



EPA Ecotoxicity Sampling in the Wingecarribee River

13 December 2017 and 18 April 2018

Wingecarribee River Monitoring Programs

Different monitoring programs:

- Western Sydney University, Sep 2016–17, 8 events
Water, invertebrates, sediment, diatoms
- Boral's routine EPA licence monitoring of adit discharge and 2 upstream and 2 downstream points in river
- Boral performance monitoring program 2018–19
8 sampling locations – upstream, downstream & control sites - water quality, sediment & invertebrates
- EPA Ecotox Sampling and analysis Dec 17 April 18

EPA Ecotox Sampling and Analysis

Sampling dates: 13 December 2017 & 18 April 2018

13 Dec: 4 sample locations upstream, immediately downstream, 2.2 km and 2.5 km downstream

18 April: same locations upstream & downstream

Sampling undertaken by EPA, WSU, Resource Regulator and community representatives

Toxicity and water chemistry was tested in EPA/OEH laboratory Lidcombe

Sampling Locations - December 2017



Visual Water Quality – Sample Point 2

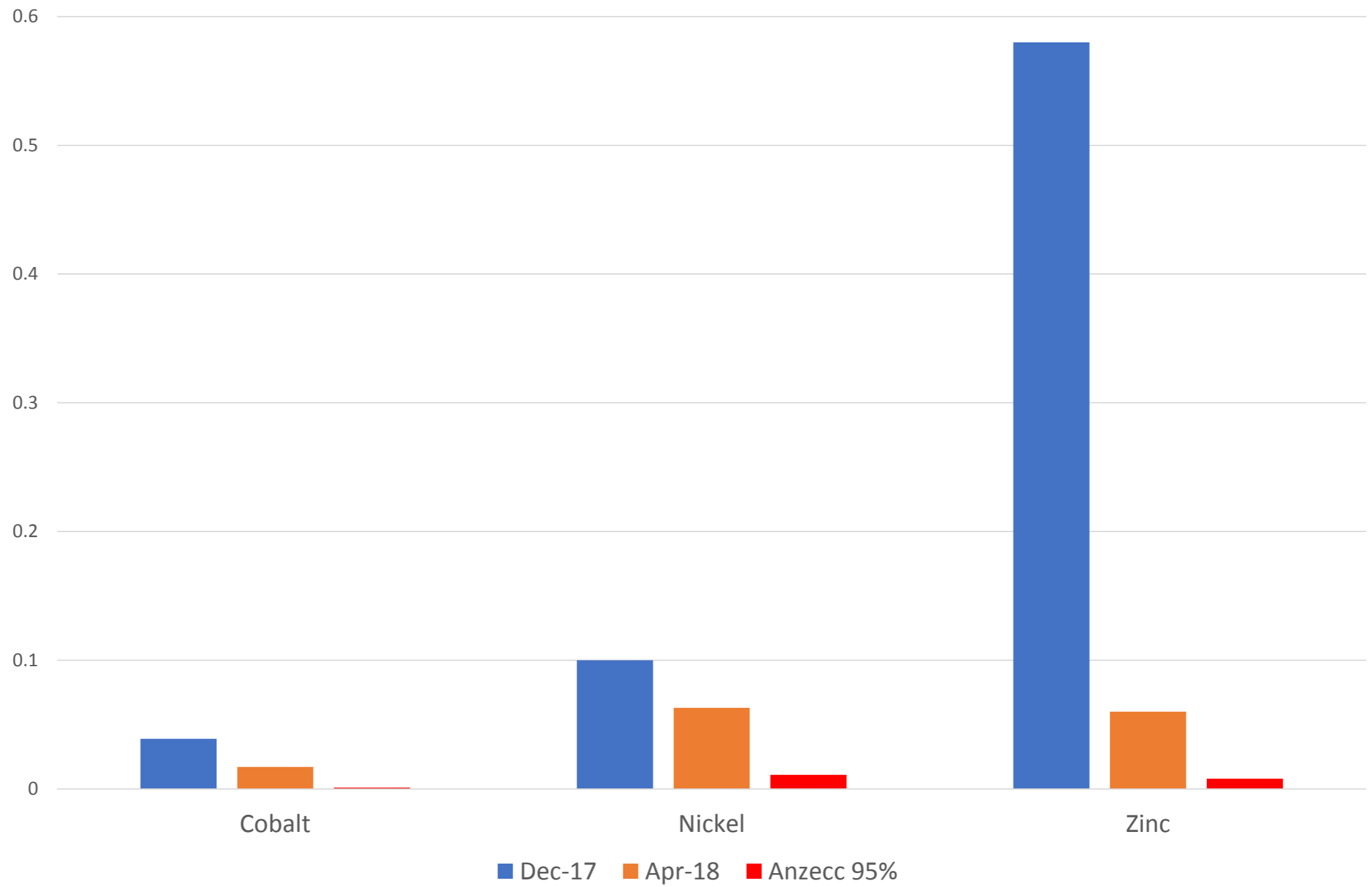


December 2017



April 2018

Key Metals - Sample Point 2



Water Quality

In summary, the results indicate:

Overall improvements in visual water quality due to large reductions in iron and manganese.

Levels of dissolved metals such as cobalt, zinc, nickel have fallen immediately downstream but still above water quality levels for environment protection in the National Guidelines.

Metal levels are elevated but not as significant further downstream 2.2 - 2.5 km

Toxicity Testing

Ecotoxicity testing of water performed on 1 vertebrate, 3 invertebrates and 1 plant.

Shrimp (*Paratya Australiensis*)

Rainbow Fish (*Melanotaenia duboulayi*)

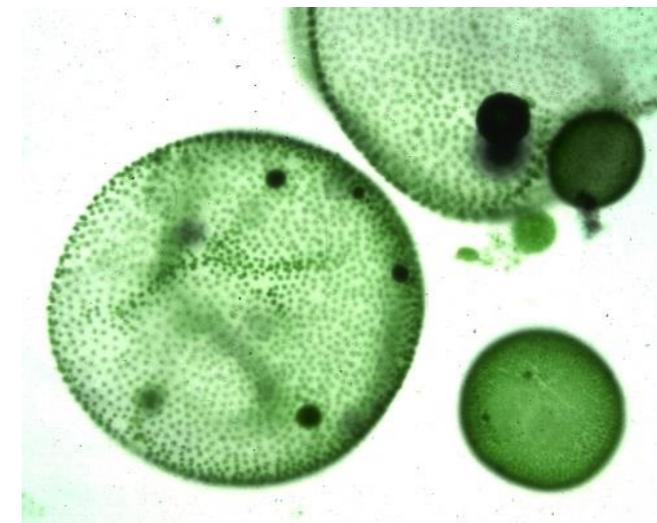
Unicellular Green Algae (*Raphidocelis subcapitata*)

Pink Hydra (*Hydra Vulgaris*)

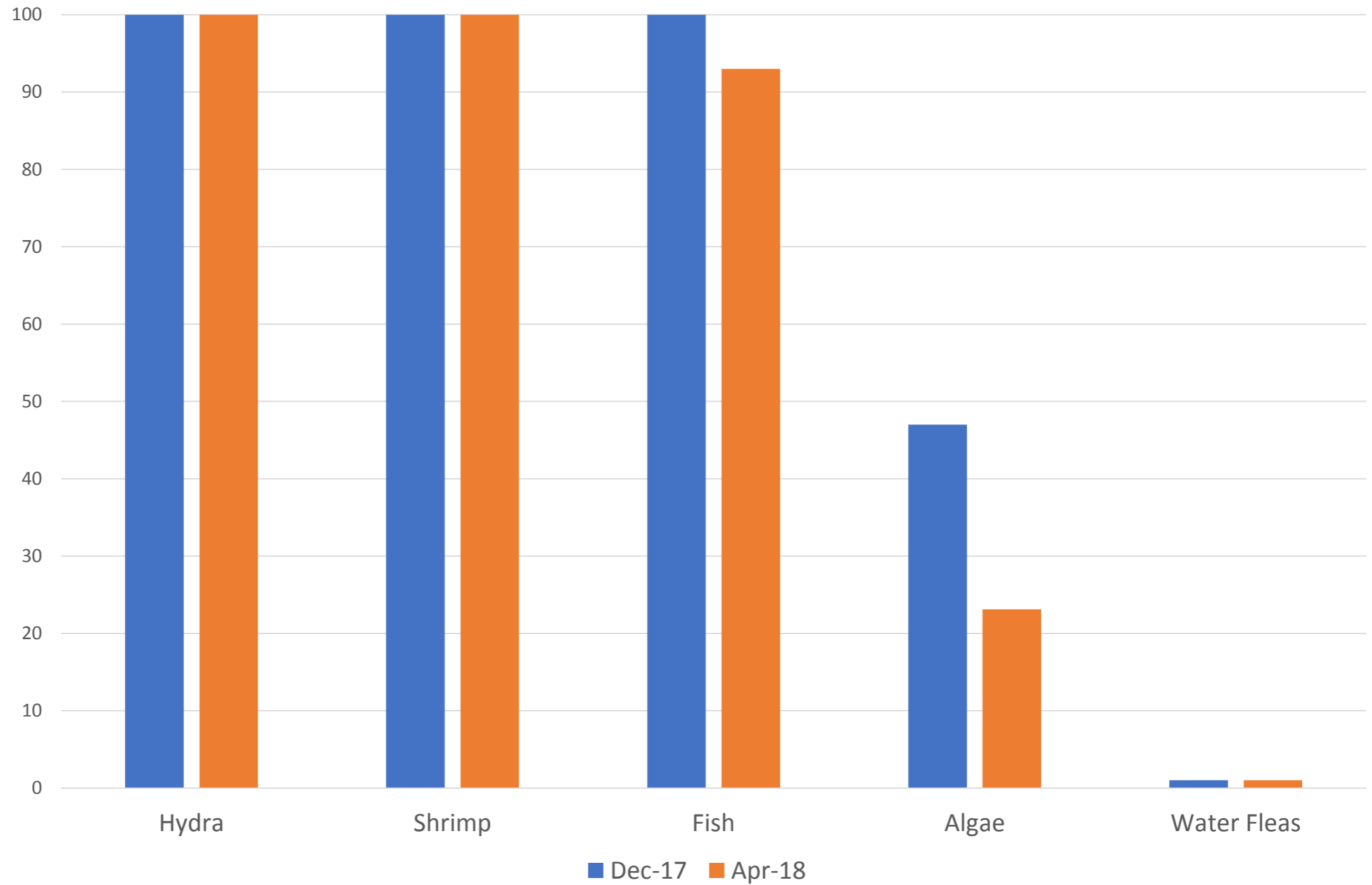
Water Flea (*Ceriodaphnia Dubia*) (Acute and Chronic)

USEPA test methods for measuring toxicity

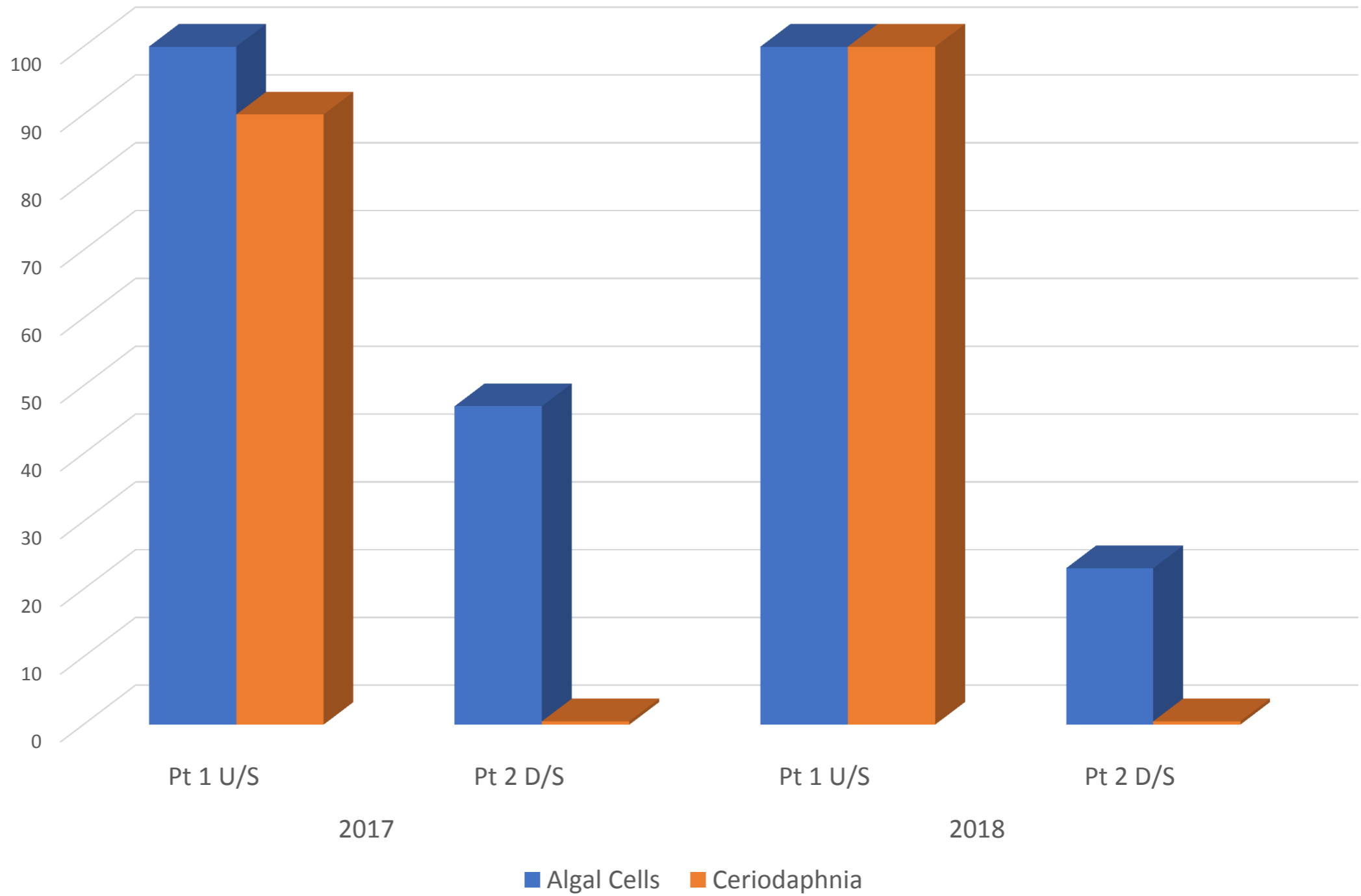
Test Species



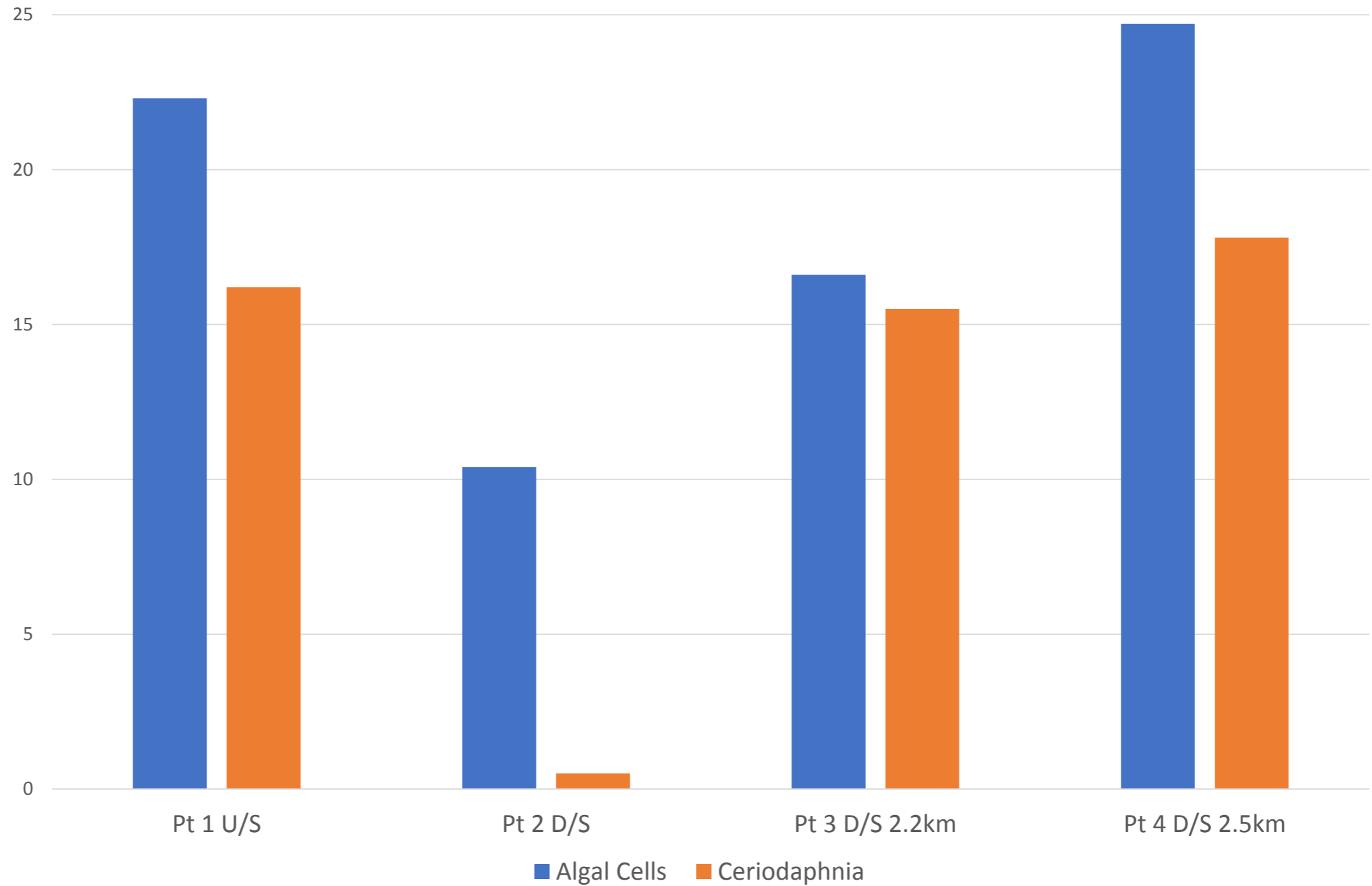
“Survival” of Test Plants & Animals – Point 2



Survival of Algae/Ceriodaphnia - Upstream & Downstream



Algae & Water Flea down river – Dec 2017



Toxicity Levels

In summary, the results indicate:

Toxic effects not evident on larger animals (shrimp & fish)

Toxicity to sensitive test species - water fleas & algae.

Overall levels of toxicity immediately downstream in 2018 were similar to the pre-treatment level in December 2017.

Levels of toxicity appear related to the continuing presence of metals zinc, nickel and cobalt.

Further Work

EPA laboratory suggested further resampling when metal levels reach equilibrium in the mine and the river downstream.

Ecotox testing is one component of monitoring to assess impacts in the Wingecarribee River.