

# Will my Hydrangeas be Pink or Blue? Field pH and Soil Colour

## Results from the National Geochemical Survey of Australia

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### The National Geochemical Survey of Australia

In 2007 Geoscience Australia initiated the National Geochemical Survey of Australia (NGSA), whose primary aim is to provide pre-competitive data and knowledge to support exploration for energy resources in Australia. NGSA data will also have wider applications in mineral exploration for other commodities and natural resource management.

### Sample Collection

In collaboration with State/Northern Territory geoscience agencies, sampling of catchment outlet (overbank) sediments was carried out at two depths: Top Outlet Sediment (TOS, 0-10 cm) and Bottom Outlet Sediment (BOS, ~60-80 cm). At each of the 1315 sampling localities, field pH and moist and dry Munsell® soil colours were recorded (Figure 1).

### Sample Processing

A bulk split (~50 %) of each sample was archived, the remainder was dried, riffle split and dry sieved to <2 mm and <75 µm fractions before being submitted for geochemical analysis (further details at: [www.ga.gov.au/ngsa](http://www.ga.gov.au/ngsa)).



**Figure 1.** Measuring soil pH and soil colour in the field.

### Soil pH Distribution

Soil pH can be related to element mobility within the regolith and correlated with various chemical and environmental factors that influence soils and plants. Strongly influenced by the soil's parent material, weathering processes, rainfall and evaporation, pH can vary markedly within a short distance.

Spatially, the TOS pH results form a striking pattern (Figure 2), with the highest values (pH 9.5-10) clustering along the coast of South Australia and extending into northern Victoria and western New South Wales. Near-neutral pH conditions typify topsoils from parts of the Northern Territory and Queensland while Victoria, Tasmania and most coastal sites in New South Wales, Queensland and south-western Western Australia have lower topsoil pH values.

The spatial distribution of BOS pH (Figure 3) has many similarities with the TOS pH map. Much of the southern half of the continent (except Victoria and Tasmania) is dominated by strongly to extremely alkaline BOS (pH 8.5-10). These more alkaline subsoils reflect climate and pedogenic carbonates and/or primary carbonates in the underlying bedrock. Northern Australia and much of Victoria and Tasmania have mostly circum-neutral (pH 6-8) or more acidic (pH 4-5.5) subsoil pH attributed to organic matter in tropical or temperate vegetation zones, more abundant rainfall, or simply lithology.

### Soil Colour Distribution

Soil colour may provide important information about mineral content, soil moisture and oxidation state. Figure 4 maps moist TOS soil colour by colouring the whole catchment according to the soil colour obtained near its outlet to more easily distinguish differences between sampling sites.

There is a large variation in soil colour across Australia. Dark brown soils are common along the mountain ranges of eastern Australia, areas potentially rich in organic material. Samples from central Australia display the classic red soils which the area is well known for.

### So will my Hydrangeas be Pink or Blue?

Hydrangeas change colour depending on the pH of the soil they are growing in. While a Hydrangea's petals will be pale cream in neutral soils, alkaline soils will result in pink or purple flowers and acidic soils will produce blue flowers (Figure 5). If hydrangeas were planted at the NGSA sampling site in the ACT there is a good chance they would have pink to purple petals!

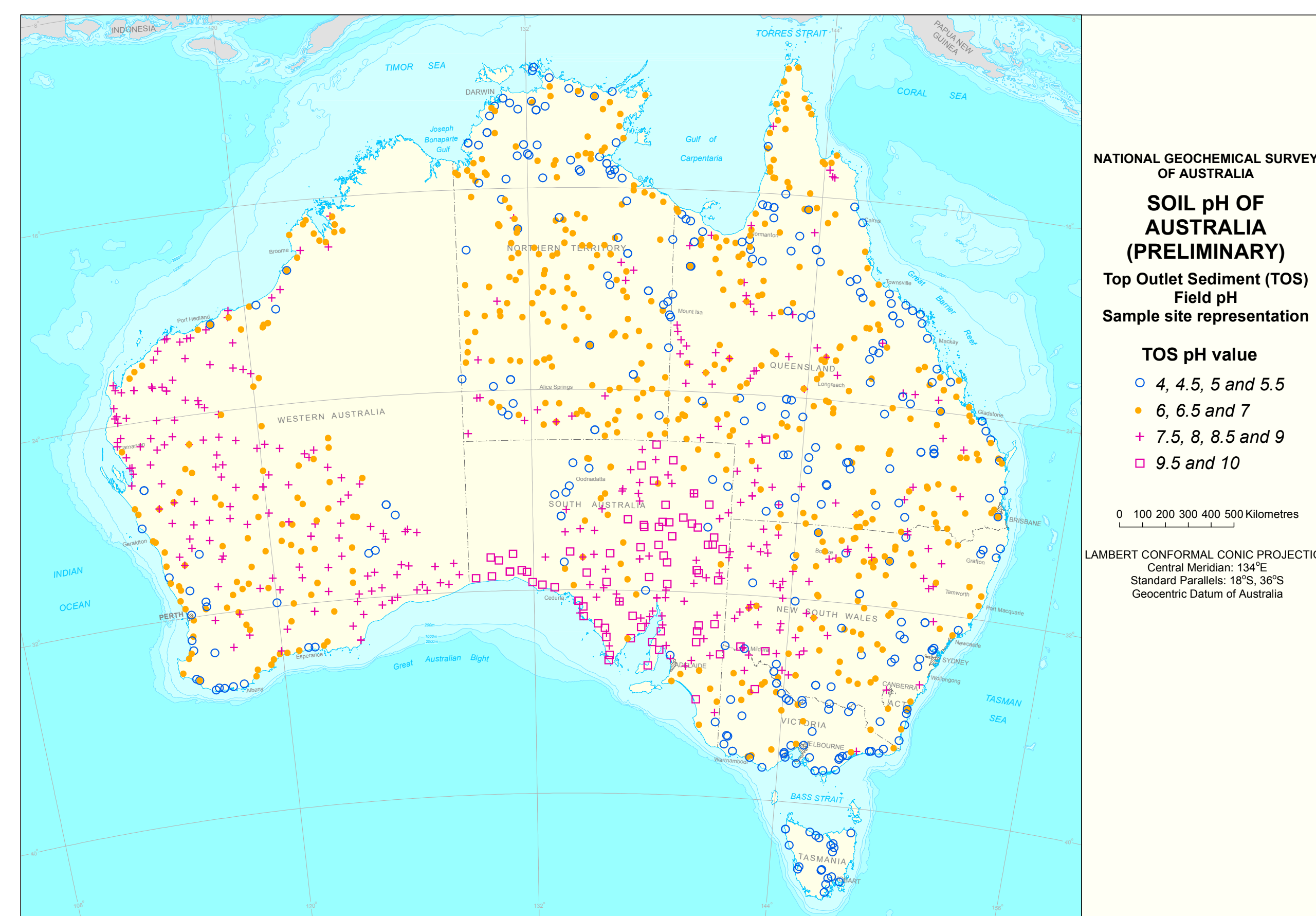


**Figure 5.** Pink and blue Hydrangeas.

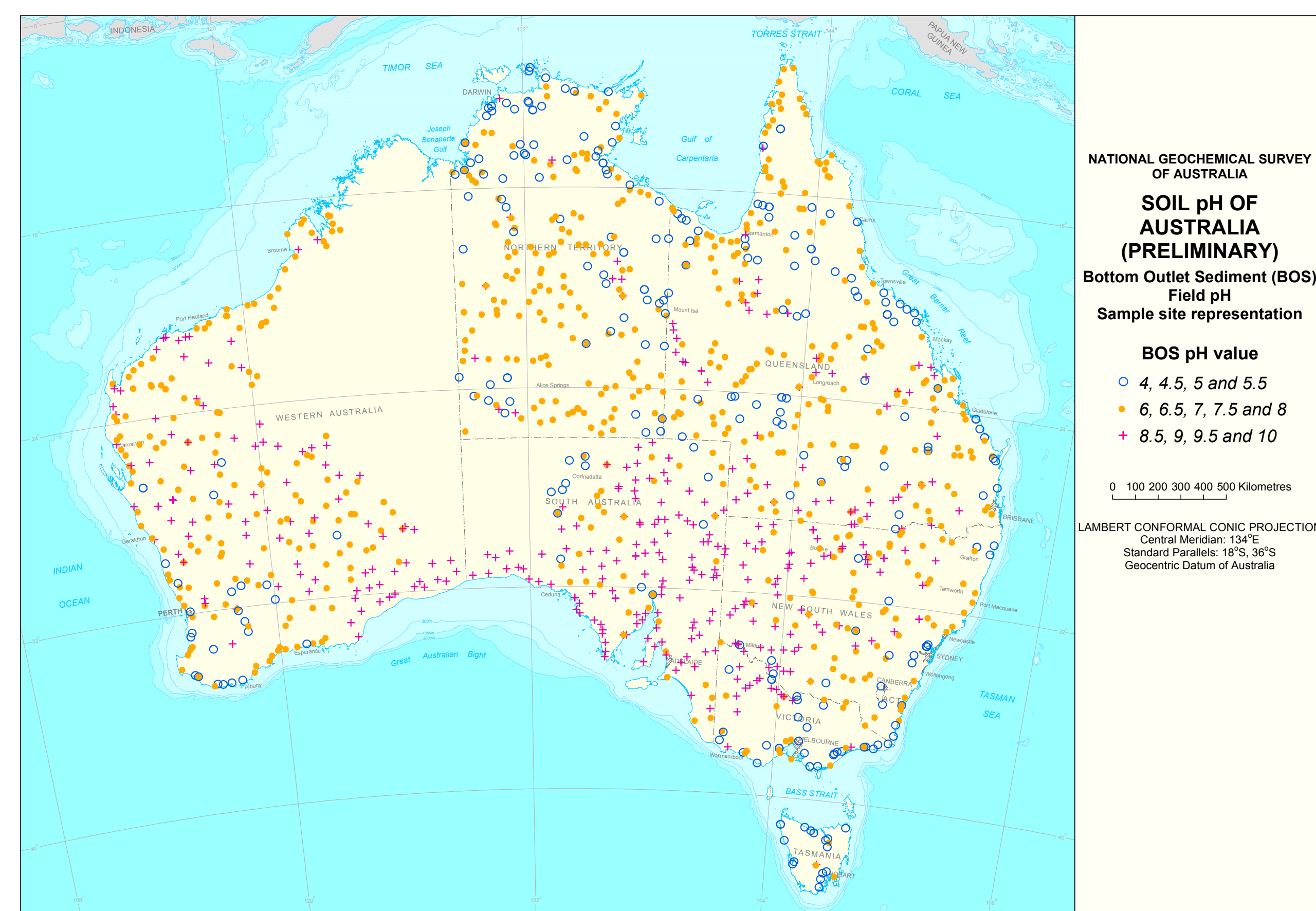
### Acknowledgements

We are grateful to the States/Northern Territory for their participation in the NGSA.

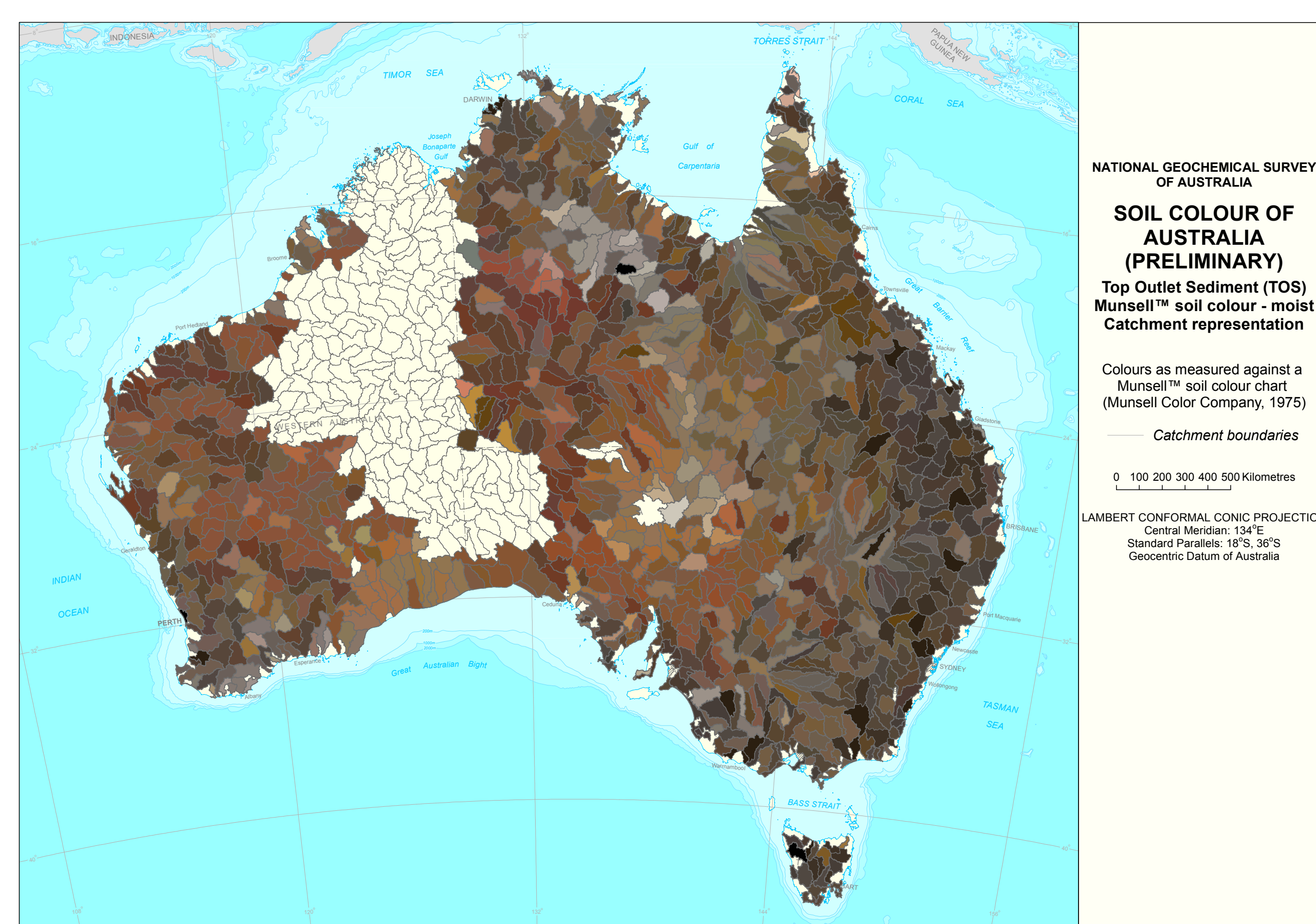
Hydrangea photos courtesy: Ebie at: <http://themain-ingredient.info/> and [http://en.wikipedia.org/wiki/File:Nikko\\_Petals\\_1.jpg](http://en.wikipedia.org/wiki/File:Nikko_Petals_1.jpg)



**Figure 2.** Field soil pH of Top Outlet Sediment (TOS). Categories follow boxplot intervals and outliers.



**Figure 3.** Field soil pH of Bottom Outlet Sediment (BOS). Categories follow boxplot intervals.



**Figure 4.** Munsell™ soil colour of moist Top Outlet Sediment (TOS) extrapolated from sampling point to whole catchment.

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