Aquatic Biota Sampling and Human Health and Ecological **Risk Assessment**

Aquatic biota sampling

In early February 2023, specialist environmental consultants completed aquatic biota sampling in Callide Creek and Callide Dam.

Aquatic biota are animals or species that live in water. It includes fish, turtles and smaller macroinvertebrate species like crustaceans.

Human Health and Ecological Risk Assessment

The sampling was completed to inform the Human Health and Ecological Risk Assessment (HHERA) that will be undertaken later this year.

A HHERA looks at specific risks to human health and the environment by looking at exposure pathways – such as drinking water, eating food and bathing in water impacted by PFAS. It takes a holistic approach to understand what the combined risk of each individual pathway is.

A qualified risk assessor (a member of the Australasian College of Toxicology & Risk Assessment) will undertake this assessment and make recommendations on the level of risk associated with each exposure pathway and if any actions are required to be taken.

We are expecting the HHERA to commence mid-late 2023 with a finalised report ready by early-mid 2024.

At a glance

Sampling was completed over a couple of weeks in late January and early February 2023

Almost 4,000 individual specimens across 19 different species were sampled.

Samples were taken across eight sites at Callide Dam, Callide Creek, Callide Weir, and at one site in Kroombit Dam, for reference purposes.

After testing there is no need to avoid eating the fish and crustaceans from the dam.

About the aquatic biota sampling report

Importantly, the report needs to be considered in context of the HHERA when it is complete. However, based on the work done to date, the preliminary findings are that the fish and crustaceans that people would most commonly eat (e.g. barramundi and red claw crayfish) within Callide Dam did not have PFAS detected in the samples.

Getting a baseline to understand the data

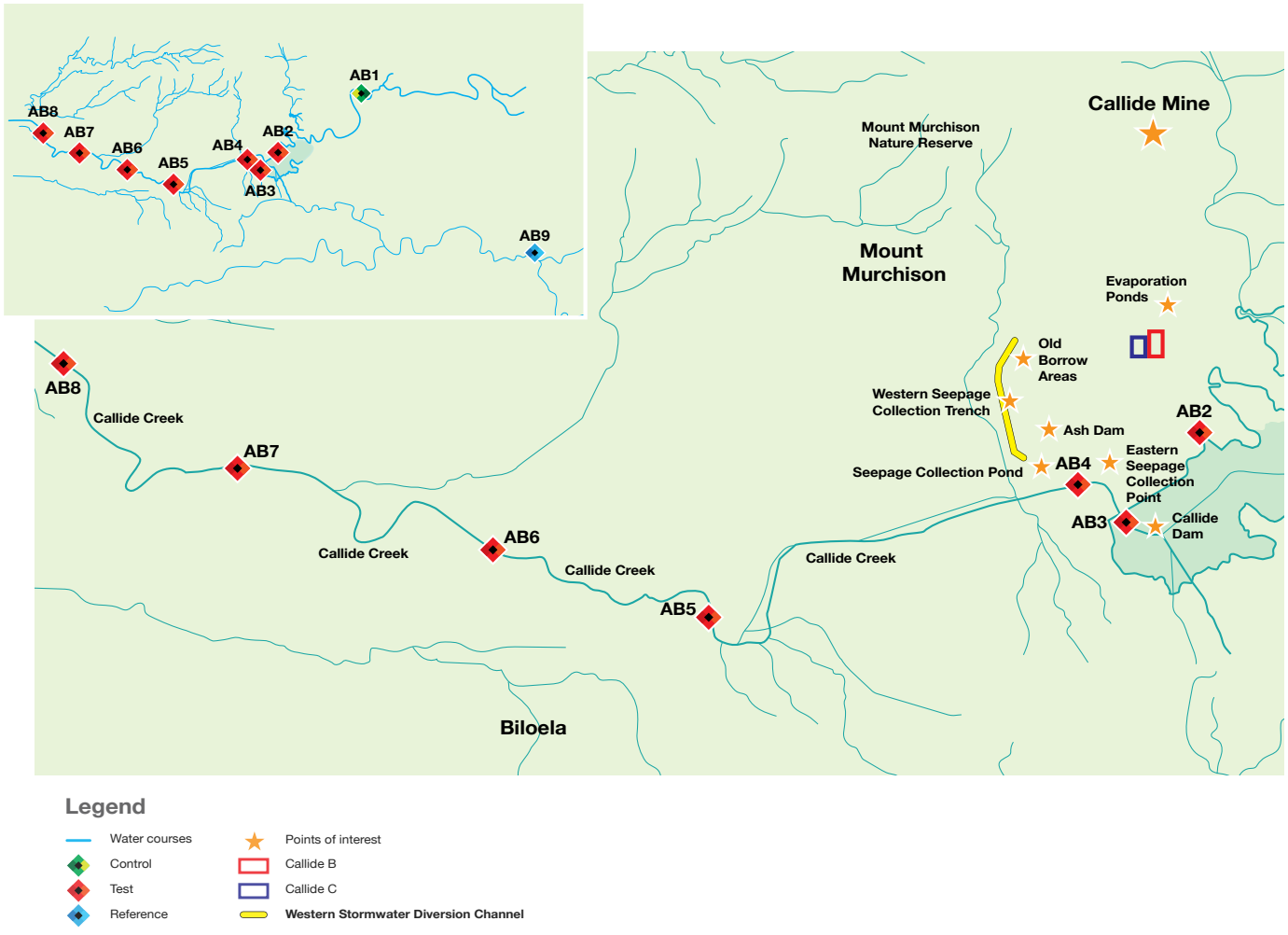
- The consultants sampled across eight sites at Callide Dam, Callide Creek, Callide Weir (including one control site), and at one site in Kroombit Dam, for reference purposes.
- The creek is referred to as a riverine habitat (water flows through the site, and sometimes the creek is wet or dry). The dam and weir are a lacustrine habitat (a permanent wetland).
- The report rates the habitat condition of the riverine as good to excellent, and the rating of lacustrine as fair. None of these ratings are related to the presence of PFAS. Lacustrine habitats will generally have lower scores because without running water, there is less habitat diversity.

Timeframe

- The report is a snapshot in time and doesn't represent a trend.
- Sampling was completed over a couple of weeks in late January and early February 2023, after a wet season with above average rainfall. Sampling was scheduled for this time because it's expected there will be more diversity of species available following the wet season.

Scan the QR code to read the full report outlining the results of the sampling or visit: csenergy.com.au/environment/pfas-monitoring/callide-pfas-monitoring

Location Map



About the results

PFAS assessment

- Of 40 sample groups, PFAS was present in 15 biota samples. These were all from the Callide Creek, and in samples collected downstream of the dam, with the exception of one catfish sample caught upstream of the dam. (This sample was below the human health trigger value so does not represent a risk for human consumption.)
- No PFAS was detected in sample groups from the Callide Dam. This includes species most commonly eaten by people – barramundi and red claw crayfish.
- PFAS concentrations in biota were highest at the site furthest downstream (Callide Weir). Note, the Callide Weir is not open to the public for fishing. This site is downstream of the township of Biloela, which may indicate other potential sources of PFAS.

Fish migrate, and swim upstream and downstream. The presence of higher PFAS concentrations in the biota does not necessarily indicate PFAS concentrations are higher in a certain section of water.

In addition, hydrogeological modelling completed late last year showed that PFAS has diluted and dispersed as it has moved downstream.

How many fish did you sample?

Almost 4,000 individual specimens across 19 different species were sampled. Of these, 98 per cent were returned to the water.

These individual specimens were grouped into 40 sample groups (comprising five or more samples).

The consultants sampled both fish and macroinvertebrates. Macroinvertebrates are generally food for fish. Macroinvertebrates are often used as a way of determining overall eco system health – because their health is influenced by their habitat.

Testing for human health consumption targeted barramundi, red claw crayfish, and yellowbelly as these are most commonly eaten by people.

Due to these species not being represented well at all the sites, it was decided to also include some other common edible catfish species.

Testing for ecological risk assessment targeted catfish, rainbow fish, freshwater mussels and freshwater prawns.

As only freshwater prawns were well represented in this testing group, other species including perchlet, hardyhead and shrimp were also included in sampling for ecological risk assessment.

Diversity and abundance of species

Fish abundance was greatest within Callide Dam. Common species included Agassizii's glassfish, carp, and catfish.

Five different species of reptiles were recorded, including the **eastern long-necked turtles.**

The critically endangered **white throated snapping turtle** was recorded in Callide Creek upstream of Callide Dam.

One **golden perch** was recorded upstream of the dam. Typically, golden perch will move upstream to reproduce where there is less silt and more pebbles.

All the **turtles** had their measurements and weight taken and were **returned to the water.**

There were various sizes of fish – indicating different age classes present, which indicates **most species are successfully reproducing**.

The report found that the **population of fish was typically less diverse than expected.** This is due to the habitat conditions, and not an indication of the presence of PFAS.

**These are illustrative examples of the fish sampled and are not intended to be scientifically accurate drawings.*

Did we test for anything else?

In addition to PFAS, the consultants also tested for other metals, zinc and fluoride elements – to ensure we had a baseline understanding of the overall health of the species. Again, the presence of PFAS does not influence or indicate if there will be other metals and elements present.

Can I eat fish from the dam?

It should be noted that PFAS was not detected in any barramundi or red claw crayfish caught in the dam, which are the species most likely to be eaten.

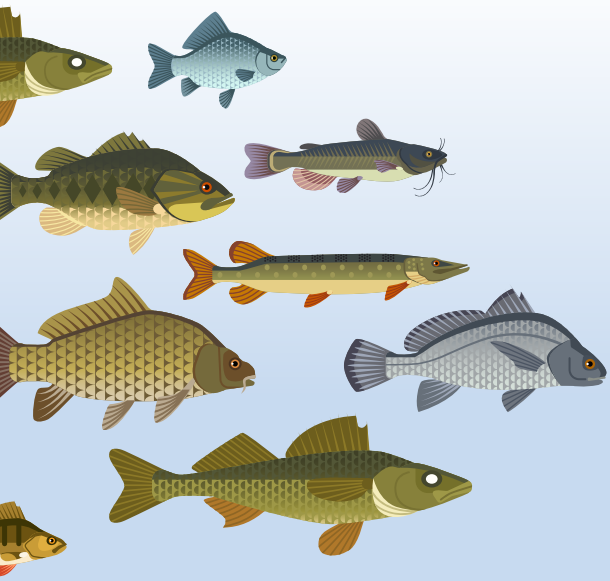
Based on the sample results, Queensland Health advises there is no need to avoid eating the fish from Callide Dam or upstream of the dam.

Can I eat fish/crustaceans from the creek?

PFAS was detected in fish caught at a number of sites along Callide Creek between Callide Weir and the base of the Callide Dam spillway. The PFAS in several fish of an edible size slightly exceeded the Food Standards Australia New Zealand trigger point for investigation. However, it is unclear whether levels of PFAS in fish in the creek would vary based on the season and water flow in the creek.

Based on the levels of PFAS found in the fish sampled, at this stage Queensland Health advises that infrequent consumption (every few months) of a meal of fish from the creek would not make a significant contribution to an individual's overall exposure to PFAS. Queensland Health advises fish is an important part of a healthy diet and recommends eating a variety of fish from different sources.

It should be noted that this interim advice may be updated on completion of the HHREA.



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Can we swim in the dam or play in the creek?

The aquatic biota sampling did not test water. Our technical monitoring program, which samples surface water and groundwater across various sites, including the dam every three months, provides us with data on PFAS in water.

To date, no results have been over the recreational guidelines for water use.

Will CS Energy extend its water sampling program further downstream?

Not at this time. We are continuing to complete work required to submit an Environmental Evaluation (EE) report to DES in early 2024 and will assess what actions are required after this work is completed.

What does it mean for the environment?

Results from surface water sampling within Callide Dam and Callide Creek indicate that the water is unlikely to pose a risk to the aquatic species.

Bigger fish do eat the smaller species in their habitat. There is a risk that through their diet, the bigger species living in or around Callide Creek will be bioaccumulating PFAS. Bioaccumulation occurs when an organism absorbs a substance faster than it can be excreted.

The ecological protection guidelines for PFAS take bioaccumulation into account, and as such are very conservative. We are currently undertaking additional work to understand any potential risks associated with the bioaccumulation of PFAS in the environment.

Results from these investigations will be used to inform the HHERA.

Next steps

The Human Health and Ecological Risk Assessment is due to commence in September and will consider this report, the previous Environmental Evaluation submitted to DES and the latest technical monitoring results. It will also consider information provided from landholders in bore use surveys that are currently under way.

For more information visit **www.csenergy.com.au** or contact Holly at **hevelyn@csenergy.com.au**

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