



# Creekwatch

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## CREEKWATCH REPORT

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July – December 2021

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OZFISH UNLIMITED  
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OzFish Unlimited, Townsville, QLD. 17 pp.

## Overview

Creekwatch is a citizen science and community awareness program established by Townsville City Council (TCC) in 2003. The program encourages community members to be actively involved in long-term monitoring activities and to become custodians of waterways in the TCC area. Regular activities include macroinvertebrate sampling, fish surveys, and water quality monitoring across various waterways in the TCC area.

OzFish Unlimited has been running the Creekwatch program for TCC since early 2021.

During this time the OzFish project team have been implementing weekly monitoring of waterways around Townsville. A core group of volunteers have assisted with the weekly monitoring activities, which have focussed primarily on macroinvertebrate and fish sampling. A total of 22 sites have been monitored for macroinvertebrates and 12 sites monitored for fish.

This report details the results of the program for the period July - December 2021.

## General Background on Townsville waterways

The Townsville region is located in the coastal dry tropics of northern QLD. TCC encompasses three river basins (Ross, Black and upper Haughton Rivers), with four smaller sub-catchments also located in the region (Black, Bohle, Ross and Haughton Rivers). A very small portion of the upper Burdekin catchment (~20 km<sup>2</sup>) is also within TCC area near Paluma and Paluma Dam.

The region contains a mixture of waterways in the southern wet tropics (Bluewater Creek and waterways further north-west, and Mount Elliott) and dry tropics (Ross, Bohle and upper Haughton catchments). A large portion of the waterways of TCC are < 100 m a.s.l. (which is where the majority of Creekwatch events occur), however, some of the headwater streams are at elevations >1 000 m a.s.l. (e.g. Mount Elliott and Paluma range). The western portion (~150 km<sup>2</sup>) of the [Bowling Green Bay Wetlands](#)—an internationally recognised wetland habitat—is located at the eastern limit of TCC.

Creekwatch activities are concentrated on waterways that are largely ephemeral (e.g. Sachs Creek; Louisa Creek; Stuart Creek; Mundy Creek), but the program also encompasses palustrine wetlands (Town Common), constructed lacustrine habitat (Idalia Lakes; upper Ross River) and wet tropics streams that may retain year-round baseline flow (Rollingstone Creek; Crystal Creek; Alligator Creek). The ecology of the waterways is influenced primarily by the biophysical characteristics mentioned above, and the region thus contains a diverse array of aquatic flora and fauna.



Figure 1 - Townsville City Council area (outlined in blue), with major sub-catchments (Ross, Bohle, Black and Haughton) outlined in pink. Map is from the QLD Gov Department of Environment and Science [Wetland Mapping System](#).

### Current Monitoring Sites

Creekwatch activities are presently undertaken at 14 streams/creeks/ivers across the Townsville region (Table 1). These systems are monitored weekly (Wednesday mornings) on a rotational basis. Some systems, such as Crystal Creek or the Middle Ross River, have been monitored as part of the school-based Creekwatch activities, outside of the regular Wednesday morning sessions. Each site is currently being monitored quarterly, with the exception of Gustav Creek (Magnetic Island) which will be monitored during the wet season. Monitoring activities have included macro-invertebrate sampling, fish surveys and water quality monitoring. The data collected from each site is recorded and stored on the OzFish database.

Table 1 - Creekwatch sites and associated monitoring frequency

Location	N Sites	Monitored
Middle Ross River	3	Quarterly
Upper Ross River	2	Quarterly
Louisa Creek	2	Quarterly
Idalia Lakes	3	Quarterly
Town Common	2	Quarterly
Stuart Creek	1	Quarterly
Alligator Creek	2	Quarterly
Sachs Creek	3	Quarterly
Bluewater Creek	2	Quarterly
Bohle River	1	Quarterly
Rollingstone Creek	2	Quarterly
Crystal Creek	1	Quarterly
Mundy Creek	1	Quarterly
Magnetic Island	2	Bi-Annually

### Biological Monitoring

Macroinvertebrate sampling and fish surveys have been conducted at locations across TCC, with the exception of Alligator Creek and Magnetic Island, which were not monitored due to logistical reasons. A total of 23 individual sites have been monitored for macroinvertebrates and 12 sites monitored for fish (subject to water depth for box traps and underwater video units).

### Macroinvertebrates

Macroinvertebrates are widely used as an indicator of the biological health of waterways around Australia. Anthropogenic pressures (including nutrient, sediment and chemicals) influence the diversity of macroinvertebrates found in a system. Different species have different levels of pollution sensitivity and this can be quantified as a [SIGNAL 2 score](#). Macroinvertebrate sampling is a regular Creekwatch activity and was conducted at every site during the July to December 2021 period.

At each location, macroinvertebrates were collected, sorted, and identified on site in the field. Volunteers used handheld kick nets to collect samples from the edge habitat. Samples were then transferred into plastic sorting trays where volunteers spent approximately 20 minutes sorting each sub-sample. During sorting, macroinvertebrates were located and removed from the sorting tray using pipettes and forceps before being placed into ice cube trays for closer examination. Volunteers then identified the macroinvertebrates to Genus level using ID charts, with confirmation and advice on species ID provided by OzFish staff.

A Macroinvertebrate Monitoring Datasheet was used to record species diversity at each site. A diversity score (Macro DIV score) was calculated for each location according to the equation:

$$\text{MACRO DIV} = \frac{\sum_{i=1}^n \text{Sensitivity Score}_i}{\text{Site Taxa Richness}}$$

The median diversity across all locations was 4.2 (range = 2.4 – 4.71). The highest diversity was observed at Bluewater Creek and the lowest diversity was observed in the Town Common and at Idalia Lakes (Bottom Lake).



Figure 2 – Volunteers sorting samples at Bluewater Creek (left); students from Ryan Catholic College sorting macroinvertebrates at the Ross River, Riverway (right)

Table 2 – Summary of macroinvertebrate sampling

Date	Location	Site	Macro DIV Score
8/7/21	Bohle Wetlands	1	4.43
13/7/21	Middle Ross	1	4
21/7/21	Upper Ross	Apex Park	3.9
21/7/21	Upper Ross	Boat Ramp	4.6
28/7/21	Stuart Creek	Caravan Park	3
4/8/21	Town Common	Bridge	3
4/8/21	Town Common	Bird Hide	4.5
11/8/21	Sachs Creek	Bridge	3.6
11/8/21	Sachs Creek	Causeway	4.2
11/8/21	Sachs Creek	Park	4.1
18/8/21	Bluewater Creek	Wil Win Park	4.71
18/8/21	Bluewater Creek	Caravan Park	4.2
24/8/21	Crystal Creek	1	4.1
1/9/21	Rollingstone Creek	Bridge	4.4
1/9/21	Rollingstone Creek	Caravan Park	4.4
8/9/21	Bohle Wetlands	1	4.2
15/9/21	Louisa Creek	1	4.5
15/9/21	Louisa Creek	2	3.71
29/9/21	Mundy Creek	1	4.14
6/10/21	Idalia Lakes	1	2.4
6/10/21	Idalia Lakes	2	4.1
6/10/21	Idalia Lakes	3	2.8
13/10/21	Upper Ross	Loam Island	4.5
13/10/21	Upper Ross	Apex Park	4.6
20/10/21	Stuart Creek	Bridge	3.3
27/10/21	Town Common	Bridge	3
27/10/21	Town Common	Bird Hide	4.6
3/11/21	Sachs Creek	Bridge	4.6
9/11/21	Bluewater Creek	Wil Win Park	4.2
9/11/21	Bluewater Creek	Caravan Park	4.1
17/11/21	Rollingstone Creek	Bridge	4.4
17/11/21	Rollingstone Creek	Caravan Park	4.6
24/11/21	Bohle Wetlands	1	4.2
8/7/21	Mundy Creek	1	3.6
14/12/21	Louisa Creek	1	3.2
14/12/21	Louisa Creek	2	3

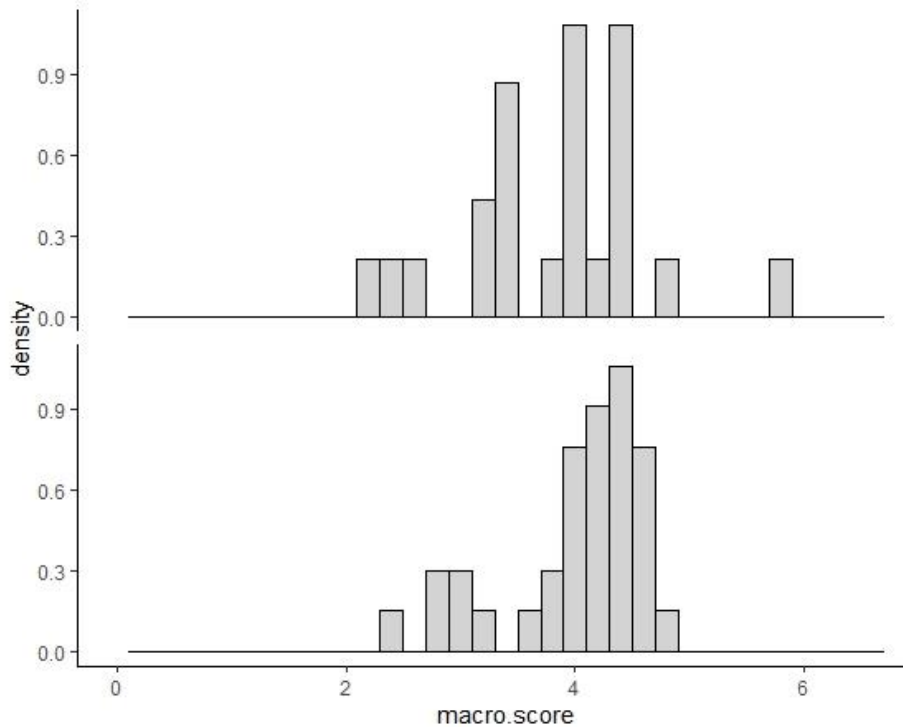


Figure 3 - Histogram of Macro DIV Scores for locations sampled in 2021 from March to June (upper panel), and July to December (lower panel)

## Fish

Fish surveys have been completed at 12 sites for the Creekwatch program over the past six months, using a combination of box traps and underwater video. The methods for each technique at each location are: *box traps* – bait and set for 30 min; *underwater video* – deploy two or more unbaited underwater video units for 10 min. A total of 539 fish from 16 species were encountered across the 12 locations sampled for the period July – Dec 2021 (see Table 3). Photos of all fish species recorded by the Creekwatch team in 2021 are presented in figures 3 – 7.

Underwater video was generally the most successful method for detecting species presence at location, which is consistent with our observations from March to June. A combination of different sampling methods frequently yielded greater species diversity than one single method (i.e. species were sometimes recorded on underwater video but were not sampled in box traps, and *vice versa*). No method used was universally more successful than others as each has its own inherent limitations: *box traps* – relies on the tendency of individual fish to enter the trap and remain there; *underwater video* – relies on sufficient clarity of water to be able to identify species on the video footage.



**Table 3 – Summary of fish sampling results for Creekwatch. N Obs = the total number of fish observed across all locations sampled; TRAP = box trap; UWV = underwater video; VIS OBS = visual observation**

Fish Species	Common Name	N Obs (TOTAL)	UWV	TRAP	VIS OBS
<i>Ambassis agrammus</i>	Sailfin glassfish	32	14	18	-
<i>Amniataba percoides</i>	Banded grunter	3	3	-	-
<i>Awaous acritosus</i>	Roman nose goby	1	-	1	-
<i>Craterocephalus stercusmuscarum</i>	Flyspecked hardyhead	60	48	12	-
<i>Gambusia holbrooki</i>	Plague minnow	115	112	3	-
<i>Gerres filamentosus</i>	Threadfin silverbiddy	8	8	-	-
<i>Glossamia aprion</i>	Mouth almighty	9	4	5	-
<i>Hypseleotris compressa</i>	Empire gudgeon	114	65	49	-
<i>Kuhlia rupestris</i>	Jungle perch	7	7	-	-
<i>Leiopotherapon unicolor</i>	Spangled perch	8	4	-	2
<i>Lutjanus argentimaculatus</i>	Mangrove jack	10	7	-	3
<i>Megalops cyprinoides</i>	Tarpon	20	14	-	6
<i>Melanotaenia splendida</i>	Eastern rainbowfish	105	73	32	-
<i>Mogurnda adspersa</i>	Purple spotted gudgeon	1	-	1	-
<i>Oreochromis mossambicus</i>	Tilapia	39	39	-	-
<i>Xiphophorus maculatus</i>	Platy	7	4	3	-
	<b>ABUNDANCE</b>	539	402	124	11
	<b>RICHNESS</b>	17	15	10	3

The use of dip nets to increase sampling resolution for fish was trialled in the first half of 2021, however this method frequently yielded poor results at each site (low catches and low fish diversity), and it was concluded that this method was not contributing substantially to the results.

The OzFish project team have recently partnered with the TropWATER research group at James Cook University to develop eDNA sampling methods for tropical river systems. We expect to start collecting samples and developing this method during the first half of 2022. The detection of fish using eDNA has the potential to improve how we sample fish, and also permits the consideration of additional sites for sampling.



Figure 4 – Common native fish species observed in Townsville waterways by the Creekwatch team: 1, Sailfin glassfish (*Ambassis agrammus*); 2, Eastern rainbowfish (*Melanotaenia splendida*); 3, Fly-specked hardyhead (*Craterocephalus stercusmuscarum*); 4, Empire gudgeon (*Hypseleotris compressa*).



Figure 5 – Common native fish species observed in Townsville waterways by the Creekwatch team: 5, Tarpon (*Megalops cyprinoides*); 6, Mangrove jack (*Lutjanus argentimaculatus*); 7, Jungle perch (*Kuhlia rupestris*); 8, Barramundi (*Lates calcarifer*).



Figure 6 – Common native fish species observed in Townsville waterways by the Creekwatch team: 9, Banded grunter (*Amniataba percooides*); 10, Spangled perch (*Leiopotherapon unicolor*); 11, Mouth almighty (*Glossamia aprion*).



Figure 7 – Common native fish species observed in Townsville waterways by the Creekwatch team: 12, Roman-nose goby (*Awaous acritosus*); 13, Hyrtl's tandan (*Neosilurus hyrtlui*); 14, Thread-finned silverbiddy (*Gerres filamentosus*); 15, Purple-spotted gudgeon (*Mogurnda adspersa*).

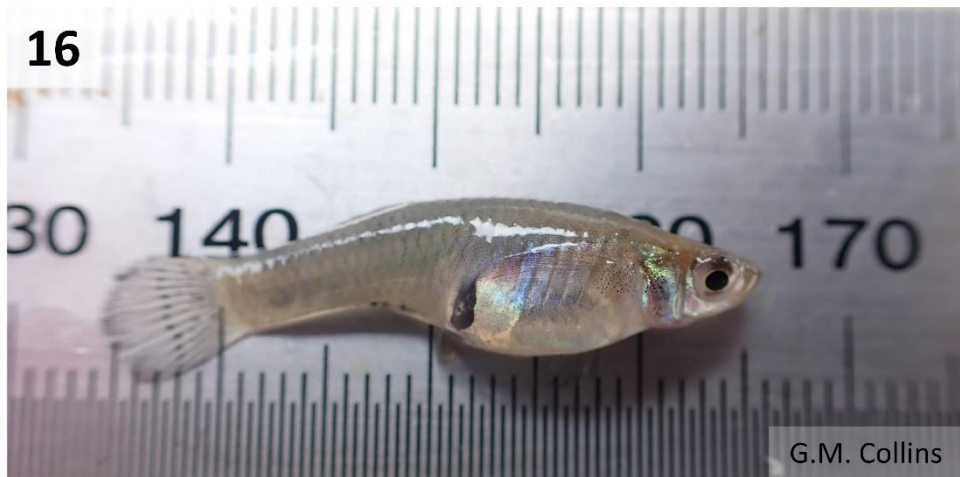


Figure 8 – Common invasive fish species observed in Townsville waterways by the Creekwatch team: 16, Mosquitofish (*Gambusia holbrooki*); 17, Platy (*Xiphophorus maculatus*); 18, Mozambique tilapia (*Oreochromis mossambicus*)

## Riparian Assessments

In the second half of 2021, riparian assessments were incorporated into Creekwatch activities. Each site will have a riparian assessment conducted annually. To date, 7 of the 14 monitored creeks have had riparian assessments completed. For this reason, data from the riparian assessments will be included in the bi-annual report in June 2022.

## Water Quality Monitoring Targets and Status

Water quality monitoring has been limited over this monitoring period due to equipment issues, which have been discussed with the Creek to Coral project team at TCC. New water quality loggers were provided to OzFish in November 2021 and will be incorporated into activities in 2022.

## Lab-based Sample Collection

No lab water quality samples were collected for the Creekwatch program. As per the previous section on basic water quality testing, this has also been discussed with the Creek to Coral team at TCC. Sample collection and lab-based testing for nutrients was intended to form a core part of Creekwatch activities for 2021, however further discussions are required to refine the aims and to logistically coordinate data collection for this component of the project.

## School Involvement and Adopt-A-Creek Progression

We currently have five schools directly involved in the program (St Benedict's Catholic School, Ignatius Park College, Mutarnee State School, Ryan Catholic College, and Riverside Adventist College). Most of these schools are visited on a monthly or quarterly basis, depending on the school's preference and availability.

Four of these schools have registered to be involved in the Adopt-A-Creek program, commencing in January 2022. Garbutt State School and Coastal Dry Tropics Junior Landcare will also be participating in the Adopt-A-Creek program (six groups in total). OzFish is excited for this new addition to the Creekwatch program and look forward to continue working with schools within the greater Townsville region in 2022.

## Community Involvement

The response from the community regarding OzFish running the Creekwatch program continues to be positive. We have successfully engaged a group of regular volunteers who attend Creekwatch every Wednesday morning (an average of 6 volunteers each week). Volunteer satisfaction in the program is good, as indicated by the results of our survey (see below).

The Creekwatch Facebook page continues to be used to share information on upcoming events and activities. This platform is also useful to showcase the program, share information and connect with potential volunteers. Upcoming Creekwatch events are promoted on the OzFish website, attached with an easy-to-use online expression of interest (EOI) form. These platforms have been used to regularly promote the program to the general public, schools, and community groups, and encourage volunteers to participate in our regular monitoring days and community events.

In the last 6 months, OzFish staff have also promoted the Creekwatch program at various events including:

- National Tree Planting Day at The Burrow Pits on 8 August 2021
- Bohle Wetlands Junior Landcare event 24 October 2021
- DTPHW meetings and report card launch (various dates)

## Volunteer Satisfaction Survey

In December 2021, five volunteers participated in a survey to assess their overall satisfaction with the program. Four out of the five volunteers said they found Creekwatch “very enjoyable” in 2021. The volunteers indicated that their favourite aspects of the program were:

- Connecting with Townsville’s waterways
- Learning new skills
- Participating in Creekwatch activities
- Contributing to water quality monitoring data collection

All five volunteers indicated that they were “very satisfied” with Creekwatch co-ordinator, Ellie Sales.



The only negative feedback received was from two of the five volunteers who mentioned that the cost of petrol and the driving distance to sites could be a financial strain at times. These volunteers previously participated in the Creekwatch program when CVA were using a van to get to sites. Volunteers were again reminded that there is no obligation to participate in Creekwatch activities every week and encouraged to perhaps focus on coming to sites closer to town, or on car-pooling if driving distances and costs are prohibitive.

### January – June 2022 Direction

Weekly sampling will continue as usual throughout the first half of 2022. Improvements to sampling techniques during this period will include:

- Incorporation of eDNA sampling into the Creekwatch program
- Use new WQ testing equipment at all sites each week
- Improve underwater video units and use at all sites where possible
- Use of iPad to record data in the field (ideally, going completely paperless)

OzFish is excited about the launch of Adopt-A-Creek in January 2022. Six groups have registered for the program and will be “adopting” six different creeks within the greater Townsville area. OzFish staff will be responsible for training and supporting groups throughout the program and look forward to doing so.