A more complete picture of river health in the Fitzroy Basin

fitzroy partnership for river health

Water sampling & monitoring

Get involved in local waterway monitoring

Why Sample?

Freshwater is our most valued and sought after renewable resource. Changes in land use have affected the natural flow of waterways, with considerable quantities of sediment, salts, nutrients and toxic chemicals entering and changing the physical, biological and chemical characteristics within them. Water monitoring of our local waterways is important so we are aware of its health, and can communicate this to others if needed, so practical actions can be taken to maintain and improve the quality of our water.

Equipment Needed

- bucket
- sorting trays
- magnifying glass
- pH test strips
- salinity meter
- turbidity tube
- scoop net with handle
- spoons/pipettes
- fish traps
- Guides (waterbugs, fish and weeds – see indicator pages for details

MyWater Portal: Data Use Warning

The results displayed on the community monitoring website are based on data that has been collected by enthusiastic and dedicated members of the community. The MyWater portal and associated results are provided for educational and awareness raising purposes. No quality control measures have been applied to the data. As such the data is not fit for use beyond this stated purpose. There is no training requirement for community members or groups to enter data to the MyWater portal.

Waterway Sampling: Health and Safety Warning

Community members or groups using this manual and conducting associated waterway testing do so at their own risk. As such, community members and groups must ensure they have appropriate levels of insurance and conduct activities according to the risk and workplace health and safety procedures of their particular group.

If in doubt, don't test your local waterways!

What are the indicators?

Physical/Chemical Indicators

pH
pH is a measure of the acidity of the water

Salt
Salt or Electrical Conductivity (EC) is a measure of the amount of salt in the water

Turbidity
Turbidity or water clarity is a measure of the amount of dirt in the water

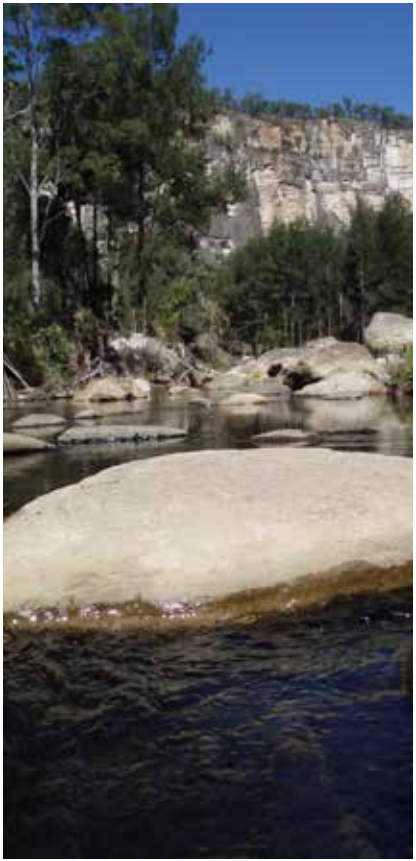
Biological Indicators

Water bugs
Waterbugs (macroinvertebrates) are insects and crustaceans that live in the water

Fish
Diversity of native fish is a good indicator of stream health

Riparian vegetation
Healthy riparian vegetation is essential to streams and creeks

Weeds
Weeds are an indicator of biodiversity loss and changed environments



Step 1

Collect a water sample

Where to sample

Running water in the centre of the stream provides the most representative sample because water on the edges or water held in pools is likely to have more variation than the main body of water. It is important not to disturb the area that you are going to sample. This can be avoided by standing downstream of where you are going to take the sample and not kicking up sediment.

How to sample

Using a bucket collect a sample of water from the sampling area.

Step 2

Test sample for water quality indicators

Physical/Chemical Indicators

- pH
- Salt
- Turbidity

Biological Indicators

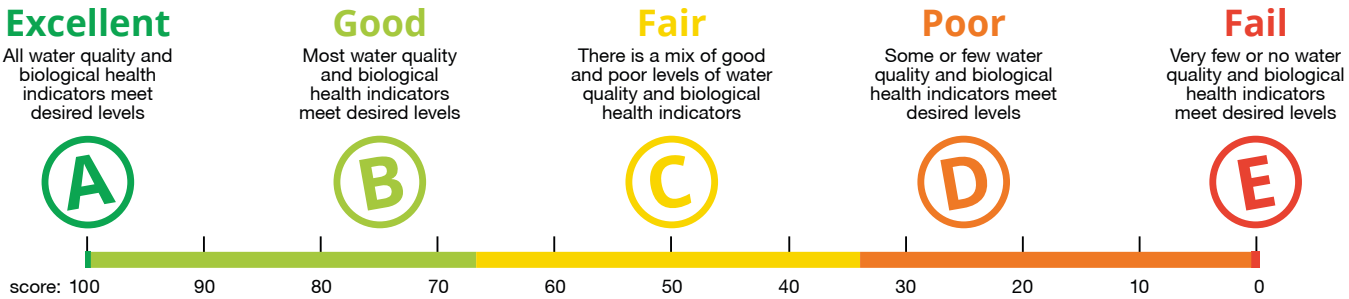
- Water bugs
- Fish
- Riparian vegetation
- Weeds

Go to the website for more information and to enter your data
www.riverhealth.org.au/report_card/community/

Before you start - understanding your results

For each water quality indicator tested, a grade can be determined by using the guideline ruler on each page. Once the raw data for all chemical/physical and ecological indicators have been entered into the MyWater community portal an overall grading of A-E (as shown below) will be awarded to the sample. An A grade means the result is equal or above the Water Quality Guidelines (WQG) and a grading of E means the result is equal or worse than Worst Case Scenario (WCS).

Further information on the A-E grading system including Water Quality Guidelines (WQG) and worst case scenarios (WCS) is available at http://riverhealth.org.au/resources/grading-explained/freshwater-and-estuary/.



pH

The term pH is an abbreviation for potential hydrogen and is based on a logarithm scale ranging from 1 (highly acidic) through 7 (neutral) to 14 (highly alkaline). pH changes can have adverse effects on the health of fish and aquatic invertebrates. Low pH can lead to increases in the toxicity of ammonia and heavy metals within stream sediments and a reduction in the survival rates of aquatic organisms.

Take care in handling the test strip so it does not become contaminated

Step 1

Take the strip from the pack, taking care not to touch coloured squares.

Step 2

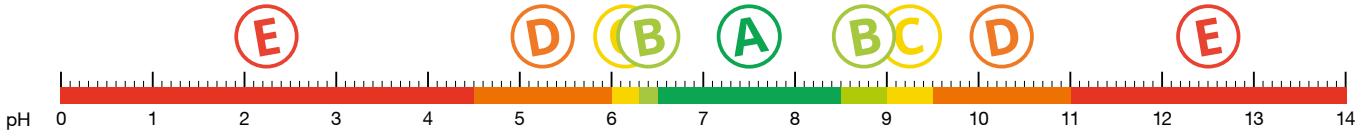
Dip one pH paper into the water sample coloured end down for a second, remove and shake off any excess liquid.

Step 3

Compare colour on the strip with the colour chart on the pH strip container to work out the pH result.

Step 4

Record the result on field sheet or directly into the website if you have a portable electronic device.



Guidelines for pH results for freshwater in the Fitzroy Region

Salt

Salinity is a measure of the content of salts in soil or water. Salinity is measured in µS/cm.Salinity can affect both the community structure and function of freshwater ecosystems. It also affects the health and survival of riparian vegetation, aquatic macroinvertebrates and fish. The salinity of water is measured by determining the electrical conductivity of salt in the water using a conductivity meter.

Step 1

Turn meter on and place bottom third of meter into water sample.

Step 2

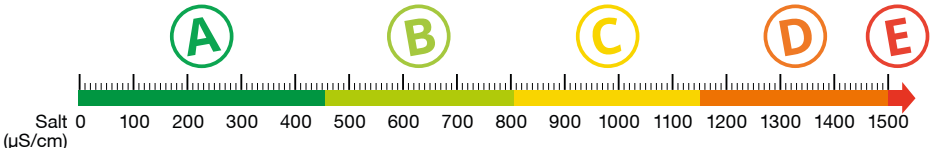
Allow a minute or two for the meter to adjust to the water temperature.

Step 3

Look at the units symbol, if mS then multiply by result by 1,000. If uS, then use the result as displayed.
1mS = 1,000uS

Step 4

Record the result on field sheet or directly into the website if you have a portable electronic device.



Guidelines for salt (EC) results for freshwater in the Fitzroy Region

The bottom of the probe should be kept clean and rinsed with tap water. Do not touch or wipe clean on clothing or anything similar as this can contaminate and therefore compromise the reading.

Turbidity

Turbidity and water clarity are both measures of the amount of sediment suspended in the water. Excess amounts of suspended particles can reduce light penetration through the water column to the bottom smothering benthic organisms like mussels and snails, irritate fish gills and carry contaminants. Changes to the availability of light within the water column also influences the ability of aquatic plants to photosynthesise.

A turbidity tube is used to estimate the turbidity of water.

Step 1

Push the two parts of the turbidity tube together; making sure they fit squarely.

Step 2

Take a sample of water ensuring the sample is well mixed and fill the tube with water.

Step 3

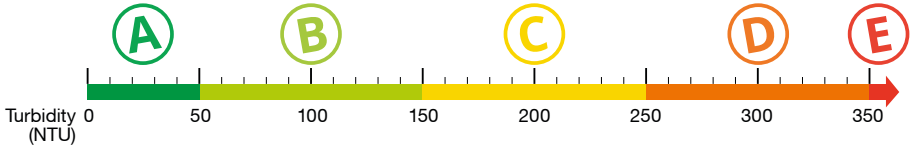
Tip out water until the three black lines are only just visible on the inside of the base of the tube. If you tip too much water out, refill the tube until you can just see the black lines.

Step 4

Look at the water level and record the closest number on the outside of the tube, on your sheet or the website portal.

Step 5

After use, wash the tube in clean water thoroughly and store the two parts of the tube where they cannot be damaged.



Guidelines for water clarity/turbidity results for freshwater in the Fitzroy Region

Water bugs

Water bugs (macroinvertebrates) are animals without back-bones that live in the water and are large enough to be seen with the naked eye (e.g. beetles, bugs, shrimp, and snails).

This is one of the most commonly used indicators of stream condition because they are common, widespread, and easily sampled. Different types of water bugs tolerate different stream conditions and levels of pollution, and are a very important part of the food chain.

There are two methods of sampling for water bugs; sweep sampling and kick sampling. Sweep sampling is best suited to the stream edge and habitats with vegetation overhanging from the stream bank, aquatic plants, undercut banks, root mats, leaf packs and woody debris. Kick sampling is designed for sampling stream bed habitats and can be used to sample a range of depths and flows. It is performed most effectively in riffles – fast flowing, rocky sections of the stream bed where the highest diversity of water bugs is generally found.

Approach the sampling area from downstream to prevent disturbing the area and select either sweep sampling or kick sampling.

Use sweep sampling in still waters and pools.
Use Kick sampling in shallow flowing streams.

NOTE: It is best to sample for water bugs after water quality testing so as not to stir up bottom sediments.

Sweep sampling

1. Sweep net among differing habitats using a short upward movement at right angles to the bank. Stir up the bottom while doing so.
2. Stop regularly to rinse mud and fine silt out of net.
3. Once finished scoop the net from the water in a forward motion and empty contents into sorting trays.
4. Sort the captured water bugs into groups of similar looking bugs using a pipette or spoon.
5. Identify bugs using magnifying glass and ID sheets on pages 10 and 11.
6. Return water bugs to the stream in a shady spot.
7. Record water bugs found on field sheet or website.

Kick sampling

1. Hold the net downstream with the net mouth facing the sampling area upstream.
2. Disturb the sampling area with your feet as you move slowly upstream. This will cause the water bugs to become suspended and pushed into the net by the flow of the water. If there is little or no flow use a short sweeping action.
3. Repeat this process over a distance of 10m.
4. Once finished scoop the net from the water in a forward motion and empty contents into sorting trays.
5. Sort the captured water bugs into groups of similar looking bugs using a pipette or spoon.
6. Identify bugs using magnifying glass and ID sheets on pages 10 and 11.
7. Return water bugs to the stream in a shady spot.
8. Record water bugs found on field sheet or website.

Waterwatch NEW SOUTH WALES
Communities Caring for Catchments

WATER BUG DETECTIVE GUIDE

Macroinvertebrate sampling and waterway health

Sampling will reveal information about the abundance and diversity of macroinvertebrates and their tolerance to pollution. This will provide an indication of the health of the waterway.

ABUNDANCE = the total number of macroinvertebrates present

DIVERSITY = the number of different types of bugs present. Healthy streams usually have a greater diversity of bug types

POLLUTION TOLERANCE = the ability of macroinvertebrates to withstand pollution. This is reflected by its SIGNAL 2 score based on their sensitivity to pollution.

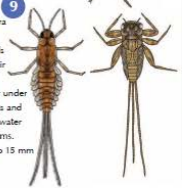
STREAM POLLUTION INDEX = calculation based on the abundance and diversity of bugs and their SIGNAL 2 score.

HEALTHY WATERWAYS = a high SIGNAL score and a large number of bug types

Very Sensitive Bugs - 10,9

Stonefly nymph 10
Order: Plecoptera
Description: Two thin tails and gills extending from their abdomen.
Habitat: Found among stones or plants, in fast-moving waters.
Maximum size: 7-12 mm

Mayfly nymph 9
Order: Ephemeroptera
Description: Three long thin tails and gills along the sides of their bodies.
Habitat: Found on or under rocks or among plants and leaf litter in standing water and fast flowing streams.
Maximum size: Up to 15 mm



Sensitive Bugs - 8,7,6

Alderfly larva 8
Order: Megaloptera
Description: Their bodies are fleshy with a a hard-shelled head.
Habitat: Found among rocks, in a variety of flow conditions.
Maximum size: Up to 20 mm

Caddisfly larva 8
Order: Trichoptera
Description: They are often enclosed within a case of twigs and plant material or silk.
Habitat: Found among sediment and rocks in streams, ponds and lakes.
Maximum size: Up to 20 mm

Riffle beetle and larva 7
Order: Coleoptera
Description: Beetle-like, tiny and usually black. Larvae have circular stripes or rings.
Habitat: Fast moving water.
Maximum size: Up to 4 mm

Water mite 6
Order: Acarina
Description: Mites usually have simple rounded bodies with eight legs.
Habitat: Found among plants or stones on the stream bed in standing or slow-moving waters.
Maximum size: Up to 5 mm

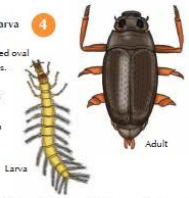
Tolerant Bugs - 5,4,3

Beetle larvae 5
Order: Coleoptera
Description: Larvae are usually elongated with well-developed legs and a large head.
Habitat: A variety of habitats including still waters or quiet areas of flowing water.
Maximum size: Up to 35 mm

Dragonfly nymph 4
Order: Odonata
Description: Stout bodies, no external gills and extendable mouth parts.
Habitat: Found within the substrate of rivers and streams.
Maximum size: 12-80 mm

Water strider 4
Order: Hemiptera
Description: Flat spider appearance with long pairs of middle and hind legs.
Habitat: Found on the surface of slow moving rivers and streams.
Maximum size: 8-12 mm

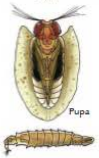
Whirligig beetle and larva 4
Order: Coleoptera
Description: A streamlined oval beetle that swim in circles.
Habitat: Found on the surface around the edges of ponds an streams.
Maximum size: 5-25 mm



Freshwater yabby/crayfish 4
Order: Decapoda
Description: Fan tailed with well developed claws and prominent front end.
Habitat: Slow flowing and still waters and burrow into sediment.
Maximum size: Up to 400 mm

Damselfly nymph 3
Order: Odonata
Description: Nymphs have three gill structures extending from the tail.
Habitat: Found on plants, among rocks and leaf litter or burrowing into the sediments.
Maximum size: 16-33 mm

Fly larva and pupa 3
Order: Diptera
Description: Larva usually have an elongated body with a small head. They do not have true legs.
Habitat: Found in shallow regions of ponds and stream amongst mud and debritus.
Maximum size: Up to 30 mm



Midge larva and pupa 3
Order: Diptera
Description: Often small and C shaped.
Habitat: Attached to debris by their tiny legs and can be found anywhere that water collects.
Maximum size: Up to 30 mm

Freshwater mussel 3
Class: Bivalvia
Description: Freshwater mussels have paired hard shells (valves) with a fleshy body between them.
Habitat: Found in or on sandy or muddy stream beds.
Maximum size: Up to 150 mm

Illustrations: Christine Rockley

NSW GOVERNMENT Environment, Climate Change & Water

- **A** — Very sensitive bugs present with lots of diversity (3+ types)
- **B** — Very sensitive bugs present
- **C** — Only sensitive to tolerant bugs present
- **D** — Only tolerant to very tolerant bugs present
- **E** — Only very tolerant bugs present

Guidelines for water bug results for freshwaters

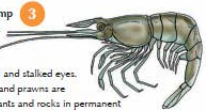
Check out our website for links to good third party waterbug identification materials

Tolerant Bugs - 5,4,3

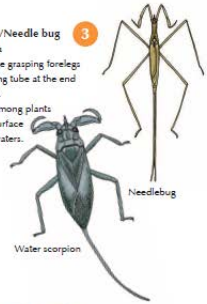
Nematode 3
Order: Nematoda
Description: Thin elongated worms without segments and can look translucent.
Habitat: Burrow into the substrate.
Maximum size: Up to 12 mm

Freshwater sandhopper 3
Order: Amphipoda
Description: Slightly curled and flattened sideways and have hard segments each with a pair of legs for swimming or walking.
Habitat: The edges of slow moving water amongst plants and stones.
Maximum size: 6-20 mm

Freshwater shrimp 3
Order: Decapoda
Description: Covered by a shell, fanned tail and stalked eyes.
Habitat: Shrimps and prawns are found amongst plants and rocks in permanent slow-moving waters.
Maximum size: Up to 35 mm

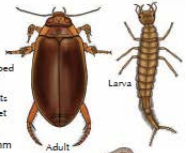


Water scorpion/Needle bug 3
Order: Hemiptera
Description: Large grasping forelegs and short breathing tube at the end of their abdomen.
Habitat: Found among plants or on the water surface of slow-moving waters.
Maximum size: Up to 50 mm



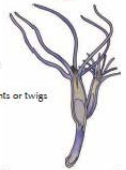
Very Tolerant Bugs - 2,1

Diving beetle 2
Order: Coleoptera
Description: Sleek, shiny beetles with hard-shelled body and hairy paddle-shaped hind legs.
Habitat: A variety of habitats including still waters or quiet areas of flowing water.
Maximum size: Up to 40 mm

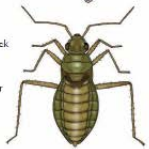


Flatworm 2
Class: Turbellaria
Description: Flat, thin, slow-moving worms with two simple eye spots.
Habitat: Found gliding over rocks and plants in a variety of flow conditions.
Maximum size: Up to 20 mm

Hydra 2
Class: Hydrozoa
Description: Hydras have a simple sack-like body with a mouth encircled by tentacles.
Habitat: Found attached to rocks, plants or twigs in fast flowing water.
Maximum size: Up to 30 mm



Water treader 2
Order: Hemiptera
Description: Long middle and back legs, and thick body
Habitat: Found on the water's surface of slow flowing pools near banks and plants.
Maximum size: Up to 5 mm



Freshwater worm 2
Class: Oligochaeta
Description: Segmented worms with rounded ends with no suckers or legs and usually coloured red or flesh coloured.
Habitat: Found in soft sediment rich in organic matter.
Maximum size: Up to 30 mm

Freshwater slater 2
Order: Isopoda
Description: Flattened from top to bottom with no body carapace or shield.
Habitat: Found in still to slow-moving waters.
Maximum size: Up to 20 mm

Waterboatman 2
Order: Hemiptera
Description: Boat-shaped with piercing mouth parts and boat shape appearance.
Habitat: Found among plants on the water surface or swimming freely in still to slow-moving waters.
Maximum size: Up to 10 mm

Backswimmer 2
Order: Hemiptera
Description: Curved back, large eyes, long hairy hind legs and swim on their backs.
Habitat: Found in standing water or slow flowing ponds.
Maximum size: Up to 11 mm

Bloodworm 1
Order: Diptera
Description: Worm-like and C shaped. Only the red ones are called Bloodworms.
Habitat: Found in soft sediment rich in organic matter.
Maximum size: Up to 20 mm

Leech 1
Class: Hirudinea
Description: Leeches are soft-bodied animals made up of 32 segments with a sucker on one or both ends.
Habitat: Found in standing or slow moving water.
Maximum size: 7-80 mm

Mosquito larva and pupa 1
Order: Diptera
Description: Thorax wider than the head and breathes through a long siphon at the end of the abdomen.
Habitat: Still water.
Maximum size: Up to 25 mm

Freshwater snails 1
Class: Gastropoda
Description: Snails are soft-bodied animals enclosed in a hard, protective, coiled shell.
Habitat: Found on plants and rocks in slow flowing or standing water.
Maximum size: Up to 25 mm

WATER BUG DETECTIVE GUIDE

Waterwatch NEW SOUTH WALES Communities Caring for Catchments
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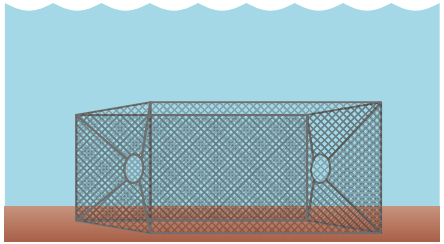
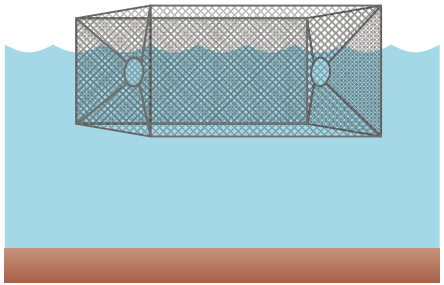
Fish

Fish are useful indicators of aquatic ecosystem health and are considered a more sensitive indicator of pollution than macroinvertebrates.

Bait trap placed on stream bed bottom



Bait trap entrance placed just below water line



Step 1

It is best to set the openings at the end of the net just below the waterline for two of the three nets.

Step 2

Bait and set the fish traps in three locations (with different habitats if possible)and leave undisturbed for at least 15 minutes. It is best to set the traps first and then complete the other sampling before returning to the traps after all other activities are completed.

Step 3

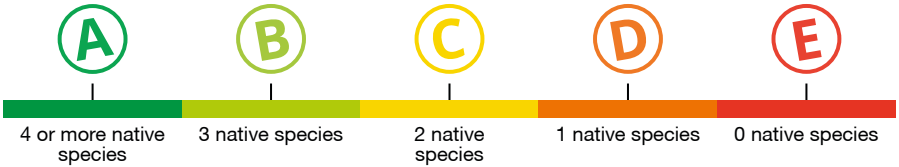
If the water is clear, sit and quietly observe water for five minutes to identify fish not trapped.

Step 4

Check the traps and place fish caught in sorting trays with some water while identifying them using the fish identification guide - A Wild Australia Guide: Freshwater Fishes.

Step 5

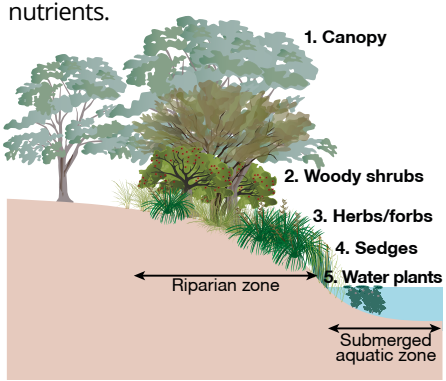
Release fish as soon as possible after identification and record fish found on record sheet or website.



Guidelines for fish results for freshwater in the Fitzroy Region

Riparian vegetation

Riparian vegetation is any flora, native or introduced, growing around water bodies that is directly associated with the moisture provided by the water body. It is recognised as one of the most important indicators for assessing the condition of streams, as it fulfils many important functions including; stabilising banks, providing shade and shelter, providing leaf litter and other organic debris to the stream and providing a buffer zone for intercepting sediments and nutrients.



Step 1

Inspect the riparian zone (see diagram) for the presence of the five different types of vegetation strata including;

1. Canopy Trees
2. Woody Shrubs
3. Herbs/Forbs
4. Sedges and
5. Waterplants

Step 2

If possible, identify plants within the strata types using an appropriate field guide such as Plants of Capricornia by Melzer and Plumb.

Step 3

Record plants found and the number of strata types present on the field sheet or website.

Guidelines for riparian vegetation results for freshwater in the Fitzroy Region

Weeds

Weeds can be extremely invasive and contribute to biodiversity loss, alter ecological processes and damage riparian environments.

Step 1

Inspect the riparian zone and use an appropriate weed identification guide to classify weeds (Grow Me Instead and Priority Weeds of the Capricorn Region are useful guides for Central Queensland).

Step 2

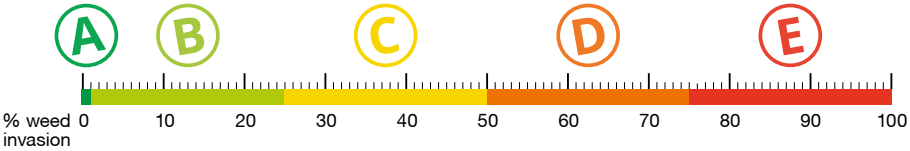
Determine the percentage of weed invasion.

Step 3

Remove weeds and dispose as rubbish (where possible).

Step 4

List weeds found and results on field sheet or website.



Guidelines for weed results in riparian zones in the Fitzroy Region

Enter sample results

Enter results on Fitzroy Partnership for River Health website

Fitzroy Partnership for River Health (FPRH) website has a community portal (MyWater) where raw water sample results are uploaded and interpreted with each of the site indicators being awarded a grade from A-E.

1. Navigate to the FPRH MyWater website www.riverhealth.org.au/report_card/community/ and click on **Upload data now**
2. Select an existing site and click 'Continue' if one for your site already exists, or create a new site by:
3. Clicking on the create a new site tab.
4. Enter details of site (longitude and latitude can be selected by dragging red marker to site location on the map) and then click 'Continue'
5. Select a recorder (if you are new then select Add new... then add your group's name and email contact).
6. Enter the date and time for your sample along with the results.
7. Submit the results and then add more records or explore your results.

If you have a tablet or smartphone with wireless in the field, you can enter this information directly into the MyWater portal at www.riverhealth.org.au/report_card/community/ otherwise use this field sheet as a guide to write your notes.

Community Monitoring Field Sheet Version 1.1 November 2014

If you have a tablet or smartphone and wireless connectivity available in the field you can enter this information at www.riverhealth.org.au/report_card/community/. Otherwise use the sheets to record your data in the field and then enter the results on the website back at the computer.

Recorder	
Site Name	
Date	
Time	
pH (1-12)	
Salt (us/cm)	
Turbidity (10 to 240)	
Water Bugs (select one)	Bugs Found: Very sensitive bugs present with lots of diversity (3+ types) Very sensitive bugs present Only sensitive to tolerant bugs present Only tolerant to very tolerant bugs present Only very tolerant bugs present
Fish (select one)	Fish Found: 4 or more native species 3 native species 2 native species 1 native species 0 native species
Riparian Vegetation (select one)	Plants Found: 5 strata's present 4 strata's present 3 strata's present 2 strata's present 1 or no strata's present
Weeds (select one)	Weeds Found: 0% weed invasion 1 to 25% weed invasion 25 to 50% weed invasion 50 to 75% weed invasion 75 to 100% weed invasion

This community monitoring initiative is provided by Fitzroy Partnership for River Health with the generous support of our valued Partners.

Major partners

Partners

This guide has referenced elements of the Queensland Government's Queensland Community Waterway Monitoring Manual, August 2007

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