

# Report summary

## TOXIC HABITAT: Heavy metal impacts on water birds near NSW coal-fired power stations



Hunter Community  
Environment Centre

***Toxic habitat: Heavy metal impacts on water birds near NSW coal-fired power stations*** is the third report the Hunter Community Environment Centre (HCEC) has released on heavy metal contamination of NSW waterways by coal-fired power stations.

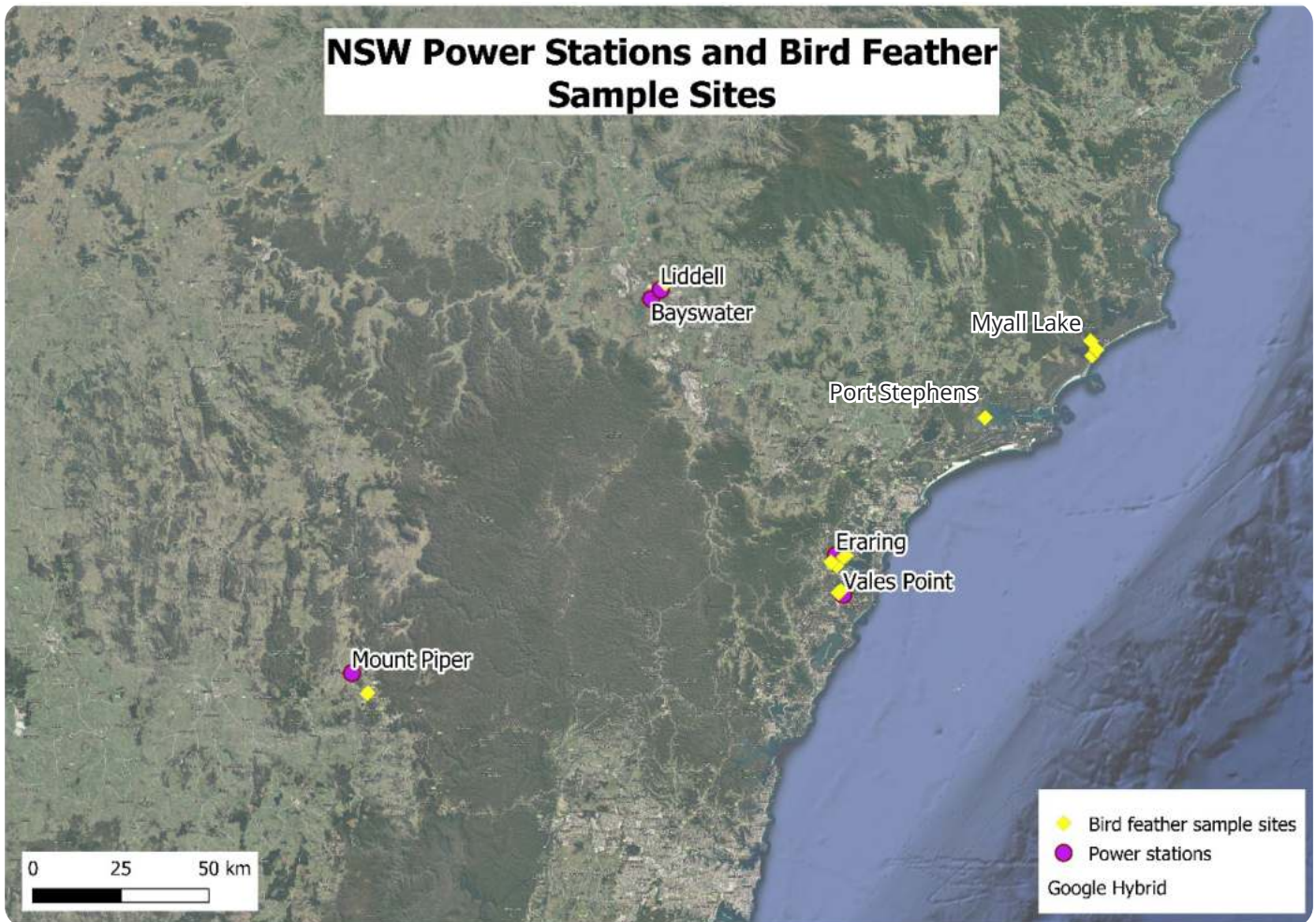
In this report, we reveal bioaccumulation of metals and metalloids in waterbird populations from three Lakes contaminated by coal-fired power stations in NSW: Lake Macquarie, Lake Liddell and Lake Wallace.

Surprisingly, we also picked up higher than expected contamination in the background samples for this study, in the Port Stephens Great Lakes Marine Park.

Briefly in this summary of the full report, [Toxic habitat: Heavy metal impacts on water birds near NSW coal-fired power stations](#), the findings of our field study and literature review completed over 2020 are presented.

While we recognise the limitations of the study presented here, the Hunter Community Environment Centre believe our findings warrant a comprehensive investigation by the NSW EPA into the heavy metal pollution impacts facing NSW waterbirds, and the contribution of coal-fired power stations.

## NSW Power Stations and Bird Feather Sample Sites



*Feather sample sites*

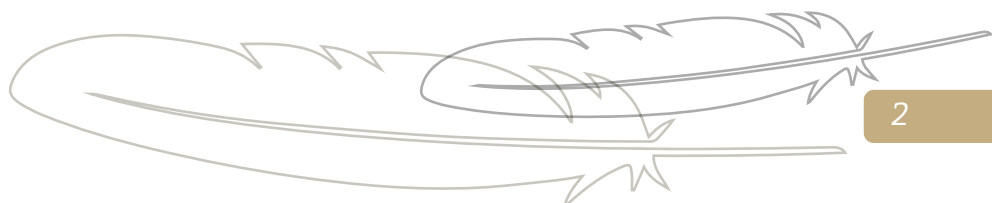
# Our Methodology

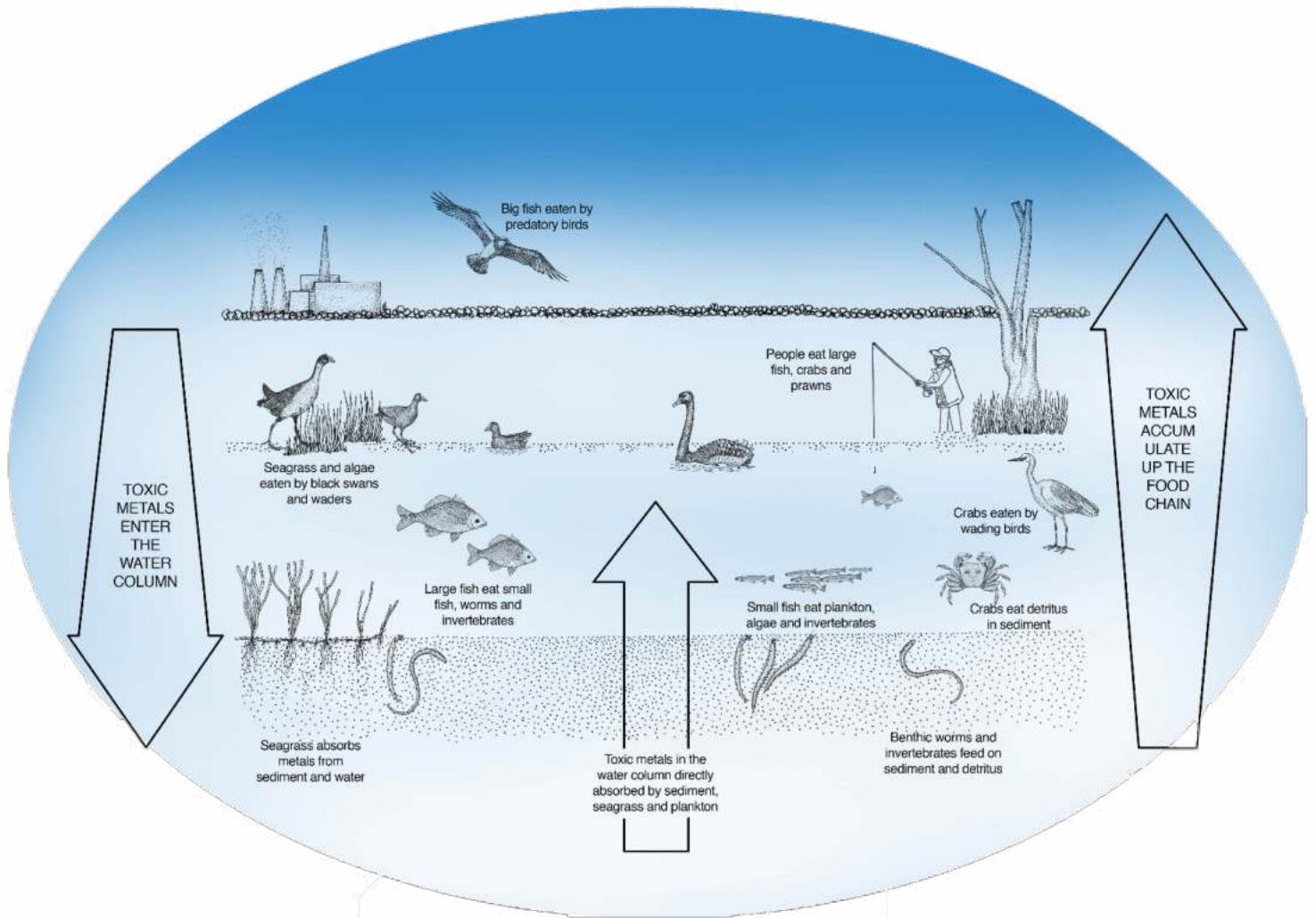
Our methodology for this study comprised field sampling followed by certified laboratory analysis, as well as a literature review of currently-understood health impact thresholds which we used to estimate potential adverse impacts on water birds from three contaminated sites.

1. We collected 40 discarded feathers from 12 genera of waterbird and four terrestrial bird species, from southern Lake Macquarie, Lake Liddell, Lake Wallace, and control sites in Port Stephens and Myall Lake.
2. We washed the feathers in warm water, photographed them, and sent representative feathers to EnviroLab in Sydney for metal analyses. [Laboratory reports for all samples are in the Appendix.](#)

Where we had multiple feathers from a single species, we sent representative feathers and digital images to the Australian Museum for identification.

3. The final report is a combination of laboratory analysis results compared to published health impact thresholds.





*Metals bioaccumulation in the food-web. Alison Ellis.*

## What risk do heavy metals pose for bird life?

Waterbirds have the capacity to accumulate metals above levels found in the surrounding environment, which can influence physiology, adversely affecting feeding habits, growth, age, reproduction, moulting, migration and distribution.

Waterbirds suffer severe health impairment or death when subjected to high concentrations of some heavy metals. Chronic exposure can also cause mortality and other acute effects.

The main consequences for birds exposed to chronic sub-lethal concentrations are: **reproductive dysfunction, increased susceptibility to disease, and behavioural changes.**

In addition, eggs of waterbirds exposed to heavy metals may have an impact on early growth and nestling survival. At the population level, heavy metal contamination can lead to dramatic declines in the number of water birds, which can lead to regional extinctions.

This study identified mostly chronic and sub-lethal levels of metals in the feathers sampled, however in samples from Lake Liddell acutely toxic and potentially fatal concentrations were found in Black Swan and Cormorant feathers.



**"Selenium concentrations in two of the Cormorant feathers collected were acutely toxic."**

## Our findings? A snapshot

**Half of all birds from which we sampled feathers were potentially suffering health impacts from heavy metals emitted by coal-fired power stations.**

In total, 24 of the 44 (55%) feathers collected contained concentrations of metals above health thresholds - 20/31 (65%) of these were from the contaminated sites.

Three of these birds – one Cormorant from Lake Macquarie, and two Black Swans from Lake Liddell – could be suffering from the toxic burdens of at least three heavy metals.

The metals of concern that were identified in study samples are: arsenic, cadmium, selenium, lead, mercury.

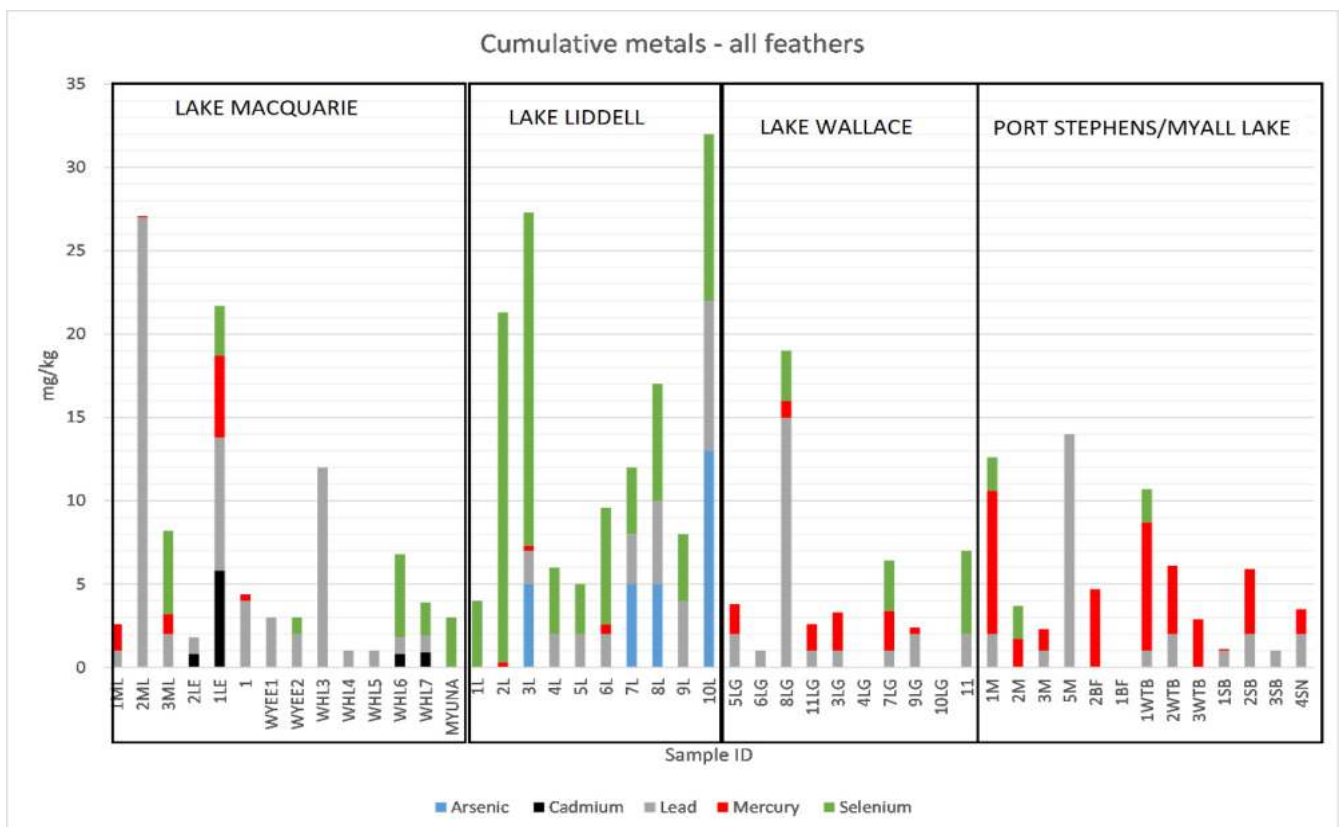


Chart 1: Metal concentrations found in feathers from all four collection areas.



What's more, many of the feathers sampled with higher metal concentrations, correlated with known contamination at the site. For example, selenium in Lake Liddell showed up in every feather collected from there at levels at which health impacts have been documented to occur.

The following heavy metals are at concentrations high enough to cause concern for bird populations;

- Arsenic, lead and selenium in Lake Liddell.
- Cadmium, lead, mercury and selenium in Lake Macquarie.
- Lead, mercury, and selenium in Lake Wallace.
- Lead and mercury in Port Stephens/Myall Lake.

Water birds including the Black Swan, Great Cormorant, Pied Stilt, Purple Swamphen/Duksy Moorhen and others are being exposed to risky levels of toxic environmental pollutants which are known to cause adverse reproductive and health effects.

Along with the loss of habitat and other threatening processes, here we have yet another burden facing bird life and biodiversity, **a toxic habitat.**

"All the feather collected from Lake Liddell contained concentrations of between one and three heavy metals that could potentially cause adverse health impacts and reduce reproductive success"



**“The continuing destruction of habitat, the intensifying and unpredictable impacts of global climate change and the added threat to birdlife in the Hunter of coal-ash contamination revealed by the HCEC in this paper is deeply troubling”**

Dan Williams  
*President Hunter Bird Observers*

The [current NSW EPA investigation into coal-ash](#) impacts should be expanded to include an assessment of the role coal-ash leachate, direct discharge and atmospheric stack emissions play in the bioaccumulation of heavy metals in NSW bird life, as well as health effects potentially facing birds feeding and roosting in habitat with contamination impacts from coal-fired power stations.

**"Coal-fired power stations are the likely source of much of the heavy metals found in Lakes surrounding NSW power stations, from both atmospheric emissions, direct discharge to waterways from ash dams, and coal ash leachate."**

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