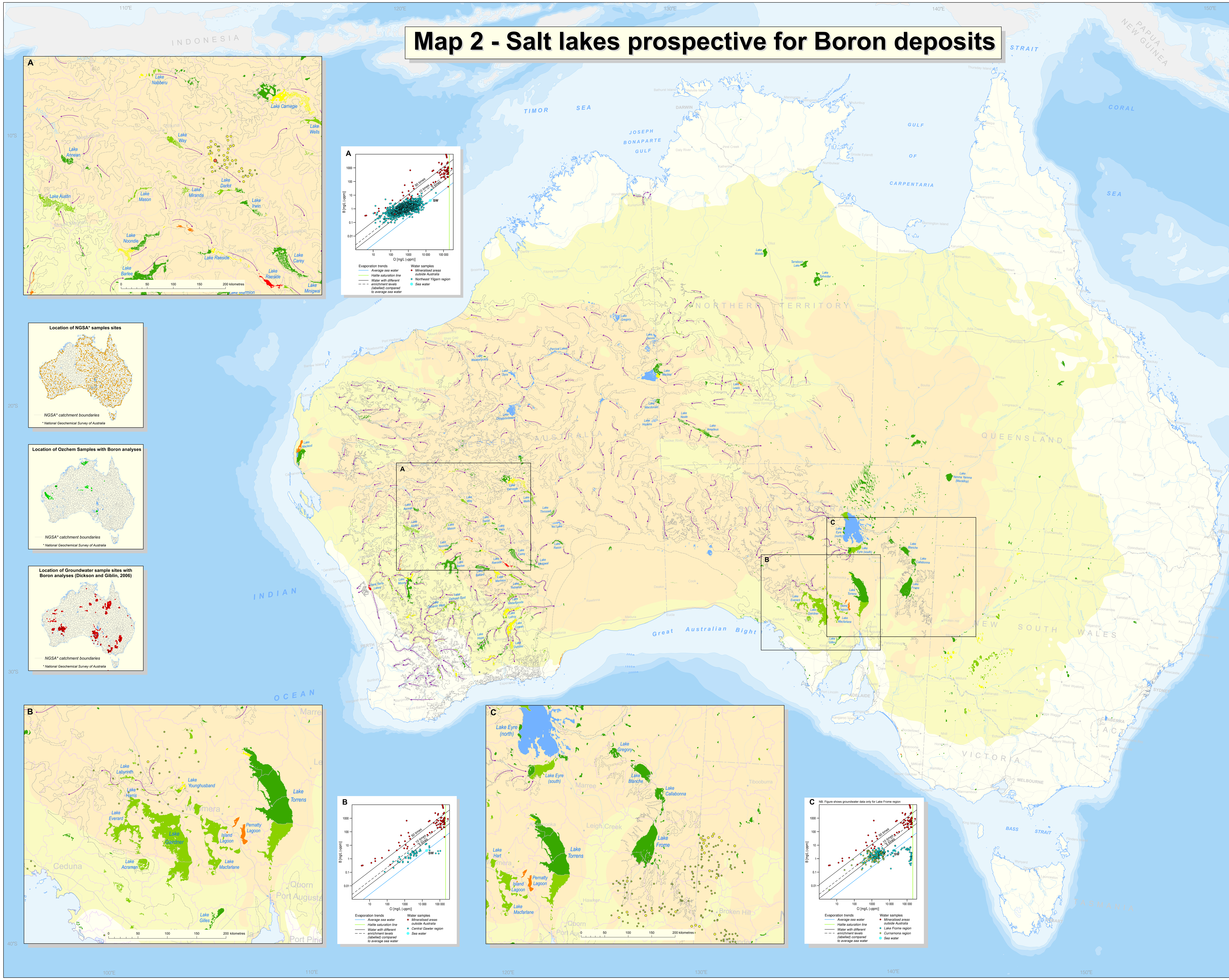
Map 2 - Salt lakes prospective for Boron deposits



Australian Government
Geoscience Australia

Scale 1:5 000 000

0 100 200 300 400 500 kilometres

LAMBERT CONFORMAL CONIC PROJECTION
Central Meridian:134˚E Standard Parallels:18˚S, 36˚S
Geocentric Datum of Australia 1994

B/Cl ratio in groundwater corresponding to levels of enrichment as compared to average sea water *(insets only)*

- *< 10 x enrichment*
- *10 - 50 x enrichment*
- *> 50 x enrichment*

Classification of lakes based on concentration of Boron (ppm) in catchment *(see explanatory notes)*

- *0.5 - 2.0*
- *2.1 - 5.0*
- *5.1 - 12.8*
- *12.9 - 24.6*
- *24.7 - 39.0*
- *Lake with no data*

Groundwater flow direction in palaeovalleys

Boundary of palaeovalley

Boundary of NGSA catchment (insets only)*

Desert / *Grassland* — *Key climate groups (Köppen-Geiger classification)*

** National Geochemical Survey of Australia*

EXPLANATORY NOTES AND DATA SOURCES:

This map shows salt lake regions favourable for boron deposits. For a more detailed description of selection method see Jaireth et al. (2013). References and links below provide information about the datasets utilised.

Boron concentrations assigned to salt lakes were estimated from three datasets: Geoscience Australia's Ozchem (for whole-rock analysis); NGSA samples in the catchments (catchment outlet sediments); and groundwaters (dataset described by Dickson and Giblin, 2006). Boron concentration in the NGSA samples was determined in aqua regia extract and thereby represents a minimum estimate of total boron concentration in the sample. The mean values of concentration were derived by averaging values in samples (separately for each of the three datasets) located in the catchment. These mean values were assigned to salt lakes located in the catchment. In those cases when values from three datasets overlapped, the highest value was assigned to the overlapping part of the salt lake. Thus, these values do not represent concentration of boron in the salt lakes but the concentration of boron in the catchment in which salt lakes are located.

NGSA catchment boundaries are sourced from Caritat and Cooper (2011).

Australian salt lakes were derived from the Australian 1:250 000 scale digital topographic dataset *https://www.ga.gov.au/products/servlet/controller?event=GEOCAT_DETAILS&catno=64058* The topographic dataset comprises over 128,000 water bodies including perennial and non-perennial lakes. Only non-perennial lakes were selected which limited the analysis to lakes in arid and semi-arid regions of Australia. A size threshold was applied, with lakes less than 4.9 km^2 removed from the analysis, leaving 1200 non-perennial lakes shown on the map.

The spatial distribution of palaeovalleys, regarded as significant in influencing groundwater system flow to salt lakes, was sourced from the WASANT Palaeovalley Map (Bell et al., 2012).

The groundwater flow direction in a palaeovalley is assumed to dominantly follow palaeovalley gradients which are deduced from palaeovalley drainage networks constructed during the production of the WASANT Palaeovalley Map (Bell et al., 2012; English et al., 2012).

The outline of arid and semi-arid zones is based on the Köppen-Geiger classification.

Groundwater data shown on inset maps and on evaporation-trend plots have been extracted from different sources:
Northern Territory: Water Resources Branch, Department of Land Resource Management, Northern Territory *http://www.lrm.nt.gov.au/nrmapsnt*
South Australia: Water Connect, Department of Environment, Water and Natural Resources, Government of South Australia *https://www.waterconnect.sa.gov.au*; Geological Survey of South Australia, Department for Manufacturing, Innovation, Trade, Resources and Energy, Government of South Australia; Draper and Jensen (1976); Caritat et al. (2005).
Western Australia: Gray et al. (2009); Water Information Management, Department of Water, Government of Western Australia *http://www.water.wa.gov.au/*

The inset maps show B/Cl ratios of groundwaters corresponding to different enrichment threshold values compared to average sea water (Drever, 1997). The B-Cl plots accompanying each inset map show concentrations of B and Cl in groundwaters. On these plots red dots represent data from salt lakes (inflow and lake waters) with economic-grade concentration of B outside Australia. Black lines (both full and dashed) show evaporation trends for waters with different levels of enrichment in B/Cl (enrichment level labelled) compared to evolved sea water of the same chloride concentration. The blue line shows the evaporation trend of average sea water. The large cyan dot represents the composition of average sea water. The green vertical line represents the line of saturation with respect to halite (NaCl).

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Köppen-Geiger classification of arid and semi-arid zones: *http://www.born.gov.au/climate/environ/other/koppen_explain.shtml*

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