment. These organisations include Lower Murray Water and the Victorian Water Quality Monitoring Network.

Through water quality monitoring Mallee Waterwatch is able to engage a broad sector of the community in catchment health issues and promotes custodianship of local waterways.

Currently the Mallee Waterwatch Program has one Regional Coordinator (0.5 FTE) and two Project Officers (2.0 FTE). Staff are based in Irymple at the Mallee Catchment Management Authority (CMA) Office and service the whole Mallee Catchment.

The Mallee Waterwatch program is supported by the CMA and partner agencies including Lower Murray Water, Murray Darling Freshwater Research Centre – Lower Basin Laboratory, Mildura Rural City Council, Mildura Waste Management Group and the Department of Sustainability and Environment. This support is generally in-kind and involves collaboration on a number of educational events such as water days, National Water Week and Waterwatch events. Further collaboration with the above groups will take place in the future to assist with determining monitoring needs for the region including site selection, monitoring frequency, and parameters for monitoring.

Waterwatch focuses on broad River Health issues and aims to engage a large community water monitoring network across the region.

3.2 Mallee Waterwatch Monitoring

Monitoring is undertaken across the diverse range of water systems found in the Mallee Catchment, which includes;

- Surface Water (rivers, creeks, anabranches)
- Wetlands (Billabongs, Lakes, Swamps, Wetlands, Basins and Lagoons)
- Groundwater
- Irrigation and Drainage Channels
- Tanks

Monitoring is undertaken at various frequencies depending on the group and monitoring purpose.

A number of organisations have expressed interest in data collected by the Mallee Waterwatch program. These include the Mallee CMA, Mildura

Rural City Council, Swan Hill Rural City Council, Murray Darling Freshwater Research Centre, Parks Victoria, consultants, community groups, schools, and Tertiary students conducting research on a specific water body.

4. Objectives and Aims of the Data Confidence Plan

4.1 The objectives of Mallee Waterwatch relevant to the Data Confidence Plan are:

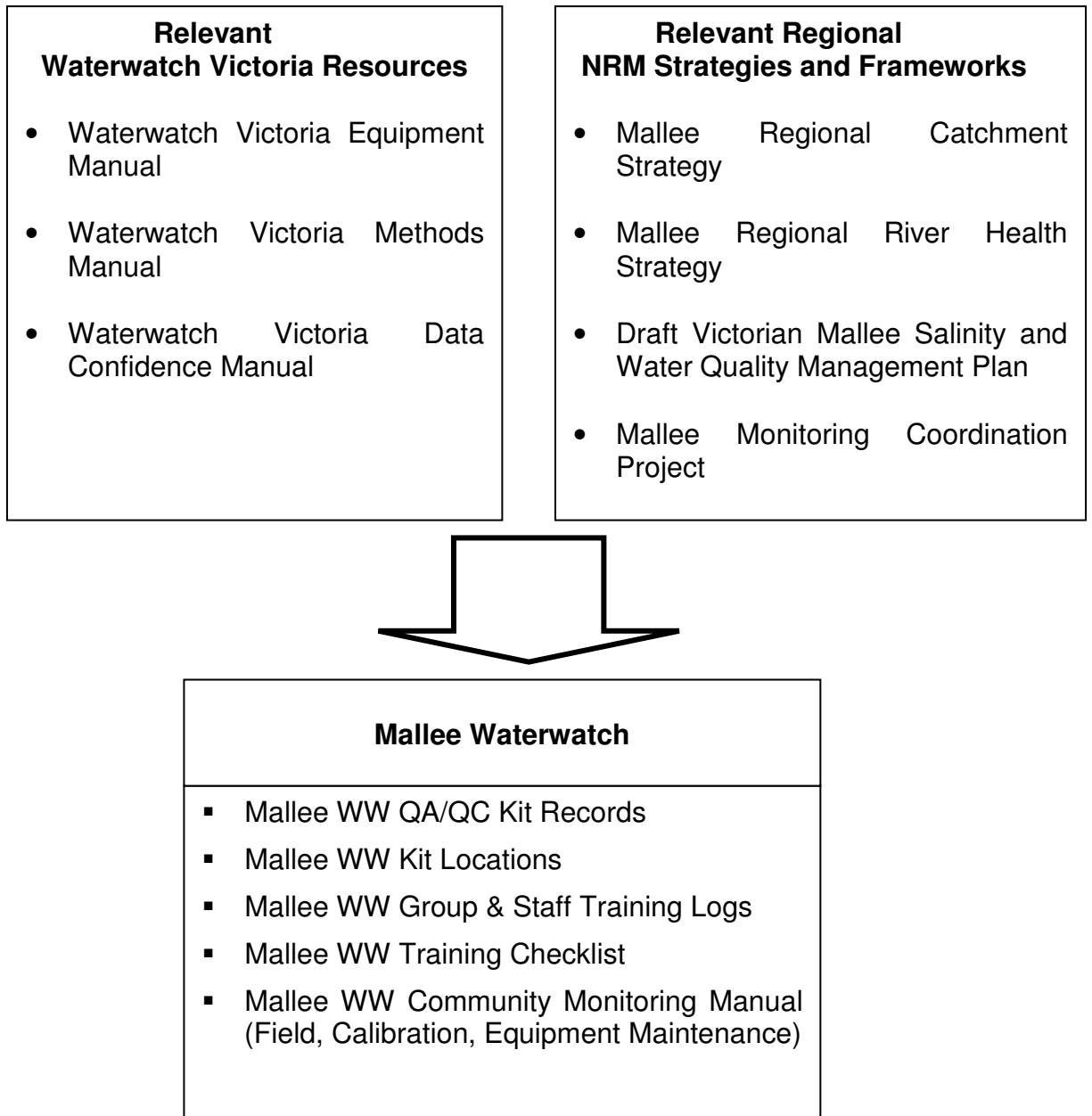
- To increase the community's capacity to be involved in Natural Resource Management (NRM) through providing training and information on water quality monitoring.
- To provide credible water quality data within the Mallee Region and assist NRM decisions in areas where data gaps exist.
- To provide a credible data collection service that compliments other water quality monitoring programs within the region.

4.2 The aims of the Mallee Waterwatch Data Confidence plan are to:

- Produce credible data of known quality, consistent with the State Waterwatch Victoria Data Confidence Framework.
- Demonstrate data quality to program stakeholders (data users, sponsors – actual and potential, community monitoring network, Mallee Catchment Management Authority – Waterways, Wetland and Floodplain, Technical Reference Committee).
- 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.

5. Waterwatch Data Confidence System:

There are a number of both state and regional resources and strategies that provide input into the Mallee Waterwatch program and the development of this plan. These are outlined in the diagram below.



6. Roles and Responsibilities

There are a number of people in the Mallee CMA whose roles have input into the Mallee Waterwatch program. The following have had input into the data confidence plan. Contact names are available from the Regional Waterwatch Coordinator upon request.

Position Title
Manager River and Wetland Health
Regional Waterwatch Coordinator
Waterwatch Officer
Water Quality Coordinator
River and Wetland Health Staff
Water Monitoring Coordinator
State Science Coordinator

6.1 Manager River and Wetland Health

- Overseeing the management of the program, ensuring the program is meeting the needs of the Mallee CMA.
- Providing feedback on specific data confidence issues.

6.2 Regional Waterwatch Coordinator

- Review the regional Data Confidence (DC) Plan and local documentation with the Waterwatch Project Officer, to ensure on-ground monitoring activities are accurately documented and reflected.
- Identify training opportunities for Waterwatch staff.
- Publish data reports with the Waterwatch Project Officer.
- Ensure Waterwatch data is being collected in a manner consistent with broader regional monitoring objectives (Regional River Health Strategy, Index of Stream Condition, etc).
- Validation and maintenance of water quality data on Regional Waterwatch Database.
- Purchase equipment and maintain a log of equipment identification numbers.

6.3 Waterwatch Officers

- Training and retraining of volunteers in field sampling and monitoring, calibration and regular equipment maintenance (where necessary).
- Maintenance of Mallee Waterwatch monitoring equipment (serial numbers, routine cleaning, servicing, repairs, calibration), and stock (calibration solutions, reagents).
- Maintenance of quality control logs (where required).
- Maintenance of volunteer records, including contact and training details.
- Filing of hardcopy records/archives (data sheets/volunteers records/logs).
- Coordination and supervision of specialised activities including snapshot events and local projects.
- Auditing of equipment.

- Preparation of reports (this may include data interpretation, project management, meeting minutes and/or notes).

6.4 Water Quality Coordinator

- Providing advice on Waterwatch data collection methods.
- Prioritising environmentally significant and strategic sites where there are identified gaps, in consultation with Water Monitoring Coordinator.
- Providing technical support as required.

6.5 Water Monitoring Coordinator

- Providing technical support and reviewing of Data Confidence plan to ensure Standards 3 and 4 meet QA/QC requirements of the North West Monitoring network.
- Identifying monitoring gaps that Waterwatch groups can fill on behalf of different program supporters such as local government, DSE, DPI, and Mallee CMA.

6.6 State Science Coordinator

- In conjunction with Regional Coordinator, review monitoring standards and Quality Assurance/Quality Control (QA/QC) requirements to ensure high quality data collection.

7. Water Quality Parameters

The Mallee Waterwatch Program monitors the following water quality parameters:

- Electrical Conductivity
- pH
- Temperature
- Turbidity
- Reactive Phosphorus
- Dissolved Oxygen
- Nitrate
- Hardness

The regional relevance of monitoring these parameters is detailed in the Mallee Waterwatch Community Monitoring Manual.

Note

- *Not all of the above parameters are monitored at all sites and frequency of monitoring varies depending on the identified needs of the group and site.*
- *Habitat surveys are completed at the commencement of monitoring at a new site.*
- *Macro-invertebrates have been monitored at some sites, predominantly as an awareness exercise with community and school groups.*
- *Other monitoring parameters can be added where a particular need is identified.*

8. Instrumentation

The Mallee Waterwatch program 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/manufacturer details (company name, contact name, address and phone number) are noted. This list does not identify which types of instruments are used for different monitoring purposes. Such information will follow under the section titled 'Regional Data Confidence Framework'.

Monitoring kits are inscribed with serial numbers for identification purposes and to aid the tracking of equipment. Records of all equipment and kits will be kept on the Watchman Database.

Instrument type and model	Parameters monitored (eg. PH)	Units of measurement (pH units)	Range (eg. 0 – 14 pH)	Resolution (eg. 0.01 pH)	Accuracy (eg. ± 0.05 pH units)	Distributor name and contact details for repairs/servicing/enquiries (name, address, phone, email)
WTW Multiline P3 PH Electrode.	pH	pH units	-2 - 16	0.01 pH	± 1 digit	Merck Ph. 1800 335 571 www.merck.com.au
Eutech PHScan2	pH	pH units	0 - 14	0.1pH	± 0.1pH	Westlab Supplies, 122 Fussell St. , Ballarat, Victoria 3354.; Ph 03 5333 2941 or 1800 358 101; sdgray@netconnect.com.au
Eutech PHTestr 10	pH	pH units	0 – 14	0.1pH	± 0.1pH	Westlab Supplies. See above.
Horiba U-10 Multiprobe – pH glass electrode	pH	PH units	0 - 14	0.1 pH (standard) or 0.01 pH (extended)	Repeatability ± 0.05 pH	Australian Scientific Pty Ltd. 11 McDougall St.Kotara, NSW. Ph 1800 021 083 Fax (02) 4956 2525; Tony Fincher afincher@austscientific.com.au
Visicolor Eco Oxygen (DO colorimeter)	Dissolved Oxygen	mg/L	1-10 (Increments of 1, 2, 3, 4, 6, 8, and 10 mg/L)	1 – 2 mg/L	Not specified	Westlab Supplies. See Above
Horiba U-10 Multiprobe – DO Membrane/galvanic cell	Dissolved Oxygen	mg/L	0 – 19.9	0.1 mg/L (standard) to 0.01 mg/L (extended)	Repeatability ± 0.1 mg/L	Australian Scientific Ptd Ltd. See above.
Visicolor HE Phosphate (DEV)	Reactive P	mg/LPO4-P	0.01-0.25mg/L P (Increments of 0.01, 0.02, 0.03, 0.05, 0.07, 0.10, 0.15, 0.20, 0.25mg/L)	0.01 – 0.05 mg/L PO4-P	Not specified	Westlab Supplies. See Above.

Visicolor HE Phosphate	Reactive P	mg/LPO4-P	0.05-1.0mg/L P (increments of 0.05, 0.10, 0.15, 0.20, 0.3, 0.4, 0.6, 0.8, 1.0)	0.05 – 0.2 mg/L	Not specified	Westlab Supplies. See Above.
Merck Aquaquant	Reactive P	mg/LPO4-P	0.015mg/L – 0.14mg/L P (Increments of 0.015, 0.03, 0.045, 0.06, 0.08, 0.11, 0.14 mg/L)	0.015 – 0.03 mg/L	Not specified	Merck See above
WTW Multiline P3	Temperature	°C	-5°C - 99.9°C.	0.1 °C	0.1 °C ± 1 digit	Merck See above
Digital Thermometer	Temperature	°C	-20 °C -100 °C	0.1 °C	±0.5 °C	Westlab Supplies. See Above
Horiba U-10 multiprobe – thermastor thermometer	Temperature	°C	0°C to 50°C	1°C (standard) to 0.1°C (expanded)	Repeatability ± 0.3 °C	Australian Scientific Ptd Ltd. See above.
Turbidity Tube	Transparency / Turbidity	Tube NTUs	10 to 400 tube NTUs	Variable increments notched along tube	Tube NTUs are an approximation of true NTU units, and a measure of transparency change.	Waterwatch via DSE/DPI Info Centre
Horiba U-10 Multiprobe – nephelometric probe	Turbidity	NTUs	0 - 800	10 (standard) or 1 (expanded)	Repeatability ± 3 %	Australian Scientific Ptd Ltd. See above.
WTW Multiline P3.	Conductivity	Microseimens/M illiseimens	Measuring Range 1, 0-1999us/cm. Measuring Range 2, 0.00 - 19.99ms/cm. Measuring Range 3, 0.0-199.9ms/cm, Measuring Range 4, 0-500ms/cm.	EC Measuring Range 1, 1us/cm. Measuring Range 2, 0.01ms/cm. Measuring Range 3, 0.1ms/cm. Measuring Range 4, 1ms/cm.	± 1% of value	Merck See Above
Eutech ECTestr 11	Conductivity	Microseimens/ Milliseimens	0-2000µs/cm 2.00-20.00ms/cm	10us/cm	±1% fullscale	Westlab Supplies. See Above
Horiba U-10 water checker, alternating 4 electrode	Electrical Conductivity	Microseimens	0 – 100 mS/cm	Variable 0.001 – 1 mS/cm depending on range and resolution mode (standard/expanded)	±2% Full Scale	Australian Scientific Ptd Ltd. See above.
Westlab Hardness Test Reagent	Hardness	Parts Per Million (ppm)		20ppm or 50ppm		Westlab Supplies. See Above

9. Monitoring Sites

Waterwatch monitoring sites listed on the Regional Database include a number of active and inactive sites. The Mallee Waterwatch program encourages monitors to select sites which are of personal and environmental interest.

Sites are allocated a code, which consists of a 3 letter and a 3 digit number sequence. Of the three-letter sequence, the first letter indicates the type of waterbody being monitored. The second and third letters correspond to the name of the waterbody. For example: *RMU 000*, *R = River*, *MU = Murray*. Site numbers are based on the sites location in the basin with 000 located in the headwaters and 999 at the mouth/junction of the stream.

Refer to Appendix 1 for detailed instructions for the allocation of site codes for all types of water bodies monitored by Mallee Waterwatch.

For a full list of sites at the time when this plan was developed, refer to Appendix 2. An updated list is available from the Regional Waterwatch Coordinator upon request.

Site coordinates (Eastings/Northings) and site descriptions are noted on the Regional Database. All sites have historically been logged through either the use of a GPS (Global Positioning System), or identified from a 1:100000 (CFA/topographic) map. New sites will be logged through the use of GPS, with existing sites being logged by GPS for greater accuracy. GPS coordinates will be recorded in MGA94. Historical site coordinates (from topographic maps) that aren't re-logged with a GPS need to be reprojected from AGD66 (AMG) to GDA 94 (MGA94).

A complete site code list is generated from the database on a three monthly basis and is stored beside the computer housing the database.

10. Monitoring Plans

Monitoring plans are drawn up for Standard 3 and 4 monitoring groups in the Mallee Waterwatch program. They consolidate the reasons for monitoring with the group, Mallee Waterwatch staff and data users. These plans give a clearer picture of where monitoring groups' data should be stored and how it should be used. It should be noted that some groups may have different data confidence levels for different parameters.

Groups undertake water quality monitoring for various reasons. It is important for Mallee Waterwatch staff to understand each individual group's motivation and desired outcomes of monitoring so adequate technical and interpretive support can be provided.

Plans are developed in accordance to the regional data confidence framework and any applicable recommendations and actions tabulated in the Victorian Mallee Salinity and Water Quality Management Plan and the Mallee Regional

River Health Strategy. This ensures significant water quality issues within the strategy are considered.

The Mallee Waterwatch Program and Waterwatch groups retain copies of monitoring plans. Monitoring plans held by Mallee Waterwatch will be stored at the Mallee CMA office in Irymple. The monitoring plan of each group will be reviewed annually and renewed bi-annually.

Refer to Appendix 3 for Group Monitor Plan Template and example.

11. Regional Data Confidence Framework

Waterwatch Victoria has recently developed a state Data Confidence framework and guidelines that identifies minimum data confidence standards for a range of monitoring purposes. Consistent with these documents, Mallee Waterwatch developed its own regional data confidence framework and identified where local monitoring groups fit. Group standards were identified through discussions between the local Waterwatch Officers and the Regional Waterwatch Coordinator. A complete list of local groups' standards is maintained by the Regional Coordinator, which is updated on a regular basis. Each monitor will be given one of four different data confidence classifications, from Standard 1 to Standard 4, depending on the monitoring purpose, equipment, QA/QC parameters and their monitoring frequency. The standard a monitoring group is classified helps decide how the data will be managed, who will use the data and how it will be used.

11.1 STANDARD 1

Most common Monitoring Group participants

- Primary Students
- Secondary Students

Training

- Standard 1 participants may attend a single educational water quality monitoring session and perform one or more of the water quality tests.
- The class is shown best practice monitoring techniques and educated on each parameter and how they relate to water quality.

Quality Control

- No quality control checks are required and tests can be conducted with minimal supervision.

Prior Exposure to Waterwatch

- There may be no or very little prior exposure to Waterwatch and the monitoring equipment used.

Monitoring Frequency

- This monitoring can be a one off for awareness and educational purposes. The group does not need to continue monitoring on a regular basis.

Data Collected

- The data collected is stored on the Regional Waterwatch Database and tagged as 'not Quality Assured' results. The information is used for interest only and not used externally for decision making purposes. The data will not be placed on the State Data Warehouse.

Parameters Measured

- Temperature
- pH
- EC
- Turbidity
- Reactive Phosphorus

Recommended Equipment

- Digital Thermometer, Eutech PHTestr 10, Eutech ECTestr 11, Visocolor HE Phosphate, Turbidity Tube

11.2 STANDARD 2

Most Common Monitoring Group participants

- Primary Schools
- Secondary Schools
- Friends of Groups
- Green Corp Groups
- Adult Volunteers
- Landcare Groups

Training

- A Waterwatch Coordinator/Officer will train participants in correct field techniques and QA/AC procedures.
- Refresher training is provided annually.

Quality Control

- Participants are observed to ensure they are using the correct technique during training and again as required.

Prior Exposure to Waterwatch

- There may be no or very little prior exposure to Waterwatch and their monitoring equipment.

Monitoring Frequency

Standard 2 groups will monitor a minimum of once per year for a targeted purpose (eg. Saltwatch week).

Data Collected

The data collected is stored on the Regional Waterwatch Database and will be flagged as being Standard 2. This data could be used to identify problem areas requiring additional follow-up monitoring by a Standard 3 or 4 monitor.

Parameters Measured

- Temperature
- pH
- EC
- Turbidity
- Reactive Phosphorus

Recommended Equipment

- Digital Thermometer, Eutech PHTestr 10, Eutech ECTestr 11, Visocolor HE Phosphate, Turbidity Tube

11.3 STANDARD 3

Common Monitoring Group participants

- Friends of Groups
- Landcare Groups
- Tertiary Students
- Adult Volunteers
- Some primary and Secondary Schools

Training

- A Waterwatch Coordinator/Officer will train participants in correct field and QA/QC procedures.
- Refresher training will be provided annually.
- Monitors will have close contact with Waterwatch staff.

Quality Control

- Participants are observed throughout initial training and during annual refresher training to ensure their technique is correct. Refresher training will include parallel testing/duplicate samples.
- Participants will be responsible for the calibration of instruments prior to testing and associated record keeping.
- Monitors will participate in two yearly regional QA/QC tests/workshops (see Section 16).

Prior Exposure to Waterwatch

- Participants will have prior exposure to Waterwatch.

Monitoring Frequency

- Standard 3 monitors must monitor at least quarterly.

Data Collected

The data is stored on the Regional Waterwatch Database and the State Data Warehouse. The data will be flagged as Standard 3 and may be comparable against data collected by external Agencies who monitor the same sites (depending on instrument specifications). This is to ensure data is accurate and credible.

Parameters Measured

- Temperature

- pH
- EC
- Turbidity
- Reactive Phosphorus

Recommended Equipment

Digital Thermometer, Eutech PHTestr 10, Eutech ECTestr 11, Visicolor HE Phosphate, Turbidity Tube

11.4 STANDARD 4

Most Common Monitoring Group participants

- Mallee Catchment Management Authority Staff
- Department of Sustainability and Environment Staff
- Murray Darling Freshwater Research Centre – Lower Basin Laboratory

Training

- Participants will undertake detailed training by Waterwatch staff.
- Extra QA/QC training is provided.
- Will participate in refresher training at least annually.
- Participants will be in close contact with Waterwatch Staff.

Quality Control

- Participants observed throughout training and at least once during the year (annual refresher training) to ensure their monitoring and calibration techniques are correct. Refresher training will include parallel testing/duplicate sampling.
- Participants will undertake regular calibration on equipment and maintain appropriate record keeping.
- Monitors will participate in 2 yearly QA/QC tests/workshops (see Section 16).

Prior Exposure to Waterwatch

- Participants will have prior exposure to Waterwatch.

Monitoring Frequency

- Standard 4 monitors must monitor at least monthly.

Data Collected

The data is stored on the Regional Waterwatch Database and the State Data Warehouse. This data will be offered to internal and external organisations wishing to access information. This data will be scientifically credible, comparable against other agency collected data, and can be used to make important managerial decisions.

Parameters Measured

- Temperature
- pH
- EC
- Turbidity
- Dissolved Oxygen

Recommended Equipment

Horiba U-10 water checker

12. Standard Operating Procedures

Standard Operating Procedures are contained within the Community Monitoring manual for each type of monitoring instrument used by the Mallee Waterwatch program. This manual describes the specific steps and processes of establishing, documenting, recording, maintaining and performing the water quality monitoring activities. These are described below as field procedures, calibration procedures, and equipment maintenance/repair and servicing procedures.

12.1 Field Procedures

The Community Monitoring Manual covers water quality monitoring activities conducted routinely at monitoring sites. These include:

- Calibration
- Sampling procedures
- Testing procedures
- Recording and checking transcriptions
- Cleaning and maintaining equipment condition.

The manual explains each parameter and its relevance to freshwater environments in the Mallee region.

A set of monitoring instructions has been developed by Mallee Waterwatch and is provided to every monitoring group as part of the monitoring kit provided.

12.2 Calibration Procedures

Instrumentation used by Mallee Waterwatch requires calibration against known standards and buffers. The instrument calibration instructions and recommended frequency are included in the Community Monitoring Manual. This provides information on calibration solutions (types used, supplier, and storage methods). Record keeping requirements are outlined in Section 14.3.

12.3 Preventative Maintenance/Repair and Servicing Procedures

In addition to calibration procedures, a number of maintenance activities are carried out by monitors and/or Waterwatch staff (at variable frequencies). These procedures are outlined in detail in the Community Monitoring Manual. Record keeping requirements are outlined in Section 14.2.

13. Mallee Training Program

The Mallee Waterwatch training program is used to provide quality training to both Waterwatch staff and Mallee Waterwatch monitors.

13.1 Mallee Waterwatch Staff Professional Development

All coordinators attend training workshops for chemical, physical and biological aspects of water quality monitoring provided by Waterwatch Victoria. Mallee Waterwatch staff are required to attend refresher training at least every two years thereafter, or more frequently if necessary. Attendance at Victorian Waterwatch training days is considered essential for all Mallee Waterwatch staff. These training days include:

- Physical and Chemical monitoring techniques
- Equipment maintenance and calibration
- QA/QC
- Macro invertebrate identification
- Macro invertebrate sampling techniques
- Recording
- Interpreting data
- Reporting
- Conducting monitor training days
- Any other issues relevant to water quality monitoring.

Professional Development training for Mallee Waterwatch staff is organised through the Regional Coordinator, Mallee CMA or the Waterwatch Victoria State Office. New coordinators/officers are able to suggest training opportunities that they feel will benefit them and assist in fulfilling their role to their best ability. These may include First Aid, Index of Stream Condition and Index of Wetland Condition.

13.2 Mallee Waterwatch Monitor Training

Volunteer monitors and staff from the Mallee CMA and other agencies, are primarily trained by Mallee Waterwatch staff. However, assistance may be sought from other suitably experienced and/or qualified persons to complement existing knowledge.

The training needs of new groups will be determined by the groups' monitoring purpose, experience and knowledge of its members, and parameters being monitored.

The following are recommendations only and should be the minimum amount of training provided to groups.

13.2.1 Initial training for new groups

New groups will generally require an introductory session outlining the Waterwatch program and the purpose for monitoring. This session will help guide groups and Mallee Waterwatch staff in the development of a monitoring plan, should the group decide to undertake regular monitoring (Standard 3 and 4). A full training session should be conducted with group members wishing to undertake monitoring. Mallee Waterwatch Staff will follow the training checklist (Appendix 4) to ensure all relevant topics and methods have been covered. One in-field session (usually the first), for all new groups, will be attended by Mallee Waterwatch staff. This will ensure group members have the confidence to carry out sampling and analysis in the field.

13.2.2 Refresher training for established groups

Standard 3 and 4 monitors will have the opportunity to attend refresher training sessions each annum. Infield training should be considered for these groups. Training schedules may increase, particularly if new members join the group.

By providing monitors with the opportunity to attend refresher training, they not only become more confident with their monitoring, but get a chance to interact with other water quality monitors in the region. Other activities like macro invertebrate sampling and habitat surveys may also be on offer so volunteers have a chance to share knowledge and gain a broader understanding of their waterways.

14. Record Keeping

The following logs have been developed for the Mallee Waterwatch monitoring program. This ensures that the program can be continually assessed and demonstrate a high standard of data confidence. Mallee Waterwatch kits have a complete audit annually to ensure equipment is working accurately and it keeps records of all maintenance, repairs and calibration, as detailed in Section 12 the Community Monitoring Manual. Below outlines the range of record keeping undertaken to maintain data quality.

14.1 Mallee Waterwatch Kit Inventory Sheet (Appendix 4)

This information is kept on an excel spreadsheet to allow Mallee Waterwatch to maintain stock levels against a known equipment checklist. It ensures that each kit has all the appropriate equipment.

14.2 Mallee Waterwatch Monitoring Repair/Service Log (see Section 12.3 and Appendix 7)

The Repair/Service log allows Mallee Waterwatch to record the servicing of equipment and monitor when equipment should be checked and replaced. The kit is cleaned and the batteries, reagents and faulty equipment are replaced. This information is kept on an excel spreadsheet.

14.3 Mallee Waterwatch Calibration Record (see Section 12.2 and Appendix 6)

Standard 3 and 4 monitors maintain calibration logs 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 on the data record sheets for Waterwatch kits and on the appropriate calibration log sheet for horibas.

Calibration Records Include:

- Mallee Waterwatch Calibration Record – Electrical Conductivity
- Mallee Waterwatch Calibration Record – pH
- Mallee Waterwatch Calibration Record – Turbidity (Horiba)
- Mallee Waterwatch Calibration Record – Dissolved Oxygen (Horiba)

14.4 Mallee Waterwatch Kit(s) Locations (see Section 15.4)

Mallee Waterwatch will use an excel spreadsheet to track the movement of monitoring equipment loaned or allocated to monitoring groups.

14.5 Shadow Testing Record sheets (see Section 16.2 and Appendix 8)

The shadow testing sheets record the variation between Waterwatch instrument value and the shadow of instrument value. This is particularly important for equipment types that cannot be calibrated manually (eg turbidity tube).

14.6 Mallee Waterwatch Group & Staff Training Logs (see Section 13)

This information is retained on an excel spreadsheet in order to keep a record of training undertaken by both Mallee Waterwatch staff and groups.

14.7 Mallee Waterwatch Training Checklist (see Section 13 and Appendix 4)

A training checklist for new groups is used along with the training log to identify training gaps for groups. See Appendix 4 for the training checklist.

14.8 Equipment Register

All equipment will be engraved with a unique number to assist with identification. Details of purchase date, replacement parts, etc will be recorded on an excel spreadsheet.

15. Data Management

15.1 Waterwatch Database

Waterwatch Victoria has recently upgraded an access-based data management system for regional programs (Waterwatch Australia Data Management Database). The program allows the electronic transfer of data from Waterwatch monitors (through the use of an Offline Data Entry Application or ODEA), to local Waterwatch Facilitators (and local databases), and to Regional Waterwatch Coordinators (and regional databases). This new data management system has advanced data validation tools to minimise data transcription and entry errors, 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 tag data according to its quality, as outlined in the Regional Data Confidence Framework. It is this tagging system that will be used to export high quality Waterwatch data for inclusion on the Victorian Water Quality Data Warehouse.

Hard copy data sheets are archived in a filing cabinet. These sheets are stored and separated according to the group who collected the data and in order of the date collected.

Backup copies of the Waterwatch Database are zipped and burned to disc/CD. This backup is undertaken at least every three months. A copy of the database files are also copied and stored on the CMA server which is backed up daily.

15.2 Data Validation and Entry

All coordinators enter data into the regional copy of the Waterwatch Australia Data Management Database, held at the Mallee CMA office. The User Manual for the Waterwatch Database is kept next to the database computer for easy reference. Site codes are checked to ensure that the correct codes have been used. Data anomalies are questioned with the Waterwatch volunteer who recorded the data. If the anomaly is resolved, the data is added to the database. Unverified data isn't added to the database.

The Waterwatch Database has a couple of data validation features to help identify highly abnormal data as a result of typing transcription errors, and for flagging possible pollution incidents. The database has a number of screening limits, called hard and soft limits. Hard limits reflect the maximum range of a parameter and are the same for all water types. Soft limits reflect the expected range of a parameter for a water system type in the Mallee region. Data that falls outside any of the limits without valid explanation will not be automatically accepted with other quality assured data. Data can be manually accepted despite falling outside soft limits, if the result is determined to be legitimate. The soft limits are set by Mallee Waterwatch and are list in Appendix 5 – "High and Low Soft Limits for Water Types in the Mallee Region". Site specific data anomalies outside of two standard deviations of a site's historical dataset will require manual verification if the result is valid.

Data sheets are marked clearly once data has been entered into the database.

The Waterwatch Officer will follow up data anomalies determined to be caused by human error/bias. The Waterwatch Officer will discuss the issues with the Waterwatch volunteer and may choose to retrain the group or individual.

15.3 Assurance of Regular Data

Waterwatch volunteers who monitor on a regular basis will be called if expected data has not been received by the Waterwatch Officer. This will ensure that data is regular and timely. To carry this out, the Waterwatch Officer will check the database on a monthly basis.

15.4 Data Reporting

Data is interpreted and reported via a number of avenues in the Mallee region. This includes:

- Quarterly newsletters
- Mallee CMA newsletter
- Annual reports
- PowerPoint presentations
- Raw data reports are forwarded, upon request to implementation groups, Mallee CMA, DPI/DSE, Local Government, Parks Victoria, universities and TAFE.

15.5 Excel Spreadsheets

A number of Excel Spreadsheets have been developed as a mechanism for recording information for a number of aspects of the Mallee Waterwatch program. These spreadsheets will assist with reporting, monitoring and evaluation of the Mallee Waterwatch program. Spreadsheets include information

related to program delivery, such as education sessions and training (opportunities, histories and attendances), instrument (calibration, servicing, location) and media event records. They do not contain water quality data.

16. 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 the quality of data.

The Mallee Waterwatch program will use a number of mechanisms to review the success of this Data Confidence Plan and its implementation. A number of regional and state QA/QC checks (both internal and external) will be used to assess the overall monitoring proficiency of the program.

16.1 Waterwatch Victoria QA/QC Week

Waterwatch Victoria conducts an annual QA/QC week, where Waterwatch staff are required to test mystery solutions of a known value as a means of checking instrument and user accuracy. All Mallee Waterwatch staff are required to attend. Standard 3 and 4 volunteer monitors are strongly encouraged to participate in this activity. These results are reported in an annual report by Waterwatch Victoria. Regions are encouraged to use the results to self-assess regional monitoring programs.

16.2 Regional QA/QC:

Mallee Waterwatch holds regional QA/QC days where monitors can check their results against known samples. This may include testing a monitor's accuracy, precision or both. All Standard 3 and Standard 4 monitors are required to attend one of these days on an annual basis.

The table below outlines a range of possible activities conducted during the regional QA/QC days, along with an indication of the type of quality control.

Activity	Type of Quality Control	Accuracy	Precision
Regional days cross-testing meters in field conditions	Calibration standard check Shadow testing/ duplicate Samples	4	4
Regional QA/QC – mystery samples. These samples will be provided to monitors annually.	Calibration standard check Mystery samples	4 Tolerance limits: ± 10% for EC ± 20% for turbidity and phosphorus for Standard 3/4 monitors	
Accuracy checks during regular training workshops	Calibration standard check	4	
Individual monitor visits at least annually depending on monitoring group. All equipment will be serviced.	Duplicate samples Sampling and measurement methodology observed.	4	4

17. Data Confidence Plan review:

An annual review of the Data Confidence Plan will be undertaken by the Mallee Waterwatch team, and biannually by the Waterwatch Victoria Science Coordinator and other interested stakeholders (eg from the CMA). The annual review will correspond with a stock take of equipment.

Annually, the Mallee Waterwatch Coordinators and the State Science Coordinator will review Standard 3/4 monitoring undertaken in the region. This review will be an opportunity to check that minimum QA/QC requirements are being met through the implementation of the Data Confidence Plan.