

Upper Murrumbidgee Waterwatch Volunteer Manual



For more information contact the Upper Murrumbidgee Waterwatch Facilitator

Waterwatch Resource Manual

Contents:

Introduction	4
Data Confidence	5
Parameters: Why Do We Monitor What We Do?	6
Parameters: What Do They Tell Us	7
ACT Waterwatch Contacts	9
ACT Water Management Areas and Subcatchments	10
Sign in/sign off sheet	11
Some reminders for monitoring	13
Safety Considerations	14
Illegal Dumping, Pollution Events and Other Unpleasant Surprises	15
Collecting Water Samples	16
Calibrating Meters	17
Kit Contents	18
Physical Parameters:	
Measuring Air Temperature	19
Measuring Water Temperature	20
Measuring Turbidity	21
Chemical Parameters	
Measuring pH	22
Measuring Electrical Conductivity	23
Measuring Dissolved Oxygen	24
Calculating Percent Dissolved Oxygen	25
Measuring Phosphates	26
Measuring Nitrates	27
Biological Parameters	
Macroinvertebrate surveys	28
Rapid Assessment of Riparian Condition	29
Frogwatch	30
Platypus Count and Platypus Watch	31
Landscape Parameters	
Photo points	32
Algae Scoring Chart	33
Water Quality Field Data Sheet	39

For more information contact the Upper Murrumbidgee Waterwatch Facilitator

Macroinvertebrate Survey Form
Rapid Assessment of Riparian Condition Form
Calibration Instructions

For more information contact the Upper Murrumbidgee Waterwatch Facilitator



Introduction:

What is Waterwatch?

Upper Murrumbidgee Waterwatch is part of a national community water quality monitoring program that brings people together from all parts of the community to raise awareness, educate, monitor, restore and protect our precious waterways.

Who is Waterwatch?

Waterwatch involves local community catchment groups, Landcare, as well as residents, schools, utilities and landowners to regularly monitor the water quality of local creeks, wetlands, lake, rivers and stormwater drains.

Why Waterwatch?

Healthy catchments indicate healthy ecosystems with thriving fish, frogs, birds, plants and people. Waterwatch raises awareness of water quality issues by engaging the whole community in promoting change and stewardship of our waterways.

Waterwatchers Make a Difference

Water quality information collected throughout the catchment provides a picture of the health in a waterway. Waterwatch groups have initiated numerous positive community based conservation activities such as creek restoration, willow removal, litter clean-ups, weed eradication, habitat development and reduced use of pesticides and fertilisers.

Data Confidence

Waterwatch is a water quality monitoring program that enables local communities to understand their waterways and catchments, and to contribute to their management and protection. A large number of community members and Waterwatch groups throughout the ACT and the Upper Murrumbidgee undertake a variety of biological and habitat assessments as well as physical and chemical tests, to build up a picture of the health of their waterways and catchments.

Waterwatch data confidence procedures set out how Upper Murrumbidgee Waterwatch measures the quality of information that participants collect. Upper Murrumbidgee Waterwatch maintains guidelines for Waterwatch coordinators and participants to ensure a medium to high level of data confidence in regard to salinity, phosphates, pH, temperature, turbidity and dissolved oxygen parameters.

Volunteers maintain their Upper Murrumbidgee Waterwatch Data Confidence certification by attending quality assurance and control (QA/QC) trainings yearly. If you can not attend set training days, make arrangements with your coordinator for an alternative training opportunities.

Training in riparian assessment, macroinvertebrate surveying, platypus and frog monitoring and algal identification are regularly offered as well as one-off trainings on related waterway issues.

Parameters: Why Do We Monitor What We Do?

Upper Murrumbidgee Waterwatch has selected the parameters measures based on the following principles:

1. Field testing methods are easy, safe and provide robust data
2. Provide useful information about waterway health

Based on these two criteria, all Upper Murrumbidgee Waterwatch sites monitor for:

Salinity
Phosphates
pH
Temperature
Turbidity
Dissolved oxygen
Nitrates/Nitrites

Upper Murrumbidgee Waterwatch sites may also be monitored for:

Frogs
Platypus
Riparian Condition
Macroinvertebrates
Algae

Parameters: What Do They Tell Us

Salinity: Freshwater ecosystems by definition are not saline. Rising salinity from groundwater is often the product of irrigation or loss of tree cover.

Phosphates: Phosphates are a limiting factor in most fresh water ecosystems to plant growth. Phosphates, which come from either animal/human waste or fertilizer cause rapid plant growth in waterways and often produce algae blooms.

pH: The pH of pure water is 7. In the Canberra region, with its limestone outcrops, some alkalinity is natural. Acid mine drainage and seasonal leaf fall from deciduous trees can cause dips in pH.

Temperature: Water temperature has a strong effect on fish. Warm water holds less oxygen than cold water, and can lead to fish kills from suffocation. Excessively cold water, especially out of season can interfere with fish breeding behaviour.

Turbidity: High turbidity affects aquatic animal's ability to navigate underwater, can be damaging to gill structures and can physically bury small animals near the base of aquatic food chains.

Dissolved oxygen: Low dissolved oxygen severely limits macroinvertebrate and fish. Generally, 'low quality animals' such as mosquito larvae, leeches and carp thrive in low oxygen environments.

Nitrates/Nitrites: Nitrogen indicates animal/human waste and/or fertilizer run-off. Like phosphorus, nitrogen promotes plant growth and algal blooms.

Frogs: Because of their semi-permeable skins and close contact with water in their larval stage, frogs have been shown to be excellent indicators of water quality and waterway health.

Platypus: As top aquatic predators, platypus are also strong indicators of the over all health of a waterway.

Riparian Condition: Riparian condition has a strong impact on waterway health. Vegetation stabilizes soil, filters nutrients and shades waterways.

Macroinvertebrates: Macroinvertebrates have varying needs in terms of water quality. Those with gills require low turbidity, and high oxygen, others emergent aquatic vegetation, still others require high phosphate levels to prompt breeding. Macroinvertebrate populations can thus provide a running commentary on waterway health to supplement the snapshot nature of chemical testing.

Algae: Like macroinvertebrates, algae can give a long term picture of waterway health.

ACT Waterwatch Contacts

ACT Facilitator

Phone 6207 2246

Email: tanya.rucoskynoakes@act.gov.au

Website: www.act.waterwatch.org.au

Mailing address: GPO 158 Canberra ACT 2601

Street Address: Macarthur House, 12 Wattle St. LYNEHAM,
ACT 2602

Ginninderra Coordinator

Phone 6278 3309

Email: waterwatch@ginninderralandcare.org.au

Website: www.ginninderralandcare.org.au

Mailing address: PO Box 446 HOLT, ACT 2615

Molonglo Coordinator

Phone 6299 2119

Email: waterwatch@molonglocatchment.com.au

Website: [http://www.molonglocatchment.com.au/
molonglo_waterwatch.htm](http://www.molonglocatchment.com.au/molonglo_waterwatch.htm)

Mailing Address: PO Box 1573 FYSHWICK ACT 2609

Street Address: Unit 13, Cassidy Arcade 72-76 Monaro St,
QUEANBEYAN, NSW 2620

Southern ACT Coordinator

Phone 6296 6400

Email: waterwatch@sactcg.org.au

Website: www.sactcg.org.au

Mailing address: PO Box 2056 KAMBAH ACT 2902

Street Address: Urambi Primary School Snodgrass Cres,
KAMBAH, ACT

Cooma Region Waterwatch Coordinator

Phone: 6452-4611

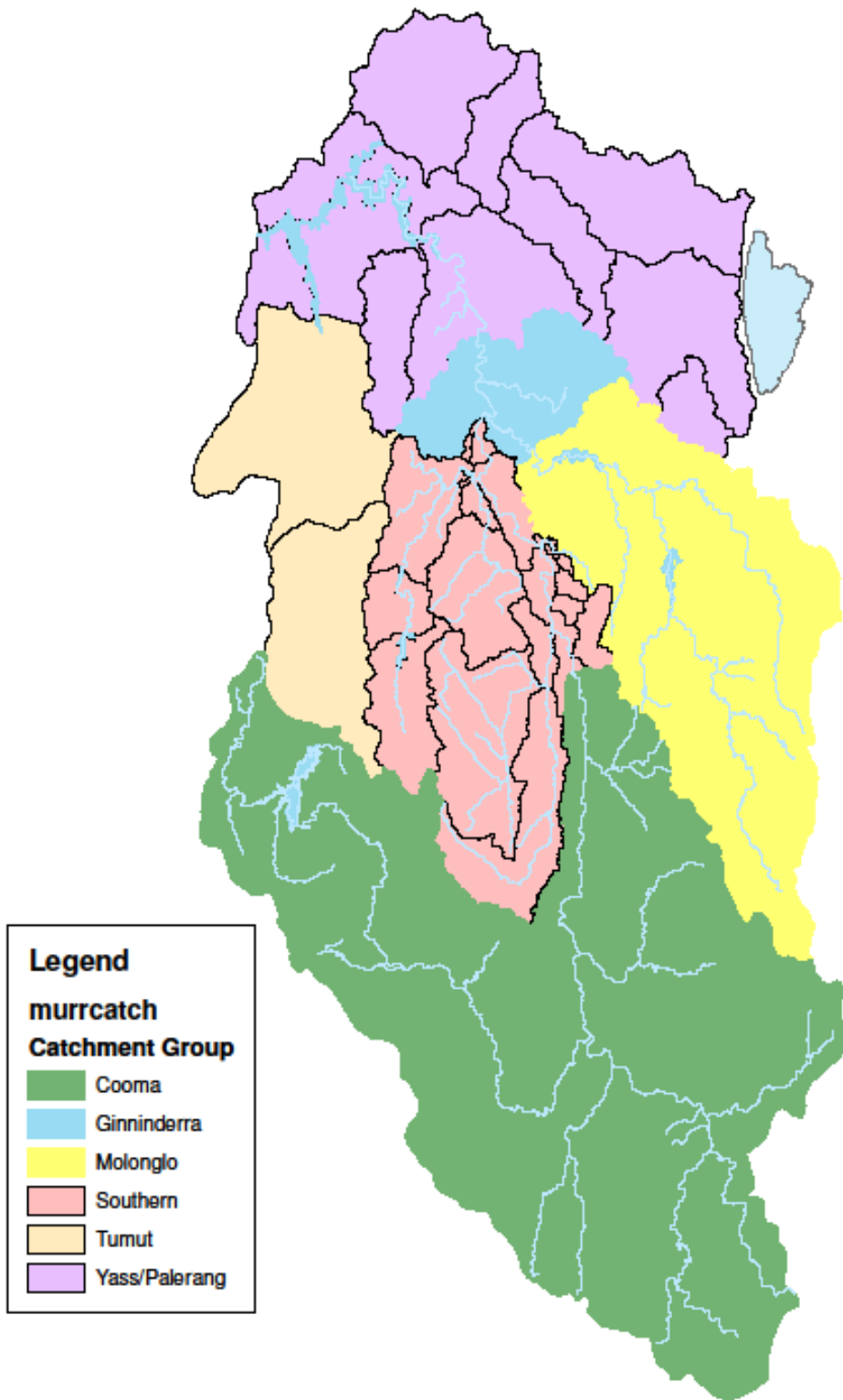
Email: antia@coomawaterwatch.org.au

Website: www.coomawaterwatch.org.au

Mailing address: Monaro High School

Street Address: Mittagang Rd Cooma NSW

Upper Murrumbidgee Waterwatch Regions



For more information contact the Upper Murrumbidgee Waterwatch Facilitator

Some reminders for monitoring

- ◆ After monitoring, return your completed field data sheet to your Waterwatch coordinator as soon as possible.
- ◆ Calibrate your pH and EC meters at the start of each day of testing to ensure accuracy.
- ◆ Note on your field data sheet or contact your Waterwatch coordinator if any equipment appears faulty or requires maintenance,
- ◆ The Waterwatch monitoring equipment remains the property of your catchment group. If for some reason you can not continue monitoring, please return it so that another group can take up your valuable work.



For more information contact the Upper Murrumbidgee Waterwatch Facilitator

Safety Considerations

- ◆ Request and use a sampling pole to get water if your site requires one.
- ◆ Let someone know where you are going and when you plan to return.
- ◆ Work with a partner or have a cell phone handy.
- ◆ Use safety glasses and protective gloves when handling reagents.
- ◆ Make sure you have safe and easy access to your waterway. Take into account the likely level of floodwaters. Do not choose a site that is prone to flash flooding.
- ◆ Do not use tussocks and weeds for handholds moving up and down banks.
- ◆ Avoid areas of thick vegetation where you can not see what you may be stepping on.
- ◆ Wear heavy work boots, socks and pants when working in thick vegetation.
- ◆ Be aware of passing traffic if you are working close to a road or from a bridge.
- ◆ Be able to swim, in case you fall in.
- ◆ Avoid contact with contaminated water. Use gloves while sampling, but take them off as soon as you have finished
- ◆ Keep a fully stocked first aid kit handy (including a snake kit)
- ◆ Remember to wear a hat and sunblock and bring adequate water.
- ◆ If you need free protective equipment, high-vis gear and first aid kits; they are available from your Waterwatch coordinator.



Illegal Dumping, Pollution Events and Other Surprises

- ◆ To report a Pollution Incident, Illegal Dumping, or Sharps call 13 22 81
- ◆ To report injured wildlife contact WIRES on 13000WIRES or 1300 094 737 or Wildcare on 6299 1966 in NSW and the RSPCA in the ACT at 02 6287 8113 (Business Hours) 0413 495 031 (After Hours)
- ◆ To call the police to report a crime or request non-emergency attendance call 131 444
Eg: Dumped car or crime scene



For more information contact the Upper Murrumbidgee Waterwatch Facilitator

Collecting Water Samples

- ◆ Rinse out all sample bottles prior to collecting any samples for testing
- ◆ Discard all rinse water downstream or on the bank
- ◆ If you need to enter the water body, sample from upstream of your feet
- ◆ Take samples from the middle of the stream. i.e half way across and half way between the surface and the bottom of the water column



For more information contact the Upper Murrumbidgee Waterwatch Facilitator

Calibrating Meters

- ◆ Several different makes and models of electrical conductivity and pH meters are being used by Waterwatch volunteers.
- ◆ Specific instructions for their calibration can be found at the back of this manual.
- ◆ Calibrate your machinery on a monthly basis before sampling
- ◆ Report meters that are not calibrating properly and seek a replacement from your Waterwatch coordinator. **Do not test with malfunctioning meters!**
- ◆ Replace your calibration solutions yearly
- ◆ If you get an unexpected reading, recalibrate your meter and take the reading again for verification
- ◆ Do not store your meters in your vehicle. Excessive heat will shorten the lifespan of both your meters and chemical reagents.



For more information contact the Upper Murrumbidgee Waterwatch Facilitator

Kit contents

Waterwatch kits contain the following equipment. Contact your local coordinator at any time if your kit lacks the following working essentials:

Thermometer
Electrical Conductivity Meter
pH Meter
Nitrate test strips
Turbidity tube
Phosphate Test Kit (low)
Dissolved Oxygen Test Kit
Waterwatch Manual
First Aid Kit
pH 7 calibration solution
EC 1413 calibration solution
Writing implements

Your kit may also contain:

Phosphate Testing Kit (high)
Ammonia Testing Kit
pH 10 calibration solution
Paper towels
Latex Gloves
Waste Water Bottle
pH 4 solution
Long reach pole

Waterwatch coordinators can make the above optional materials available to you upon request, and as site conditions require.

Physical Parameters:

Measuring Air Temperature

- ◆ Inspect the thermometer for cracks, defects, damage or dirt.
- ◆ Take the air temperature from a dry shady spot
- ◆ Wait at least one minute until reading stabilizes
- ◆ Read from eye level to the nearest .5 degree C



For more information contact the Upper Murrumbidgee Waterwatch Facilitator

Measuring Water Temperature

- ◆ Inspect the thermometer for cracks, defects, damage or dirt.
- ◆ Hold thermometer in the centre of the water column. Avoid shallow still edges where water will be warmer.
- ◆ Wait at least one minute until reading stabilizes
- ◆ Read from eye level to the nearest .5 degree C



For more information contact the Upper Murrumbidgee Waterwatch Facilitator

Measuring Turbidity

- ◆ Be sure not to stir up the bottom when collecting your sample
- ◆ Ensure sample is well mixed before testing
- ◆ Fill the turbidity tube to the top with sample water
- ◆ Hold the tube out of direct sunlight and over a white surface at arms length, then look down through the water column to see the squiggly lines at the bottom of the tube.
- ◆ If you can see three distinct lines while the tube is full to the top, then the turbidity is less than 10 NTU (<10 NTU)
- ◆ If you can't see three distinct lines, then pour out a small amount of water and look again.
- ◆ Continue pouring out small amounts of water until you can distinguish the lines.
- ◆ Note the reading from the scale on the side of the turbidity tube to the nearest marking.
- ◆ If the reading is above 200, dilute the sample with 1:1 distilled water. Repeat the testing procedure and multiply the end result by 2.
- ◆ Wash turbidity tube with tap water to ensure tube is clean.



ACT Guidelines:
At most sites, the acceptable level of
turbidity is <10 NTU

For more information contact the Upper Murrumbidgee Waterwatch Facilitator

Chemical Parameters

Measuring pH

- Rinse pH meter tip with sample water
- Place meter tip in the sample and allow the reading to stabilize
- Record reading on data sheet.
- Rinse the tip in tap water or pH 4 solution and store with a damp sponge or piece of towelling in the cap

ACT Guidelines:

At most sites, the acceptable level of pH is between 6.0 and 9.0



For more information contact the Upper Murrumbidgee Waterwatch Facilitator

Measuring Electrical Conductivity

- ◆ Rinse EC meter tip with sample water
- ◆ Place meter tip in the sample and allow the reading to stabilize
- ◆ Record reading on data sheet.
- ◆ Rinse the tip and dry the electrode before replacing the cap.
- ◆ The stainless steel electrodes need to be kept clean and dry to prevent corrosion.

ACT Guidelines:

There are currently no legislated guidelines for electrical conductivity in the ACT.

It is considered that EC concentrations greater than $1000\mu\text{S}$ are very high and warrant attention.



Measuring Dissolved Oxygen

- There are several testing kits being used by Waterwatch volunteers. Specific instructions for each method are in the back of this manual
- Rinse collection bottle with sample
- Fill sample bottle completely, capping it underwater, being sure to allow not bubbles to form.

ACT Guidelines:

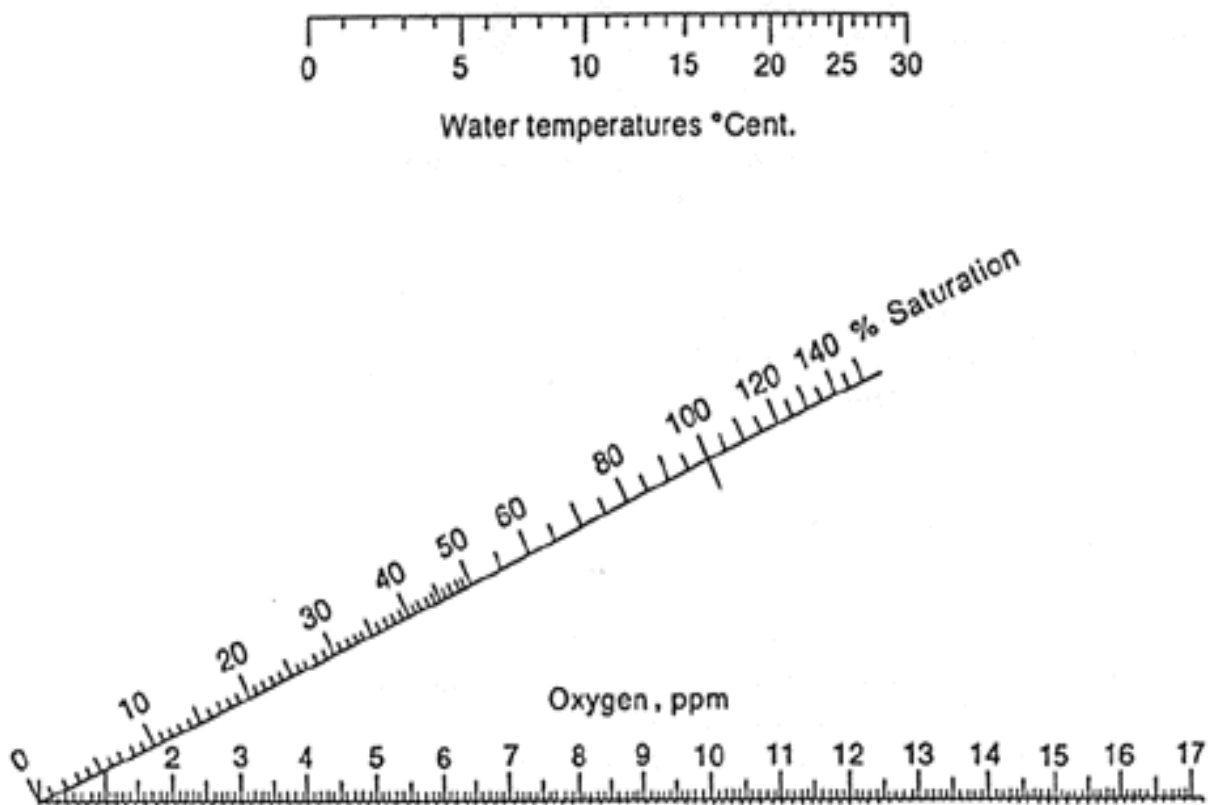
At most sites, the acceptable DO should be ≥ 4 mg/L



For more information contact the Upper Murrumbidgee Waterwatch Facilitator

Calculating Percent Dissolved Oxygen

- Using a straight edge line up water temperature with mg/L of oxygen to determine percent saturation.



For more information contact the Upper Murrumbidgee Waterwatch Facilitator

Measuring Phosphates

- ◆ Insert colour comparator disc into the comparator black
- ◆ Rinse both sample collection tubes several times with the sample water, then fill up to the mark on the bottles.
- ◆ Place the lid on the LEFT glass tube.
- ◆ If the water temperature is colder than 18 °C, warm the RIGHT sample before testing (It is acceptable to take these samples home and level them on a bench to warm up)
- ◆ Add one level black measuring spoon of PO4-1 to the RIGHT glass tube, close and mix.
- ◆ Add 15 drops of PO4-2 to the RIGHT glass tube. Close and mix.
- ◆ Wait 5 minutes.
- ◆ Remove the caps from both sample tubes, and look through the glass sample tubes.
- ◆ Slowly turn the comparator disk until both samples look the same.
- ◆ The reading can be taken by following the groove on the comparator block down to the number directly below it.

ACT Guidelines:

While the ACT does not test phosphates, concentrations of greater than .1mg/L are considered to be very high.



For more information contact the Upper Murrumbidgee Waterwatch Facilitator

Measuring Nitrates

- Without touching the paper test zones, dip the test strip for one second into the sample.
- After 60 seconds, compare the test paper zones to the colour scale on the container.
- In the presence of nitrate the outer test paper turns red.
- The second reaction zone on the strip show the nitrite concentration.

ACT Guidelines:

At most sites, the acceptable level of nitrate is ≤ 30 mg/L for nitrite ≤ 10 mg/L



For more information contact the Upper Murrumbidgee Waterwatch Facilitator

Biological parameters:

Macroinvertebrate surveys

- ◆ Choose a sampling area carefully. Bare areas such as sand banks and muddy beds without stones, wood or vegetation usually support few macroinvertebrates. Select a riffle area, if one is present at your sampling site. Emergent plants, bank overhangs, and submerged logs all provide habitat.
- ◆ Always return to the same site.
- ◆ Do not sample macroinvertebrates more than twice a year, or you will begin to physically damage the site.
- ◆ For safety reasons, deep water and very fast-flowing water should also be avoided.
- ◆ Standing up river of the net, with the net firmly on the sample site's bottom, stir up the bottom of the sample area with your feet. (the 'twist' is an excellent step for this sort of sampling)
- ◆ Use the net to sweep among stones and logs, into the shore and under overhangs.
- ◆ Sample 10 square metres of waterway in this manner.
- ◆ Invert net into a half filled bucket of water.
- ◆ Examine and remove all animals entangled in the net.
- ◆ Pour into sample trays and sort each type of animal into a section of an ice cube tray.
- ◆ Identify and count each type, and record your results on the Signal 2 macroinvertebrate survey form.



For more information contact the Upper Murrumbidgee Waterwatch Facilitator

Rapid Assessment of Riparian Conditions

- ◆ Assess at least once a year
- ◆ Reread the RARC instruction packet included in the back of this manual to refresh yourself on the RARC methods
- ◆ Follow the same transects each time, at the same time of year
- ◆ Be aware that some sites are naturally tree-less and thus will have a lower 'ideal' RARC score.

ACT Guidelines:

An excellent RARC score for our region is greater than 30.
Areas showing good recovery from the 2003 Bushfires are now showing RARC scores in the low 20s



For more information contact the Upper Murrumbidgee Waterwatch Facilitator

Algae Scoring

- Choose the score for **Abundance of Algae** that best describes the general site using page 33 of this manual
- Using the **key** on page 34 of this manual or the included flow chart make a decision about the probable **main** alga present.
- Find that alga in the **Rating of Algal Form** table on page 35
- Divide the **Abundance of Algae** score, by the **Algal Form** score.
ex: A thin layer of *Stigeoclonium* tufts would be $2/5 = 0.4$

Excellent [1]	Good [2]	Moderate [3]	Poor [4]	Degraded [5]
<0.45	0.46–0.59	0.6–0.99	1.00–1.99	>1.99



For more information contact the Upper Murrumbidgee Waterwatch Facilitator

Frogwatch

- ◆ Register your interest with the Frogwatch coordinator.
- ◆ Attend Frogwatch Training Seminar
- ◆ Register the site you wish to monitor
- ◆ Visit your site/s during the daytime
- ◆ Visit your site/s during the first 2 hours after dark as this is when most frogs will be calling.
- ◆ Record environmental parameters such as weather conditions and water temperature, then sit down and wait until the frogs resume calling
- ◆ Take a recording for 2-5 minutes either using a tape recorder or a digital MP3 recorder.
- ◆ Ensure your field data sheet is complete, as well as your volunteer activity record form.
- ◆ Submit these along with your recording to the Frogwatch coordinator.



For more information contact the Upper Murrumbidgee Waterwatch Facilitator

Platypus Count and Platypus Watch

- Request a Platypus Count or Watch kit from your coordinator if you do not have one
- Send in your registration forms immediately to participate, do not wait until you have filled up a platypus count sheet.
- Platypus Counters should visit their site on at least a weekly basis. (Don't worry if you are going away on holidays, many sites are monitored by more than one person/group)
- Platypus Watchers should organize themselves so that each person's view of the river only slightly overlap's the view of their neighbour (this takes a group of 4 or more)
- Look for platypus in flat water at dusk and dawn
- Note water rat sightings as well



For more information contact the Upper Murrumbidgee Waterwatch Facilitator

Landscape Parameters : Photo points

- ◆ Pound both the tent peg and the star picket into a discreet area at your site that gives you a good representative view of the site.
- ◆ Photograph *at least* once a year within the same month.
- ◆ Note the location, time of year, and time of day the photograph was taken on the field data form. The photos are useless without this information.
- ◆ Always use the same zoom setting on your camera. Take four shots from the star picket:
 - ◆ Up hill (your back should be facing the waterway)
 - ◆ Turn 90% shoot upstream
 - ◆ Turn 90% and shoot across the water body
 - ◆ Turn 90% and shoot down stream
- ◆ When taking pictures take both portrait and landscape for each shot so that you end up with 8 pictures for each photo point session
- ◆ Label pictures :Site_Date_time_ and "upstream" "downstream" "across" or "uphill" eg. SUL018_091002_0945_upstream.jpg
- ◆ Keep a copy of your photographs.



For more information contact the Upper Murrumbidgee Waterwatch Facilitator

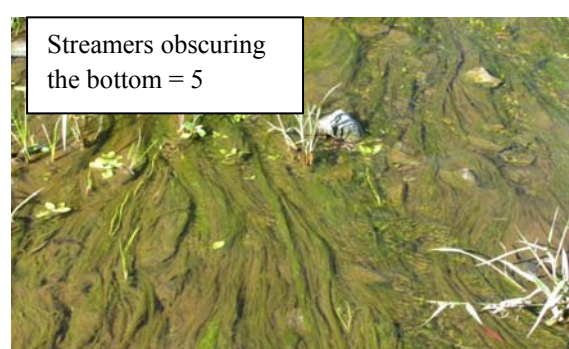
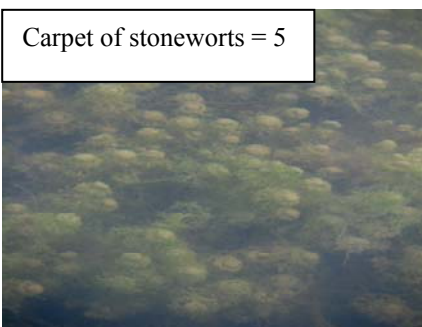
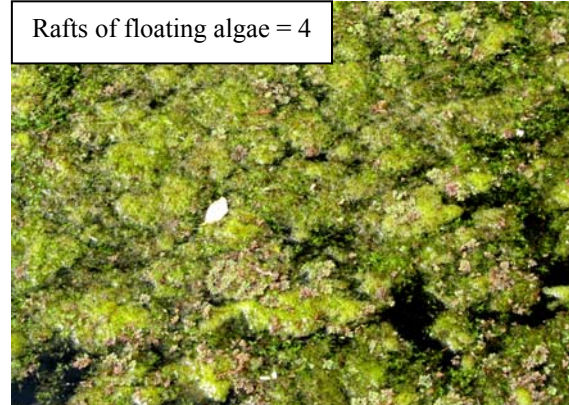
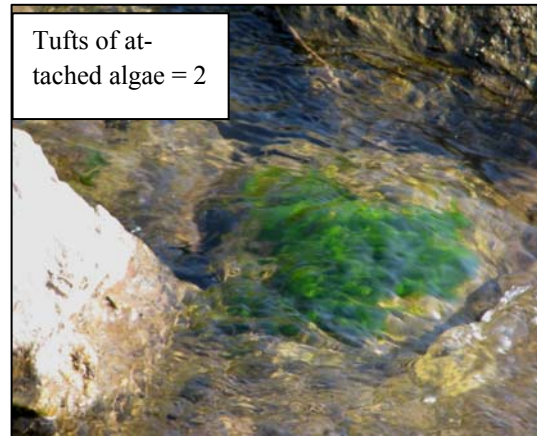
Waterwatch Filamentous Algal Observations

How to report your Algal Score:

Step 1. Choose the score for **Abundance of Algae** that best describes the general site.

Abundance of Algae:

Score	Category	Description
1	Little or no growth observed	Conditions vary from no algae to only very small populations
2	Thin layer present	A thin layer of algae visible, either floating suspended, or tufts covering some submerged surfaces
3	Crusts or coatings	All submerged stones, snags covered
4	Rafts and plumes	Sufficiently concentrated that rafts or balls of algae are visible, and starting to move across the water column. This includes scums and blooms
5	Carpets or blankets	Outlines of substrate hardly recognizable, algal growth often extending well into the water column



For more information contact the Upper Murrumbidgee Waterwatch Facilitator

Step 2. Using the **key** or flow chart make a decision about the probable **main** alga present.

A simple key to filamentous freshwater Macroalgae

Algal material either encrusting or attached to the substrate (periphyton)

A .Encrusting

1. Slimy or greasy, more or less robust, drying in flakes — Cyanoprokaryotic crusts
2. Gritty or gelatinous, fragile, drying as a white powder — Bacillariophyceae (diatoms)

B. Attached

1. Discrete cushions or balls

- a. Dark green or black — Rivularia, Tolypothrix or Nostoc (Cyanoprokaryota)
- b. Bright green or glassy — Chaetophora or Coleochaete (green algae)

C. Tufts or streamers

1. Apple green, slippery, fragile — Stigeoclonium or Draparnaldia
2. Dull green to yellow, coarse, robust

a. Distinct Smell

- i. Smells like wet wool or tom cat — Cladophoraceae
- ii. smells like fish, mud or geosmin — Vaucheria

b. No Smell

- i. Bright green, — Tolypothrix
- ii. Dark green fringing aquatic vegetation — Oedogonium, Klebsormidium
- iii. Pink or dusty mud coloured, soft — Audouinella

D. Small 'conifer-like' free standing plant — Chara or Nitella.

Algal material free floating (metaphyton)

A. Coarse to feel, often yellowish or brownish grey

1. Fragile, little or no smell — Oedogonium
2. Robust, wet wool or tom cat smell — Cladophoraceae

B. Fine to feel, often bright or bottle green or bluish

1. Silky to feel, green — Zygnemaceae
2. Slimy to feel, sometimes bluish — Compsopogon or filamentous desmids
3. Bulky, and either tubular or net-like

a. Net-like — Hydrodictyon reticulatum

b. Tubular, like bait-weed — Enteromorpha sp

C. Tubular and compact, usually with a whitish end — Duck poo!

Step 3. Find that alga in the **Rating of Algal Form** table.

Rating of Algal Form:

Rating	Algal form	Algal names	Descriptive notes
8	pink tufts	<i>Audouinella</i>	Fluffy pink or muddy tufts on rock or water plant stems
7	'snot balls'	<i>Rivularia</i> or <i>Nostoc</i>	Attached dark green or black cushions or balls on rocks or snags
6	Bright green cushions	<i>Chaetophora</i> or <i>Coleochaete</i>	Attached bright green or glassy cushions or balls on vegetation, rock, or snags
5	Apple green tufts	usually <i>Stigeoclonium</i> or <i>Draparnaldia</i>	Slippery and fragile
5	Algal fringe	<i>Oedogonium</i> also includes <i>Klebsormidium</i> , <i>Microspora</i> , and <i>Tribonema</i>	Coarse, breaks up in the hand, often dirty grey or even purple, little or no smell.
4	Stoneworts	<i>Chara</i> and <i>Nitella</i>	Small plants like Christmas trees, sometimes with orange and black decorations
3	velvet moss or foxtails	<i>Vaucheria</i>	Coarse, full of silt, fishy or geosmin smell. When on damp soil forms a dark green velvet.
2	Bottle green cushions or tufts	<i>Tolypothrix</i>	Attached bottle green cushions or tufts, common on aquatic plants
2	Silky rafts	Zygnemaceae: <i>Spirogyra</i> , <i>Zygnema</i> or <i>Mougeotia</i> .	Silky, starts bright green or bottle green; when floating at surface may show yellow patches of sunburn. Grassy smell.
2	Cyanoprokaryotic Crust	<i>Phormidium</i> , <i>Oscillatoria</i> and relatives	Slimy or greasy, robust, dark coloured crust, drying to sheets or flakes (can float as ragged sheets)
2	Bulky, tubular, water-net	<i>Hydrodictyon</i> , <i>Enteromorpha</i>	Wet grass look in water; nets visible in cupped hand but if just tubes its bait-weed
1	Blanket weed streamers or blankets	includes <i>Rhizoclonium</i> , <i>Cladophora</i> and <i>Pithophora</i>	Coarse, robust, dull green to yellow, attached (and often crinkled when stranded) or suspended 'blanket-weed', smells 'wet wool' or 'tom cat'
1	Blue streamers	<i>Compsopogon</i> , <i>Hyalotheca</i>	Bluish green streaks on soil or in water, slimy; branching filament structure should be visible in hand
1	Diatom crust	<i>Melosira</i> or <i>Tabellaria</i>	Gritty or gelatinous, fragile, rusty brown or dirty grey crusts, drying to a white powder
1	Re-suspensible scum	<i>Microcystis</i> , <i>Anabaena</i> and related organisms	Cyanobacterial blooms; suspended flecks congregate into wettable surface scum;
1	Water repellent scum	<i>Euglena sanguinea</i> and <i>Botryococcus</i>	Scum forms a skin on the water surface, will stick to anything poked in it, but water beads on top;

Step 4. Divide the **Abundance of Algae** score, by the **Algal Form** score.

ex: A thin layer of *Stigeoclonium* tufts would be $2/5 = 0.4$.

Step 5. Make any pertinent comments in either the Algal Comments, or the General Comments space.

Catchment Health Indicators for Conspicuous Algae

Excellent [1]	Good [2]	Moderate [3]	Poor [4]	Degraded [5]
<0.45	0.46–0.59	0.6–0.99	1.00–1.99	>1.99

What the score indicates.

Abundance scores of 1 or 2 indicate conditions favouring the successful grazing of algae or low nutrients or light levels. Abundance scores of 3 or 4 indicate conditions favouring moderate algal growth in excess of grazing pressure, sufficient light or slightly elevated levels of nutrients. Abundance scores of 5 indicate imbalance in the system, although a stonewort carpet may substitute for vascular aquatics in ponds and sandy pools. Sensitive or demanding algae will score high in the form ratings, common and widespread species will score between 3 and 5, while algae scoring 2 or 1 have the potential to be a nuisance. As with the SIGNAL ratings for macroinvertebrates, any site may have a suite of different rating algae present, and water chemistry, season of the year and other factors need to be considered before site condition can be perceived. This scheme gives an indication not a prescription.

There may be occasions when two or more kinds of algae are readily distinguishable. On these occasions score them separately, then average the results.

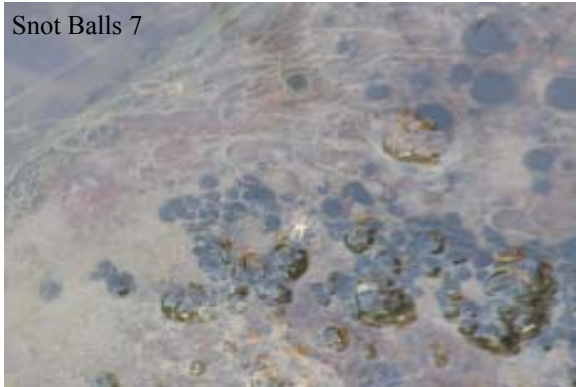
The result of the two scores gives a rating for the conspicuous alga at that site. If every rock in the riffle in an alpine stream were to be decorated with pink tufts of *Audouinella*, then it would get a rating of 0.375 (abundance 3, form 8) still in the **Good** Catchment Health indication. On the other hand, a similar coating of blanket weed would score 3.0 (abundance 3, form 1) and indicate **Degraded** Catchment Health.

A Ready Reckoner for the algal scores.

1/8 = 0.125	2/8 = 0.25	3/8 = 0.375	4/8 = 0.5	5/8 = 0.625
1/7 = 0.14	2/7 = 0.28	3/7 = 0.43	4/7 = 0.57	5/7 = 0.7
1/6 = 0.16	2/6 = 0.3	3/6 = 0.5	4/6 = 0.6	5/6 = 0.83
1/5 = 0.2	2/5 = 0.4	3/5 = 0.6	4/5 = 0.8	5/5 = 1.0
1/4 = 0.25	2/4 = 0.5	3/4 = 0.75	4/4 = 1.0	5/4 = 1.25
1/3 = 0.3	2/3 = 0.6	3/3 = 1.0	4/3 = 1.3	5/3 = 1.6
1/2 = 0.5	2/2 = 1.0	3/2 = 1.5	4/2 = 2.0	5/2 = 2.5
1/1 = 1.0	2/1 = 2.0	3/1 = 3.0	4/1 = 4.0	5/1 = 5.0

Caveat: This is all a data collecting exercise, as I have based the whole scheme on a hunch. At this stage there is nil (none, nix, naught, zero, zot, zippo) science to back up the numbers. Hopefully as data accumulates we will be able to modify the algal list so that it reflects reality more directly.

Gallery



Stoneworts 4

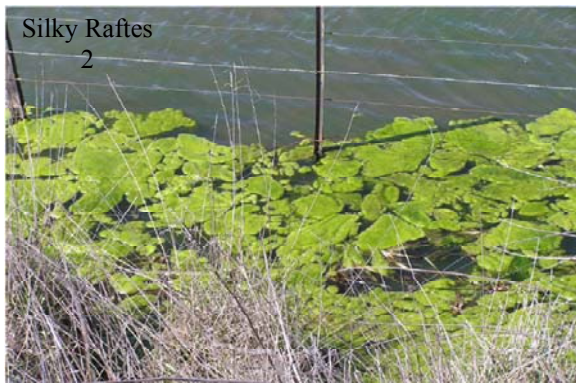
(Photo Gillian Towler, RBG Syd.)



Algal fringe, mostly Oedogonium 5



Bottle green cushions or tufts 2



Silky Raftes 2



Bulky water net 2



Suspended cyanobacterial bloom 1

For more information contact the Upper Murrumbidgee Waterwatch Facilitator



Water repellent Euglenoid bloom. 1

For more information contact the Upper Murrumbidgee Waterwatch Facilitator

Waterwatch- FIELD DATA SHEET

Name:.....

Date: Time:.....

Site Name:..... Site code:.....

Parameter	Result	Units	Measurement Comments
Air Temperature		°C	
Water Temperature		°C	
pH		pH units	
Electrical Conductivity		µS/cm	
Turbidity		NTU	
Dissolved Oxygen		mg/L	
% Dissolved Oxygen		%	
Phosphates		ppm	
Nitrate		mg/L	
Nitrite		mg/L	
RARC Score			
Signal 2 Score			
Algae Score			

For more information contact the Upper Murrumbidgee Waterwatch Facilitator

