



# Feasibility of using Juvenile Mysids as a Water Toxicity Test - Plus Artox Preliminary Investigation



**DATES** February – August 2014

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## **FOCUS**

This project is a continuation of ongoing research carried out at Reef HQ aquarium, Townsville, to develop a reliable bioassay that the aquarium can incorporate into its testing of creek water, from testing feasibility and sensitivity up to an operational protocol.

The focus is on two types of bioassay using a) juvenile Mysids and b) Artemia nauplii, assessing the potential reinstatement of the Artox test using quarantine cysts instead of specific cysts.

This study also touches on the sensitivity and reliability of the Microtox tests.

## **OUTCOME**

### **Mysids bioassay**

**An experimental protocol was developed for juvenile Mysid tests** from culture and collection to test conditions and result analysis with the following characteristics:

- The protocol uses 20 juvenile mysids
- It spreads over 24 hours and takes 1.5 to 2 hours of 1 person's time to run
- A validity threshold of 10% mortality was established for control water
- A toxicity threshold of 20% mortality was established for tested water.
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**The impact of various toxicants was tested** on Mysids with the following results:

- Copper: no impact at 25 ug/L; medium impact at 50 ug/L; high impact at 100 ug/L
- Sodium Lauryl Sulphate (present in detergents): medium impact at 10 mg/L; high impact at 100 mg/L. The no impact level remains to be confirmed
- Yacht bilge / engine effluent: medium impact at 4% dilution.
- Dive compressor oily water: high impact at 4% dilution.
- Turtle hospital water (high nutrient concentration): no impact at Nox 20 uM and Phos 1.75 uM.

**The Mysids bioassay was run with 8 consecutive creek water intakes** and the actual operational protocol was refined. All intakes passed the test except one that was invalid due to high mortality in control water.





Results showed that :

- the test **protocol with juvenile Mysids was repeatable and valid** (as a reliable control was established);
- **juvenile mysids are a meaningful toxicity indicator species for the toxicants tested** in comparison to environmental guidelines;
- **juvenile mysids are much more sensitive than the Microtox bioassay** for copper, SLS, and other effluents tested.

Thus the juvenile mysids bioassay proved to be a **feasible and useful creek water quality bioassay and the Mysids bioassay has been included into the suite of tests for Creek Water intakes at the end of the project at an operational level.**

However some issues with the juvenile mysids bioassay remained and **further improvements are required** with:

- **Improving the juvenile collection procedure** by reducing the time involved
- **Standardising the size threshold for juvenile mysids** used in creek water intake tests;
- Exploring the **pros and cons of running the test in the Quarantine room versus the refugia**, in particular under summer conditions where a sharp temperature change may influence the test;
- **Investigating juvenile mysids sensitivity further** for various real life effluents and for ammonia in particular.

### Artemia bioassay

The experimental Artox protocol used before 2012 at Reef HQ Aquarium for artemia nauplii tests was **revived** with aquaculture cysts (Gulf Breeze Aquaculture) instead of selected Artox cysts.

**Results on Artox tests were invalid** because the control artemia died in significant numbers. Interpretation of toxicity tests was thus not possible.

**Younger artemia** (24 hours old instead of 48 hours) should be trialled for future investigations. Once a valid and repeatable protocol has been established, **toxicity tests with similar toxicants as those used for juvenile mysids should be carried out** to compare the sensitivity and decide if the Artox test should be re-included in the suite of creek water intake tests in the future or not.

