

# **FINDINGS FROM THE EPA DATA CATEGORIES PILOT TRIAL IMPLEMENTED IN SOUTH AUSTRALIA**

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## **BACKGROUND**

For the last five years, the South Australian Environment Protection Authority (EPA) has supported the development of a Quality Assurance and Quality Control (QA/QC) program and data confidence framework for the Waterwatch SA community water monitoring program.

### **History of Waterwatch SA water monitoring**

During the last ten years the main focus of Waterwatch SA has been to raise community awareness about the health of waterways and catchment issues. Community water monitoring has been used as the key environmental education tool to achieve the objectives of Waterwatch SA.

Traditionally the main target audience for Waterwatch water monitoring has been the school-age community. However, community group involvement has also been very strong in some regional programs; with up to a quarter of groups being general community groups, such as Landcare groups, Friends of Parks groups, other catchment groups and community service clubs.

Currently, Waterwatch groups monitor the following physical, chemical and biological parameters as indicators of catchment health:

- pH
- Turbidity
- Temperature
- Electrical Conductivity (EC)
- Nitrate
- Phosphate
- Macro-invertebrates

Through Waterwatch SA, community water monitoring data about the health of catchments is collected by Waterwatch groups and entered into the Waterwatch Australia Database Management (WADM) system at a regional level.

In the longer term it is hoped that these regional databases will be useful references for water quality information, particularly in areas with minimal or no other formal monitoring programs. For example, in the past Waterwatch groups in the Broughton Wakefield Waterwatch region have been able to collect data on Electrical Conductivity (EC) levels more regularly and consistently compared to government agencies and scientific organisations.

The quality of the data contained in current Waterwatch SA regional databases is largely unknown, as adequate records have not been kept regarding QA procedures and QC information.

### **Community expectations for community water monitoring**

Over the last ten years, community groups have become involved with Waterwatch monitoring for a range of reasons. These include:

- interest in learning about the health of their local catchment (a typical reason for a school group undertaking monitoring)
- learning how to use water monitoring equipment (school science interest & community group interest)
- wanting to regularly monitor a favourite site or place where a group is undertaking on-ground activities, such as weed removal and revegetation (common reason for community groups such as Landcare or Friends of Parks groups)
- wanting to monitor a site they think is polluted (community group ‘watch-dog’ role)
- volunteering to collect data for government agencies (but this is not a current role of Waterwatch SA).

Waterwatch SA encourages community involvement in monitoring, and as a result of some the community group expectations listed above not being met groups have become disillusioned that their data is not being used and acted upon by government agencies. Previously some community groups have had the expectation that Waterwatch SA monitoring data directly feeds into state and national water monitoring databases of government agencies, such as the EPA and Environment Australia. This issue is now being addressed through the development of monitoring plans, which encourage monitoring groups to identify local or regional data users as the key users of their data.

Issues relating to the expectations of community collected data need to be addressed in terms of how programs such as Waterwatch SA are marketed to both community groups and potential data users. It is important to ensure that the product that is being promoting is the same product that community groups and potential users need to purchase. As a result of identifying this need to meet expectations of community groups and users, both groups have been consulted and involved in providing input into the development of the Data Categories for Community Water Monitoring.

### **Development of the Data Categories for Community Water Monitoring**

The development of the framework was initiated as a result of community concern that Waterwatch data was not being used for environmental management and concern from a scientific perspective regarding the variability of community collected data.

In 2001/2002, a review was conducted of the perceptions of Waterwatch groups, regional staff and potential data users regarding the quality of Waterwatch data. The findings were presented in a report titled “Perceptions of Waterwatch Data - Navigating the road to the Scientific Potential of the Waterwatch Data Chain” (Bergin 2002). The key finding from the review was that potential data users would be interested in using community-collected data if the quality of the data could be identified. It was recommended in this report that the EPA and Waterwatch SA investigate the potential to develop a data confidence framework for community-collected data. This framework has developed into the EPA Data Categories for Community Water Monitoring.

Through funding from the EPA for a project to evaluate and analyse Waterwatch SA data (Monroe 2003), the EPA has been able to identify a number of steps to be taken to improve the quality of community water monitoring data and identify the data to known data levels. The steps have been incorporated into the development of the Data Categories pilot project.

These steps have included:

- providing regular and consistent training for WWSA staff and groups
- development of monitoring plans for Waterwatch groups
- improving the quality and accuracy of information collected on data record sheets
- attempting to standardise equipment for all Waterwatch groups
- developing clear guidelines for sample collection and water testing
- providing annual training for all Waterwatch groups in water monitoring
- conducting quality control testing for Waterwatch staff and groups.

The framework has three levels of monitoring: general, standard and advanced. The general level has no quality checks therefore data is of an unknown quality, whereas the standard and general levels have increasing levels of QA/QC requirements to enable the quality of the data and confidence limits of the data to be identified.

As part of the process of defining the data categories, a series of QC solutions were provided to regional staff and Waterwatch groups for testing during 2002. The data from the QC testings was analysed in a report titled 'Waterwatch SA Data Analysis Report' to assess the accuracy of water monitoring being undertaken by Waterwatch groups.

The conclusions from Monroe (2003) indicated the following:

- overall Waterwatch SA pH, EC and turbidity monitoring is confidently measured within an acceptance level of plus or minus 10%
- Waterwatch monitoring of nitrate and phosphate has a much greater level of variability in terms of accuracy.

The acceptance levels determined through the analysis of Waterwatch data fed into the development of the Data Categories, which were developed for the following reasons:

- to be used as a guide for potential data users regarding the confidence levels of the quality of community collected data
- to provide water monitoring groups with a guideline on what is required to determine the quality of data at different monitoring levels.

Community collected data needs to be of a known data level if it is going to be useful to potential users.

## **THE PILOT OF THE DATA CATEGORIES FRAMEWORK**

In 2004 the EPA undertook a pilot project to implement the EPA Data Categories for Community Water Monitoring throughout the regional Waterwatch SA programs. This project has involved the delivery of QA/QC training workshops and the use of QC testing on community collected data. This process has enabled the quality of community-collected data to be identified and therefore can more confidently be used in environmental reporting processes, e.g. Bureau of Rural Sciences (BRS) salinity mapping project, State of Environment (SoE) Reporting and natural resource management (NRM) reporting.

The findings from the pilot project are broken into a summary of the following:

- participant information
- participant feedback on training workshops
- results from the QC testing.

## Participation information

Data on state and regional participation rates for the 2004 trial indicate that initially participants were very keen to be part of the trial of the three data category levels of general, standard and advanced monitoring (Table 1), with a total of 343 groups registering to be a part of the trial. This is a good response rate considering that approximately 500 monitoring groups are involved in monitoring across the Waterwatch SA program. Overall 143 participants registered to be general level monitors, 122 registered for the standard level and 78 groups registered to be part of the advanced level.

**Table 1: Initial registration for participation in the Data Categories Pilot Trial**

Waterwatch Region	General Level	Standard Level	Advanced Level	Regional Totals
Patawalonga and Torrens	37	44	25	106
Northern Adelaide & Barossa	21	22	24	67
Onkaparinga Waterwatch Network	24	10	14	48
Broughton & Wakefield	31	13	7	51
South East	5	10	4	19
Riverland	7	10	-	17
Lower Murray	18	14	4	36
<b>Total</b>	<b>143</b>	<b>122</b>	<b>78</b>	<b>343</b>

However, the actual proportion of the Data Category levels attained through the Pilot project by participants differed somewhat from what participants initially registered to achieve.

At this stage the analysis of the data from the Pilot of the Data Categories is still in progress. However, from the data that has been analysed to date, the indication is that a much lower proportion of community groups have actually achieved the requirements for the advanced and standard data categories than those who initially registered. Table 2 indicates the total number of groups who aimed for the standard and advanced levels and the actual number that have been able to achieve the standard or advanced data levels for at least one water monitoring parameter.

**Table 2 Numbers of participants from Waterwatch SA meeting the requirements for the standard and advanced data categories**

Waterwatch Region	No. registered for Standard or Advanced level	No. achieving the Standard or Advanced level	%Achievement per Regional Area
Patawalonga and Torrens	69	33	48%
Northern Adelaide & Barossa	46	17	37%
Onkaparinga Waterwatch Network	24	16	67%
Broughton & Wakefield	20	14	70%
South East	14	9	64%
Riverland	10	7	70%
Lower Murray	18	16	89%
<b>Total</b>	<b>201</b>	<b>112</b>	<b>56%</b>

From the findings presented in Table 2, the issue relating to matching what people aim to achieve and with what they can achieve needs further attention. In the metropolitan regions with larger overall participants there was a much lower level of groups actually achieving what they set out to do through their monitoring activities. This result was more due to people being unrealistic in the first instance about what they could actually achieve and the time involved, than not achieving the required QC results for each level. Participation in Saltwatch (see paper A by L. McDowell for National Waterwatch Conference 2005) did increase the overall figure for those who did meet the standard or advanced level monitoring requirements for at least one parameter.

### **Participant feedback on training workshops**

Participant evaluations of the training session were undertaken to assess the level of satisfaction with the program and the extent of knowledge increase as a result of the workshops. Overall participants indicated that they started with an average knowledge of QA/QC procedures and as a result of participating with the workshops they gained a good understanding of the required QA/QC procedures for Data Categories Pilot Trial.

Key findings from the feedback from the training component of the Data Categories Pilot included:

- overall workshops were good value and informative
- evening workshops suited most people
- some thought the 2 hour workshop was too short
- a three hour workshop was run later in the year, but feedback indicated these were too long
- explanation of the data categories and requirements was easy to understand for most
- some of the processes of getting people to QC testing in the workshop could be improved

As a result of this feedback future workshops need to:

- make the aims of the workshop clear and appropriate to the target audience
- trial a 2 ½ hour workshop (instead of 2 hours or 3 hours)
- be in the evening or maybe weekends, not week days
- provide examples of how people can meet the QA/QC requirements (use real case examples)
- make workshop processes as simple as possible and have all solutions, equipment etc. ready at each work station in advance (don't rely on participants to select what they need from a box or the front of the room)

### **Quality of data / acceptance of data**

The findings for the QC testing component the Pilot of the Data Categories are consistent with the findings from Monroe (2003) for the achievable ranges for the different monitoring parameters.

As indicated above, the conclusions from Monroe (2003) indicated:

- overall Waterwatch SA pH, EC and turbidity monitoring is confidently measured within an acceptance level of plus or minus 10%
- Waterwatch monitoring of nitrate and phosphate has a much greater level of variability in terms of accuracy (sometimes as high as a 100 percent error range).

The initial findings from the Pilot of the Data Categories indicate that

- Electrical conductivity (EC) data is confidently measured within a 5 % error range by 95 percent of participants, thus placing well over 95 percent of the groups into the advanced level for EC data (Advanced level requirement is that groups can measure within 10% accuracy for EC)
- pH and Turbidity data can be measured by over 90 percent of groups within a 10 percent error range, thus placing the majority of participants into the advanced level for pH and Turbidity monitoring
- Nitrate and Phosphate monitoring is much more variable and approximately a third of participants were not able to achieve results at the advanced monitoring standard.

The results of the Pilot project to date indicate that in many instances a community monitoring group may be able to meet the advanced level requirements for EC, pH and Turbidity testing, but may only meet the standard level requirements for the nitrate and phosphate testing. These findings have implications in terms of recoding of this information in WADM and the subsequent access to the data. It may not be possible to simply select groups monitoring at a certain level of the data categories as some groups will be monitoring across a number of categories for different parameters. Therefore, issues such as the storage, retrieval and access to community collected data obtained through a data category framework need to be further investigated to make the implementation of the EPA Data Categories for Community Water Monitoring feasible across South Australia.

## **FUTURE OF THE DATA CATEGORIES FOR COMMUNITY MONITORING**

The EPA currently recognises the importance of community engagement programs, such as Waterwatch, as tools for awareness raising about broader water quality issues relating to eutrophication of catchments, nutrients and maintenance of environmental values. The QA/QC component of Waterwatch is not the primary focus of the program, but does allow any data that is collected to have associated levels of data confidence to enable data to be more confidently used in appropriate environmental reporting. An example is the use of the Saltwatch data in the Bureau of Rural Sciences (BRS) salinity-mapping project for the Mount Lofty Ranges.

For the development of a comprehensive database on community water monitoring across the state, participants need to be encouraged to continue to monitor sites that have been monitored in the past, in order to build a good temporal coverage of the data. To improve the spatial coverage of the data, new groups and sites may have to be selected strategically to fill gaps in the coverage. To determine the quality of the data participants need to be involved in regular QC testing to determine the confidence level for the data. The outcome of such a database will be that more meaningful comparisons of data will be able to be made between sites, regions and years, and that the confidence levels of the data will be known. Through a comprehensive database linked to a Geographic Information System (GIS), community collected data such as Waterwatch data could be linked to regional environmental data and potentially feed into State of Environment Reporting and regional monitoring and evaluation for integrated natural resource management (INRM) processes.

The QA/QC focus of community water monitoring should be considered in light of the overall aim of such programs, which is raising awareness about water quality issues and engaging people in monitoring water quality across catchments. Feedback from Waterwatch facilitators and participants Pilot of the Data Categories indicates that the QA/QC focus should not be at

the expense of the education and awareness focus of community monitoring. The QA/QC component of community monitoring but should be complementary to the key aim of raising awareness through ensuring that good quality data can be collected and used to inform both participants and the broader community about water quality issues in South Australia.

The recommendation from the trial implementation of the Data Categories for Community Water Monitoring is that the EPA implement the framework for community water monitoring across the state as a key element of the scientific QA/QC support for community water monitoring programs such as Waterwatch. Further work also needs to be done to link community collected data into other environmental information and reporting processes such as State of Environment (SoE) reporting and natural resource management (NRM) reporting.

For further information on Waterwatch and community water monitoring events and activities refer to [www.sa.waterwatch.org.au](http://www.sa.waterwatch.org.au)

## REFERENCES

- Bergin, S.M.(2002) '*Perceptions of Waterwatch Data – Navigating the road to the Scientific Potential of the Waterwatch Data Chain*', Transocean Research and Consulting. Unpublished report produced for the EPA.
- McDowell, L (2005) "Saltwatch – a community engagement tool and a water quality monitoring event" Paper A presented at the National Waterwatch Conference 2005, Melbourne Victoria. Printed in the *National Waterwatch Conference 2005 Proceedings*.
- Monroe, H. (2003) '*Waterwatch SA Data Analysis Report*', prepared for the EPA by Helen Monroe while being contracted through Kelly Scientific. Unpublished report produced for the EPA.