- at station 14 and possibly related to the concentration of vessels at this locality.

Calcium and **Magnesium** (concentrations determined as MgO and CaO) (Fig. 7)
Whereas magnesium shows comparable concentrations in all stations, calcium shows three

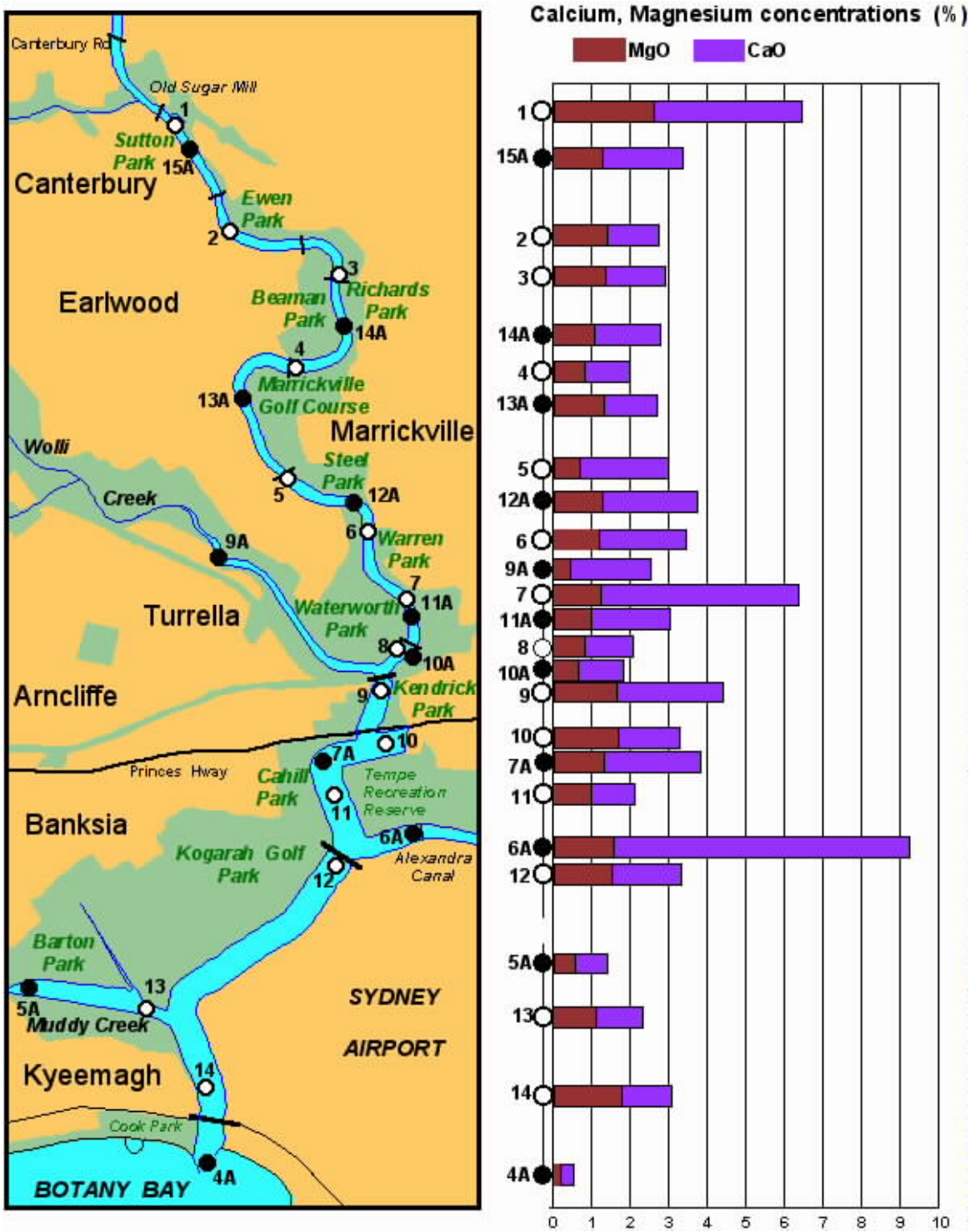

Figure 7 – Distribution of calcium and magnesiun concentrations

main peaks at station CR1, CR7 and CR6A.

Both oxides are connected to the construction industry as CaO, for example, is the main component of cements and gyprock. Elevated CaO concentrations in Alexandra Canal could be attributed to cement works near its northern bank.

Phosphate (P_2O_5) (Fig. 8).

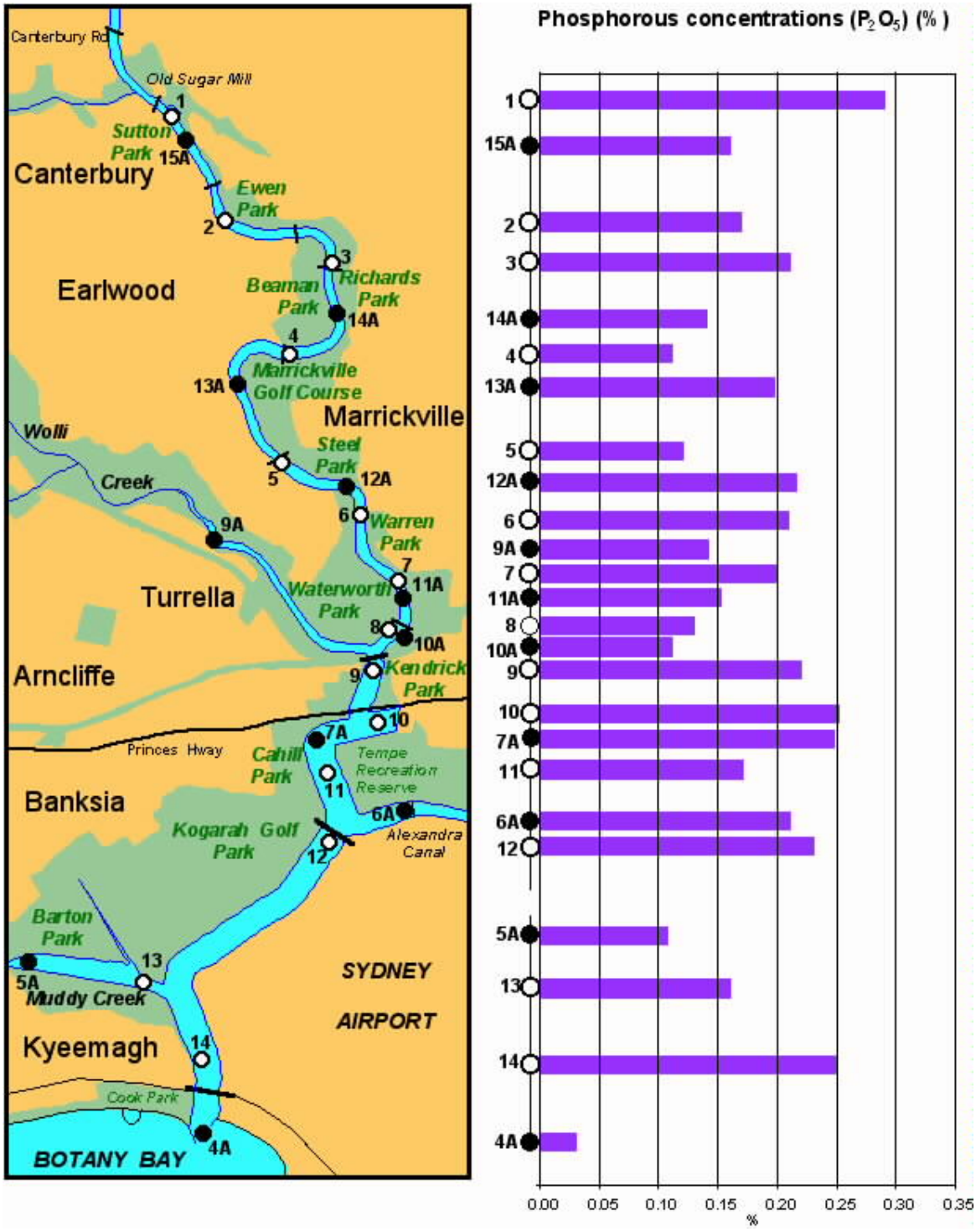

Figure 8 – Distribution of phosphate concentrations

Phosphate present in the river sediments is related to excess fertilisers used on parks and gardens that are washed from soils and into the stormwater system. Values of phosphate correlate quite well with the land uses surrounding of the river. The relatively high values correlate well with the surrounding parks and golf course, while lower values are seen where catchment inputs come from largely developed areas.

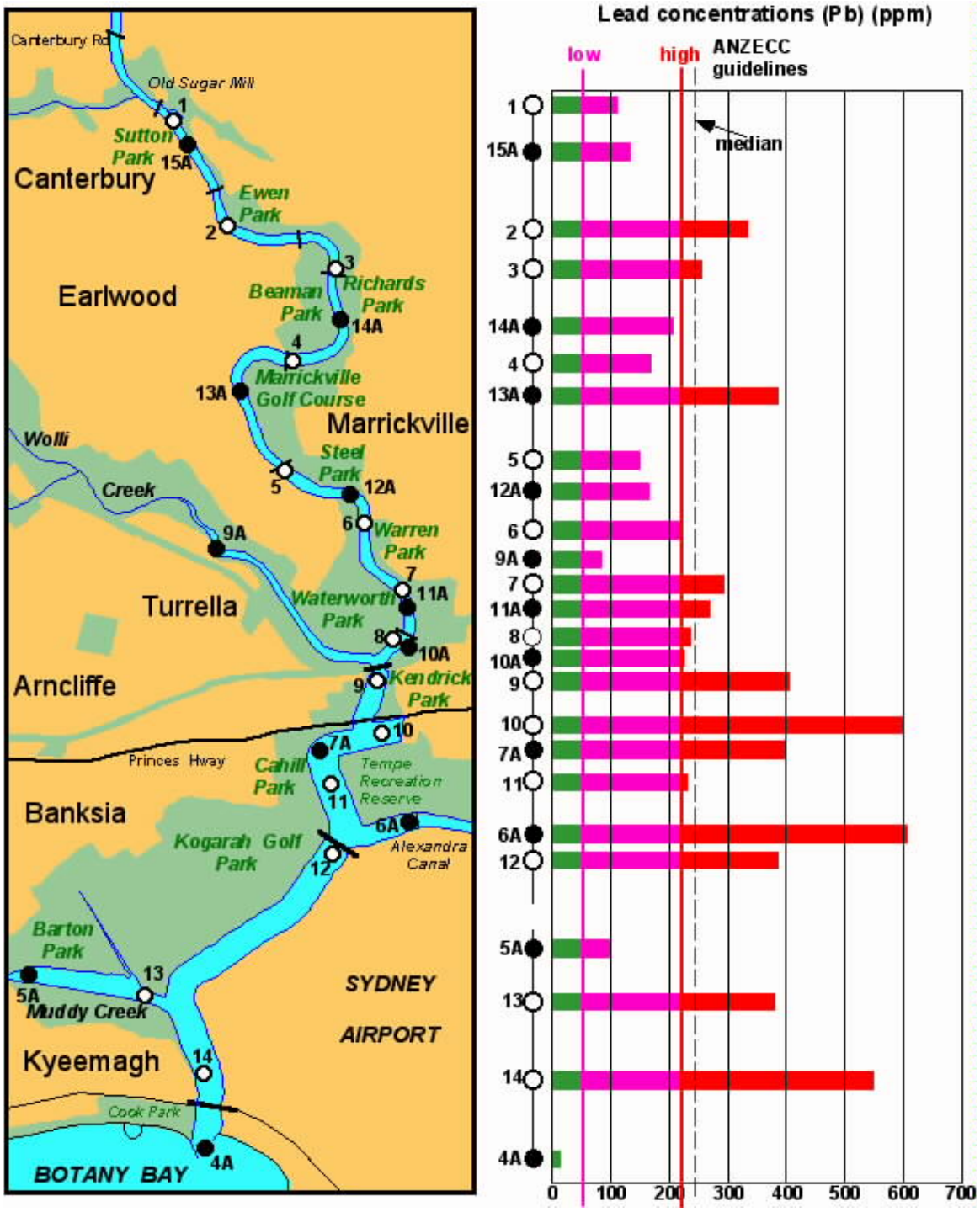

Figure 9 – Distribution of lead concentrations

Trace Elements

Lead (Pb) (Fig. 9)

Lead is found in excess of the ANZECC guideline high values in 64% of the samples, with the highest values at Tempe boat harbour, Alexandra Canal and at station CR14. This diffuse source of lead is derived from many sources among which Pb-based paints and vehicular exhaust emissions predominate together with lead-acid batteries and as

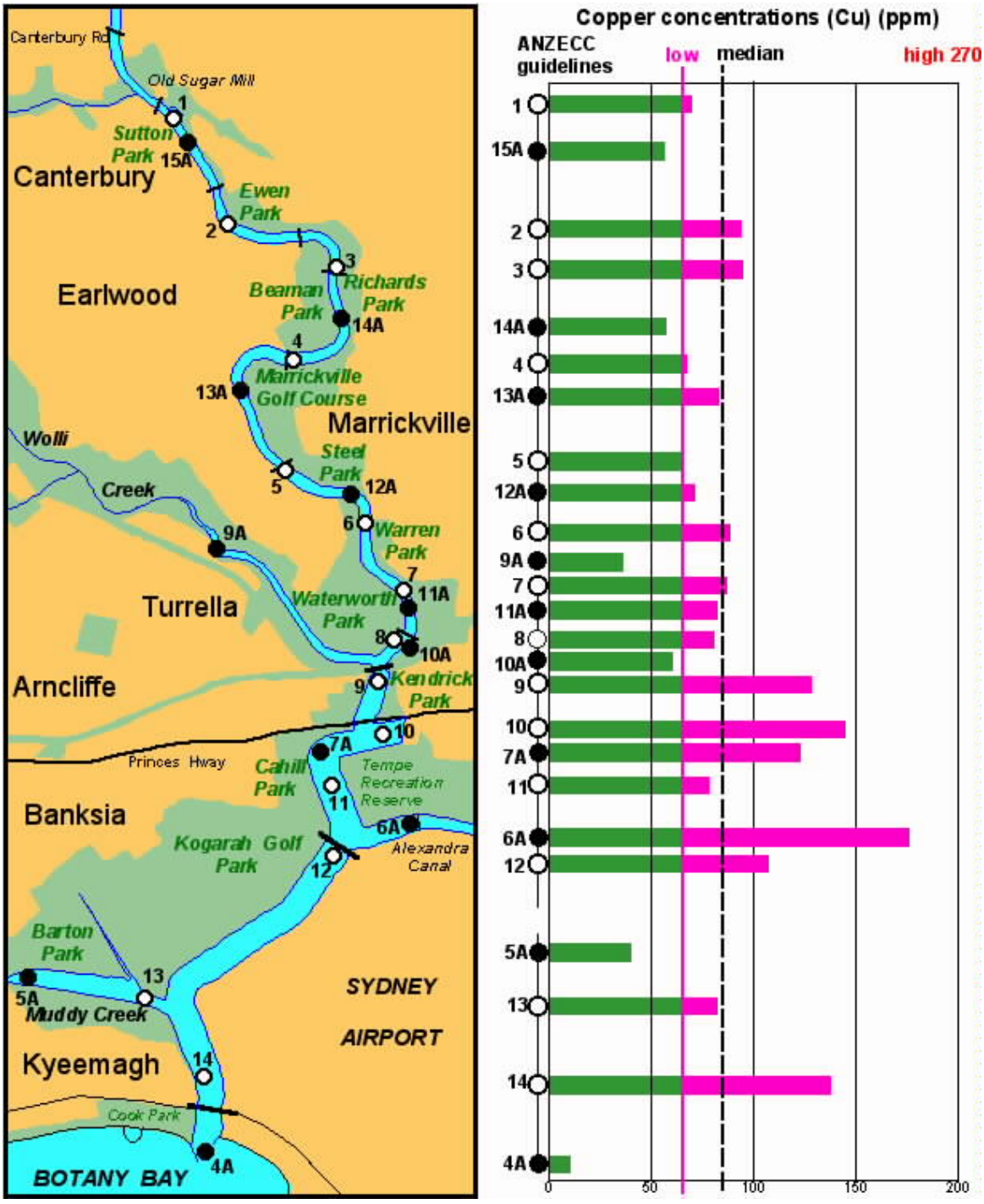

Figure 10 – Distribution of copper concentrations

ballast. Additional potential point sources of Pb to Cooks River includes waste dumps, major sewage overflows and past industrial discharge.
A more detailed analysis of the local activities is required to identify the sources.

Copper (Cu) (Fig. 10)
Both copper and zinc are associated with boating activities, as well as general building construction and vehicles. Eighteen stations (72%) have a concentration higher than the "low" ANZECC guideline value. The banning of tributyltin-based antifouling paints may have lead to increased Cu input into estuarine systems as antifouling paints with higher Cu content are now used.
While the increased levels of copper in the upper river could be attributed to diffuse sources, it is likely that the moored boats at Tempe boat harbour, the proximity to some major road ways including the Princess Highway, and historical discharge of industrial wastes may be the major impacts elevating copper concentrations

Zinc (Zn) (Fig.11)
Zinc concentrations show a correlation with the inputs suggested for copper but also show additional input from the river above the study site, and from a number of sub-catchments within the area. More than half the samples (52%) have a concentration higher that the "high" value of the ANZECC guidelines. The highest values are at the Tempe boat harbor and at station CR14; this correlates with the lead distribution. Birch *et al.* (1996) suggests that a large group of boats could have a greater input of zinc than stormwater discharge; high concentrations are associated with slipways, moored boats and sacrificial anodes.

Arsenic (As) (Fig. 12)
Arsenic in its inorganic forms poses a significant toxicity hazard to biota. Assessment of arsenic in sediments of particular interest as it is believed bottom sediments are the major source of the metal for benthic communities (Kennish 1997). Arsenic compounds have been uses in insecticides, herbicides (for railway and power poles), fungicides, algaecides