

Pines at Mines and Wines

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& Environmental Sciences



May 2022, Orange, NSW

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Establish regional background and mineralised signatures in cypress pines - and the basis for statistical separation of the two

Evaluate use of field portable X-ray fluorescence spectrometry (pXRF) for *in situ* analysis

Controls on metal uptake by pines

Minex CRC - Program 3, Project 9:
Targeting mineral systems in covered terranes
<https://minexcrc.com.au/about-minex-crc/what-is-minex-crc/>

~588 conifers worldwide

Evolved ~310 Ma in Europe & Nth America, 65-70 Ma in Australia

Conifers trees have simple needle-like leaves (phylloids)

Seed plants with woody cones

13 native to Australia, 3 to New Caledonia

Glaucophylla, from Gk. *γλαυχοσ* (silvery) and *φύλλον* (leaf)

C. columellaris previously syn. with *C. glaucophylla*, *C. endlicheri* and *C. intratropica*

Plantae / Charophyta / Equisetopsida / Pinidae / Pinales / Cupressaceae / Callitris / Callitris glaucophylla

Callitris glaucophylla Joy Thomps. & L.A.S. Johnson

White cypress pine

species Accepted Name authority: Australian Plant Census

Overview

Gallery

Names

Classification

Records

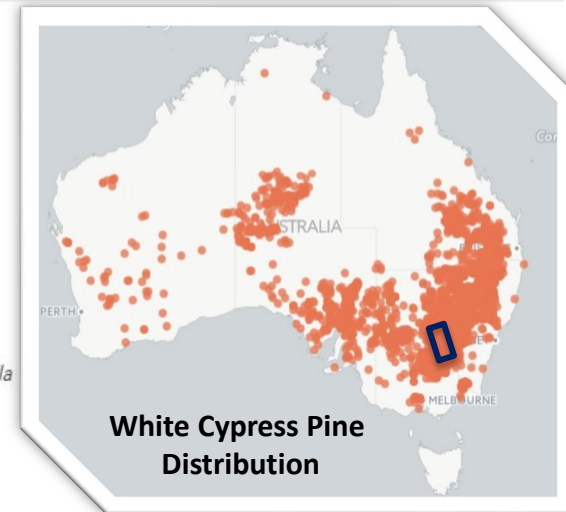
Literature

Sequences

Datasets

Classification

kingdom Plantae
phylum Charophyta
class Equisetopsida
subclass Pinidae
order Pinales
family Cupressaceae
genus *Callitris*
species *Callitris glaucophylla*



Typical Cypress Pines



C. glaucophylla



***C. endlicheri* (rare)**

MinView

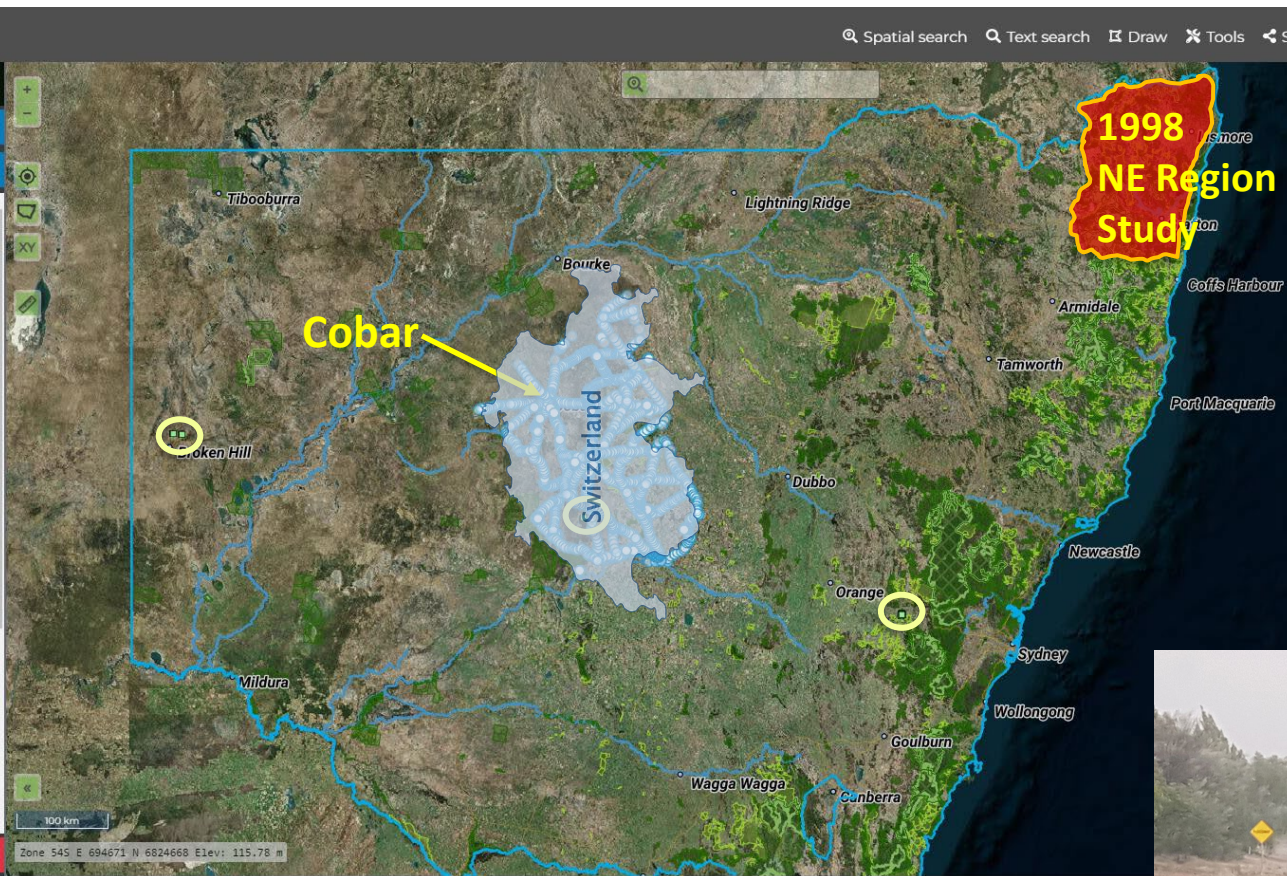
Map layers

Add view

Add layer

☒ GPS device☐ Mineral occurrences☒ Surface geochemistry - biogenic☒ NSW State boundary☒ Locations☒ Roads☒ National park☒ State conservation area☒ Declared wilderness☒ State forest☒ Rivers☐ Exploration and mining title
applications☐ Exploration and mining titles☐ SRTM hillshade☐ NSW surface geology☐ Cenozoic sedimentary province☐ Cenozoic igneous province☐ Great Australian Basin

Remove all

42,000 km²

5% of NSW

4,000 samples:

Regional

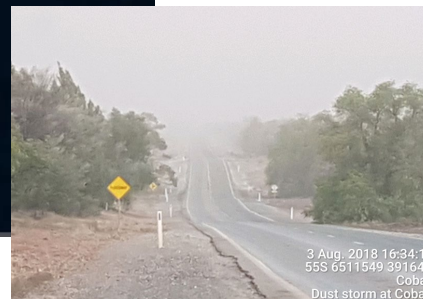
Deposits

Prospects

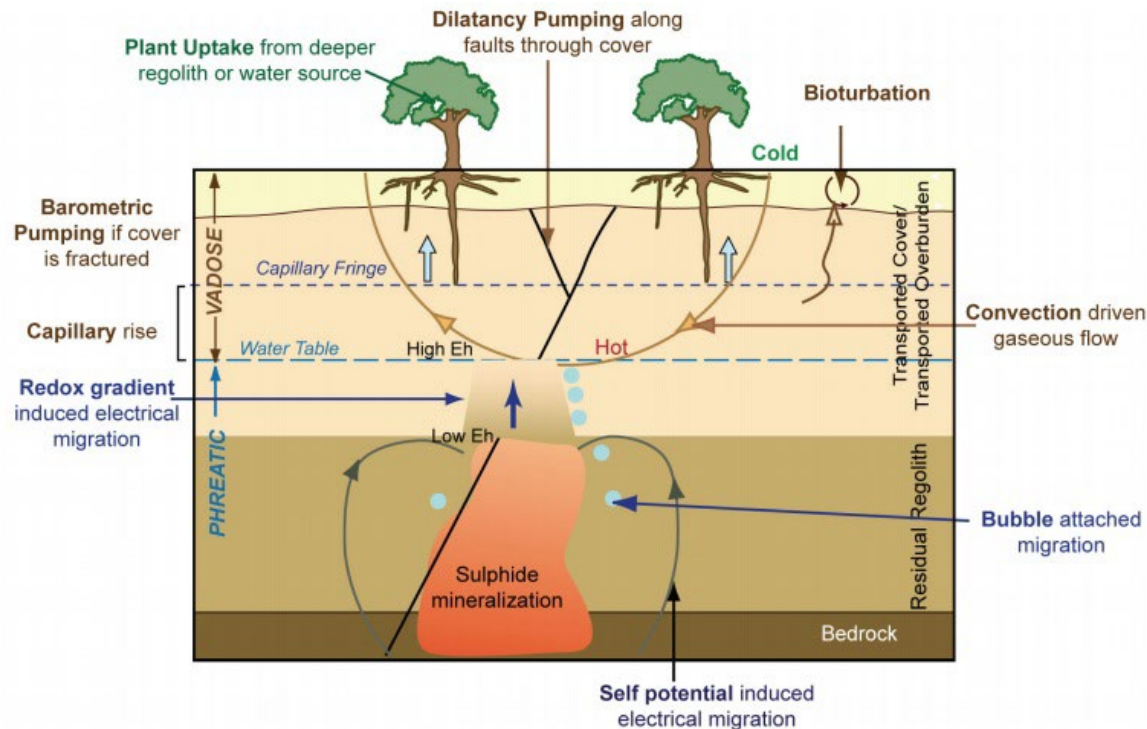
Seasonal

2 tree dissections

Dust studies



3 Aug, 2018 16:34:11
55S 6511549 391643
Cobar
Dust storm at Cobar.



Theoretical advantage of trees is their capacity to take up many key elements used in targeting mineralised systems, sampling large zones in the regolith and penetration through transported cover

(from Aspandiar et al, 2008.

<http://crcleme.org.au/Pubs/OPEN%20FILE%20REPORTS/OFR246/OFR246.pdf>

Hera Tree Dissections



**High grade: Au to 45 ppb
in pine needles**

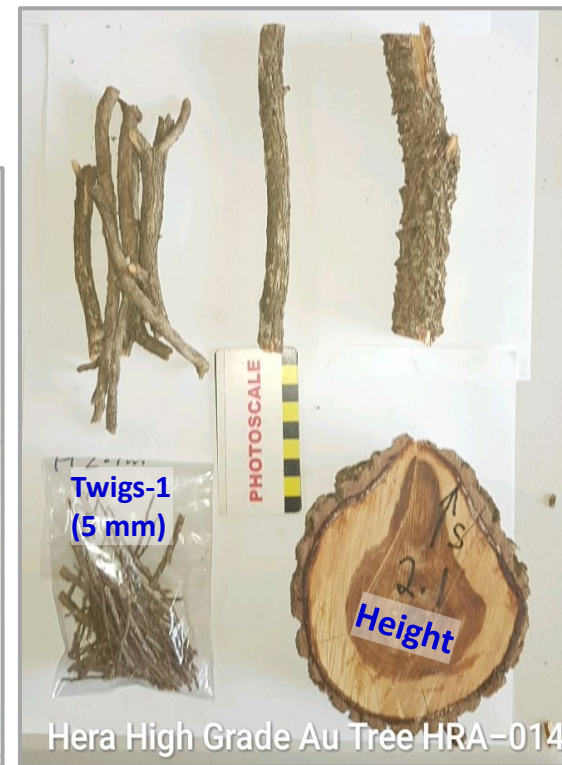
**Background: Au <2 ppb
in pine needles**



**Twigs-2
(1-2 cm)**

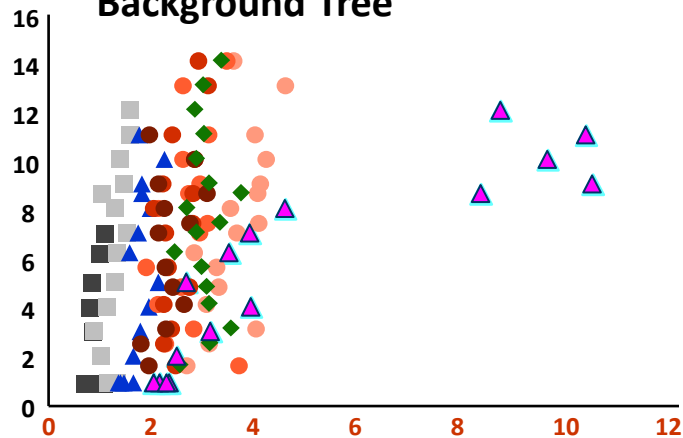
**Twigs-3
(2-3 cm)**

**Twigs-4
(3+ cm)**

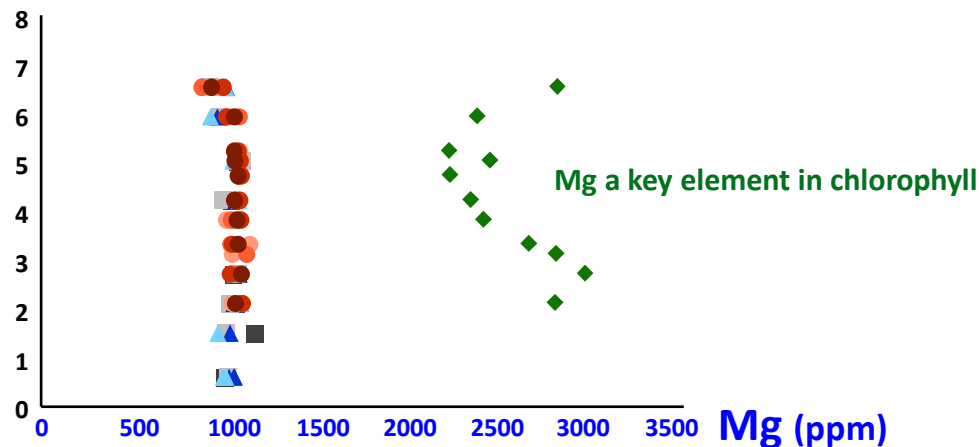
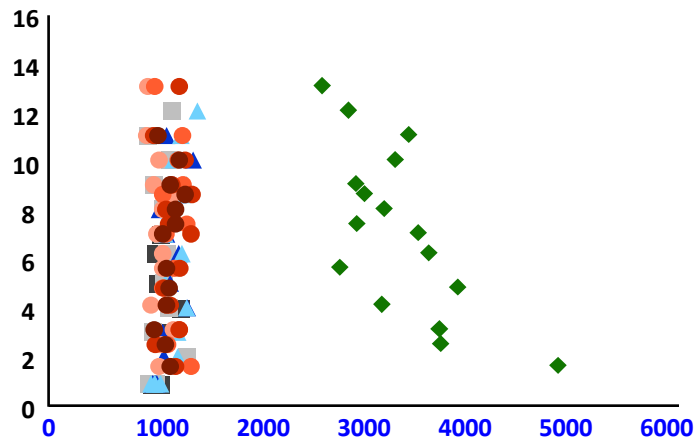
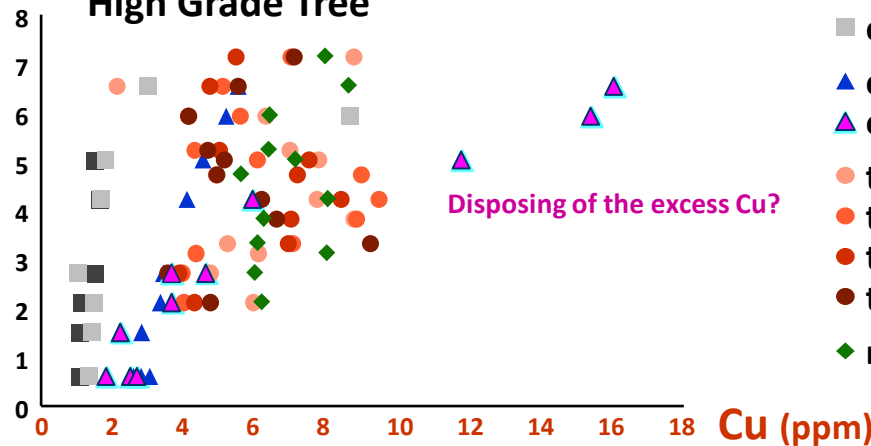


Height (m)

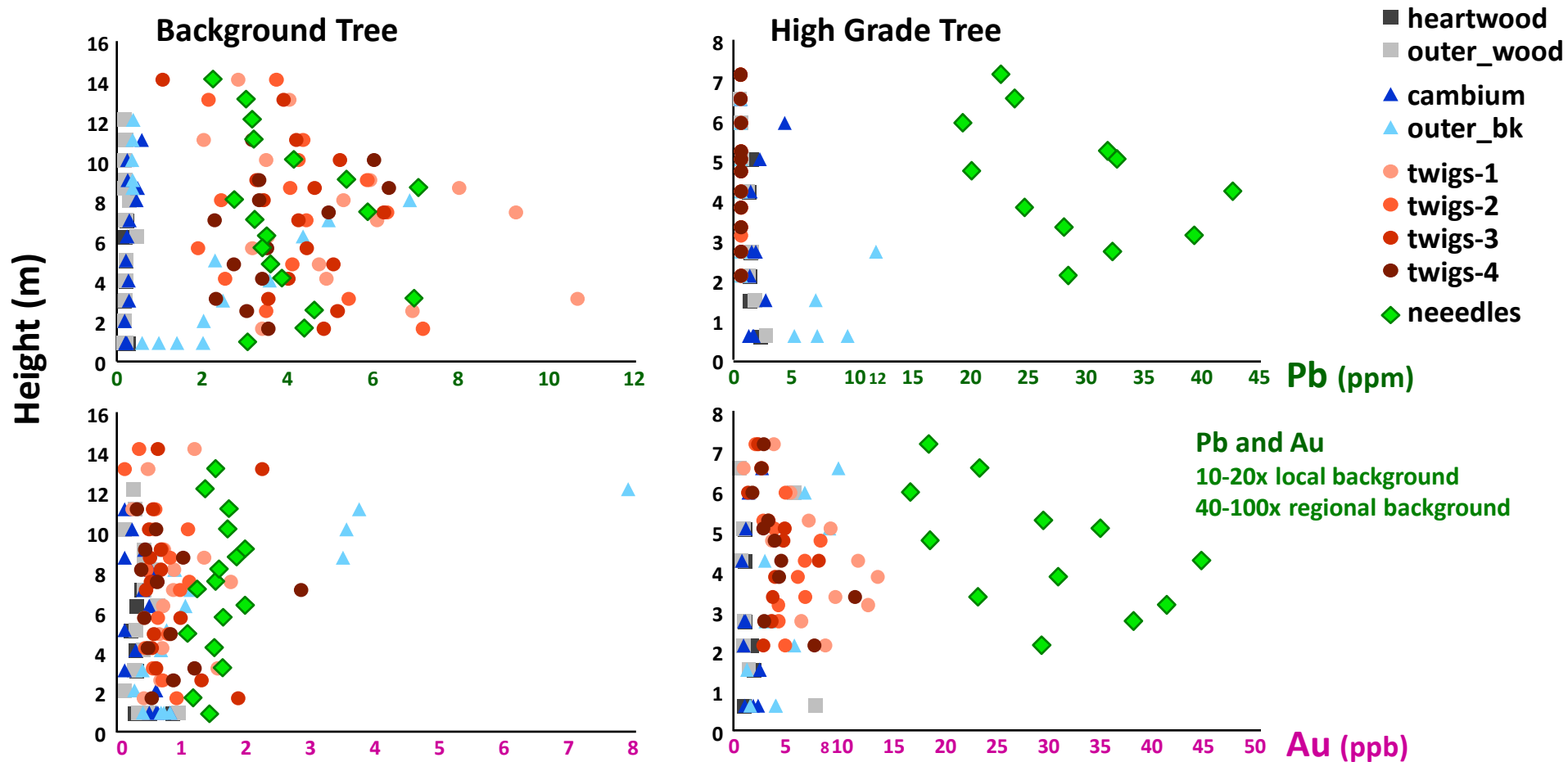
Background Tree

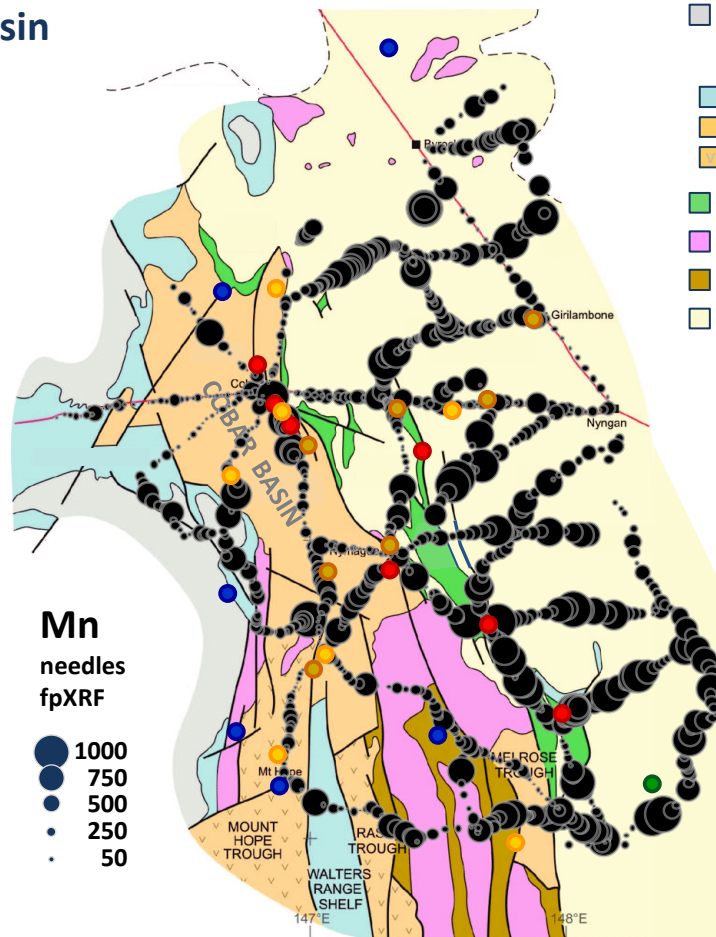
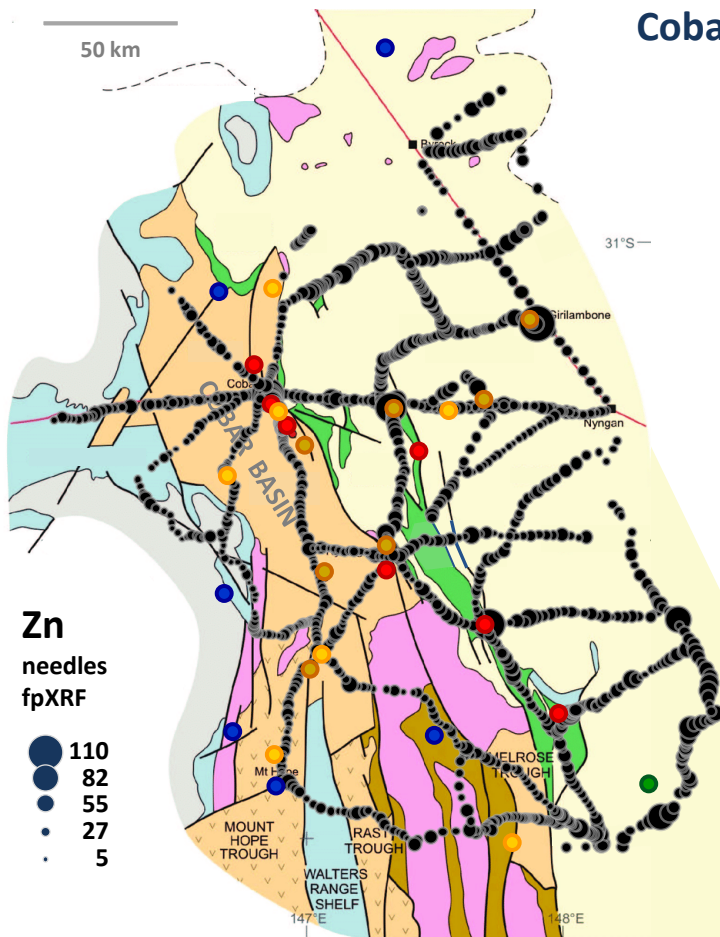


High Grade Tree



Why needles are best





- Mulga Downs Gp
- Cobar Supergroup**
 - Shallow water marine
 - Deep water marine
 - Volcanic / v'clastic
- Kopyje Shelf
- Siluro-Dev granites
- Tallebung Gp
- Girilambone Gp

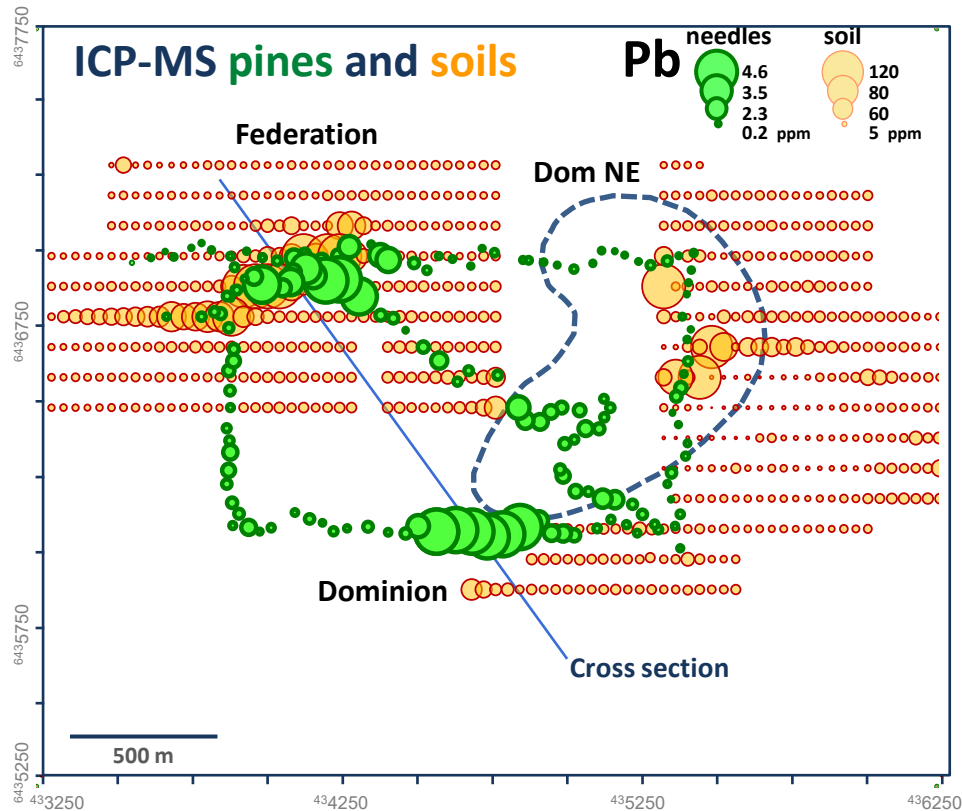
Mineral deposits

- Au
- Cu
- Polymetalli
- Pb-Zn-Ag
- Ni-Co

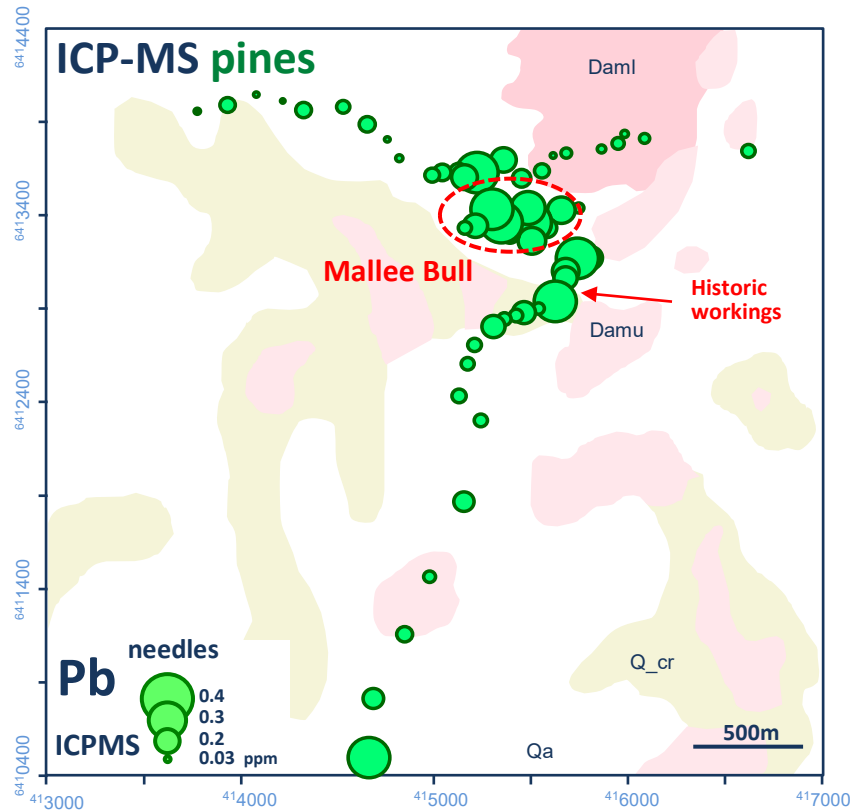
C. glaucophylla
(Cypress pine)
needles

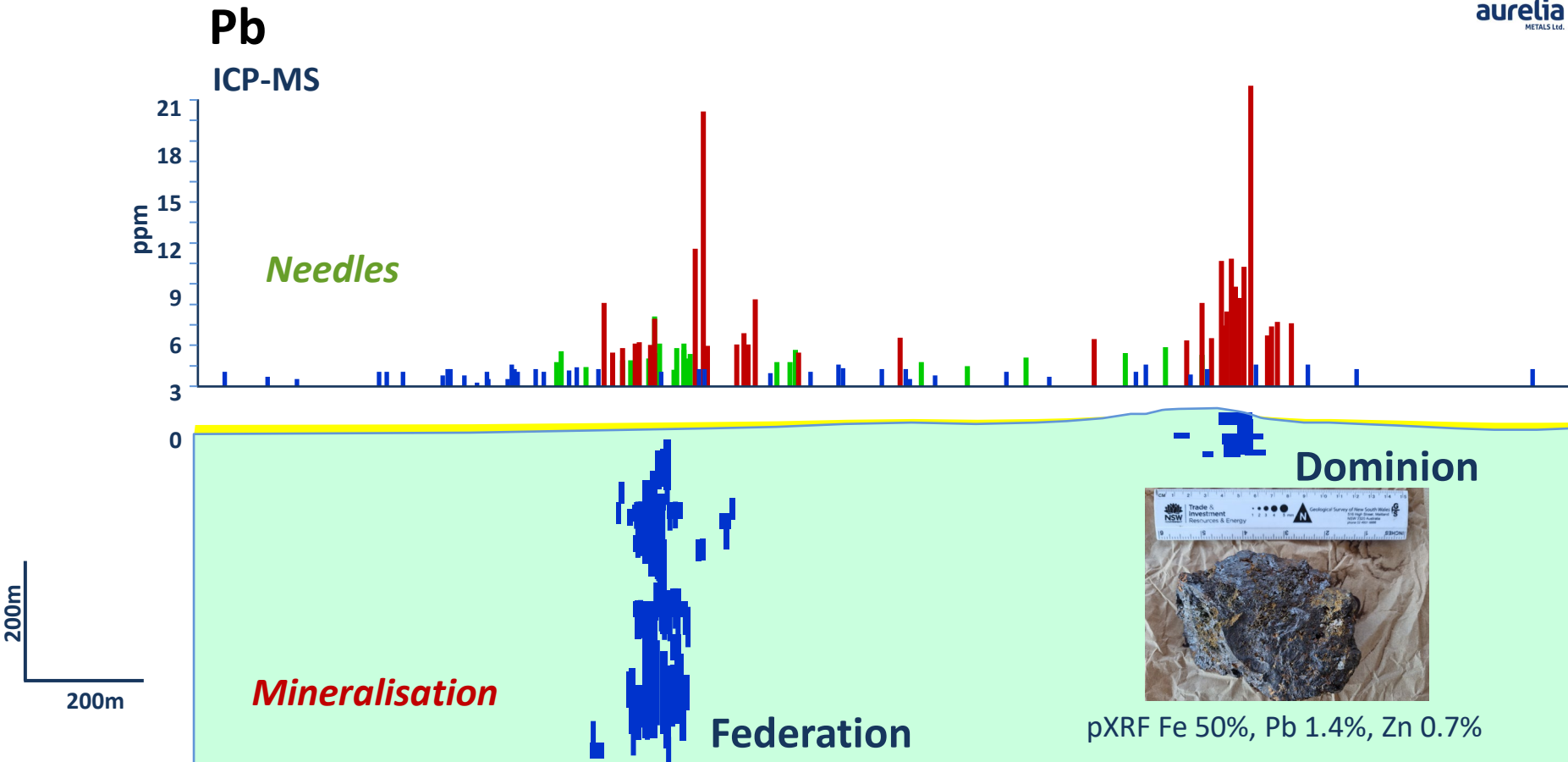
Is Pb the key to Cobalt?

Federation

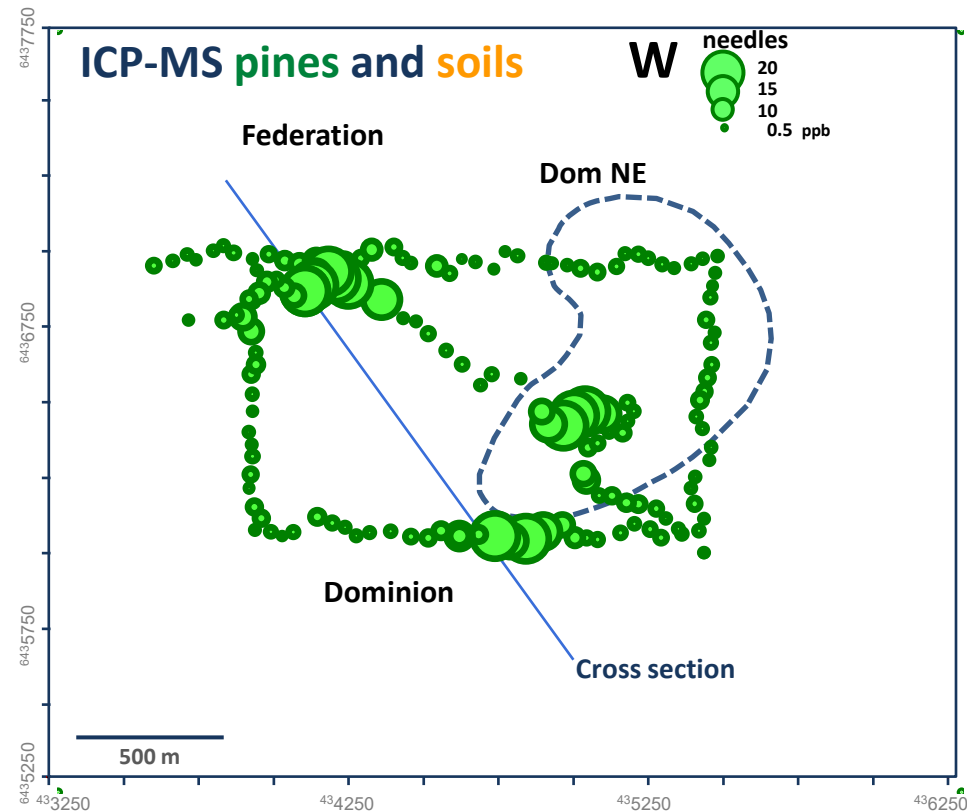


Mallee Bull

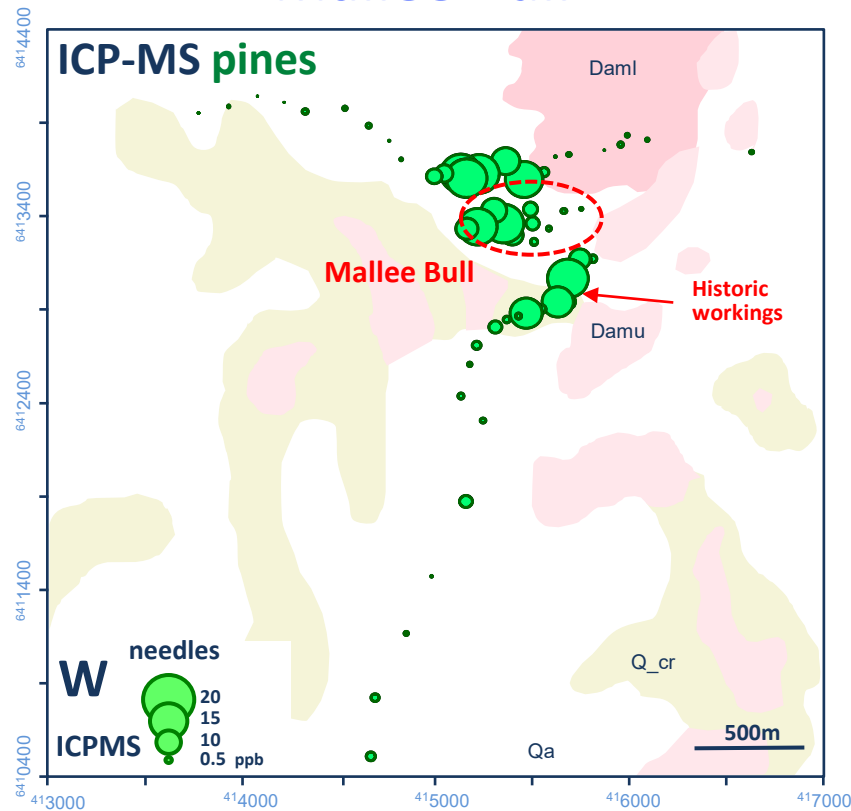


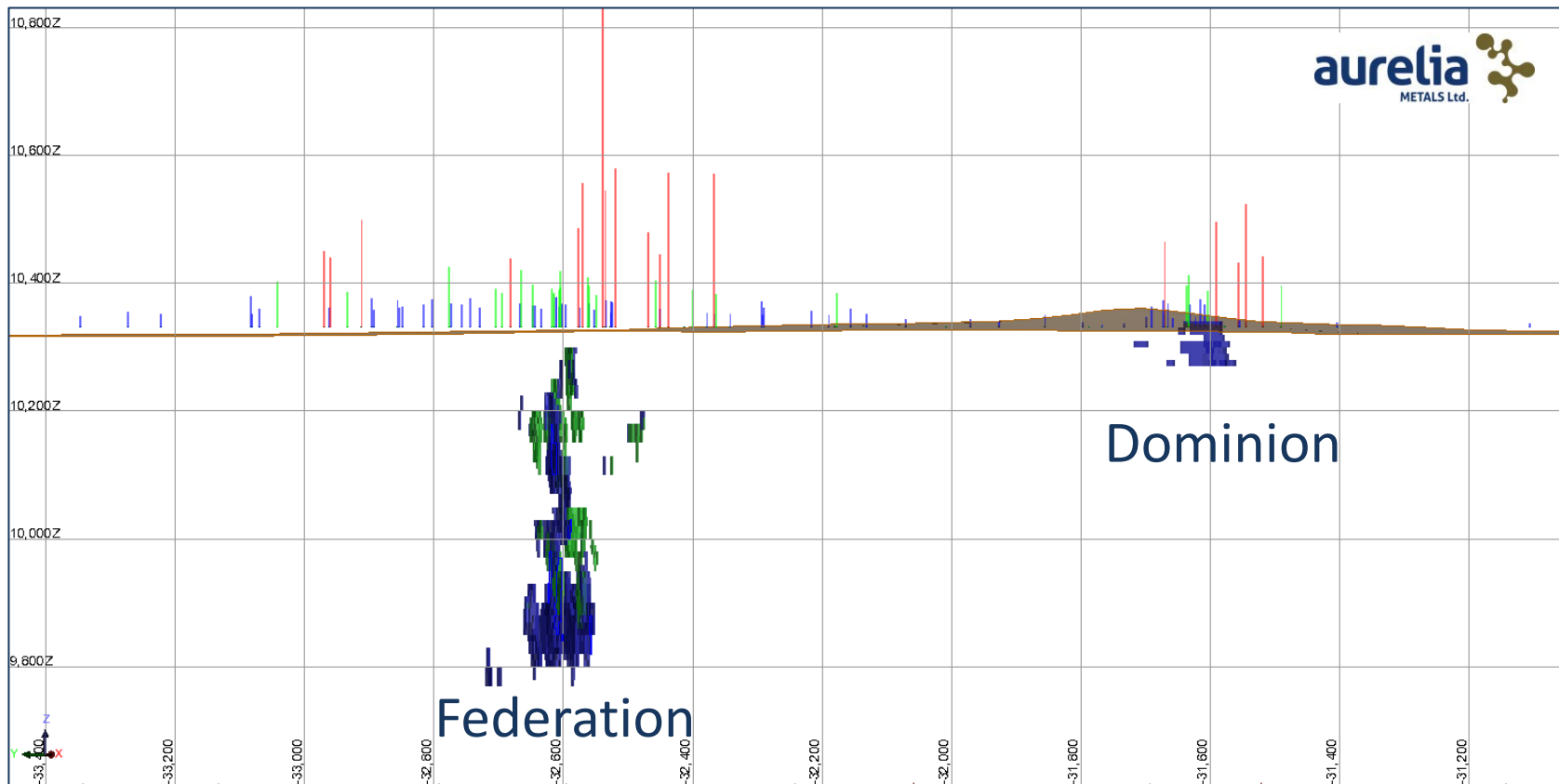


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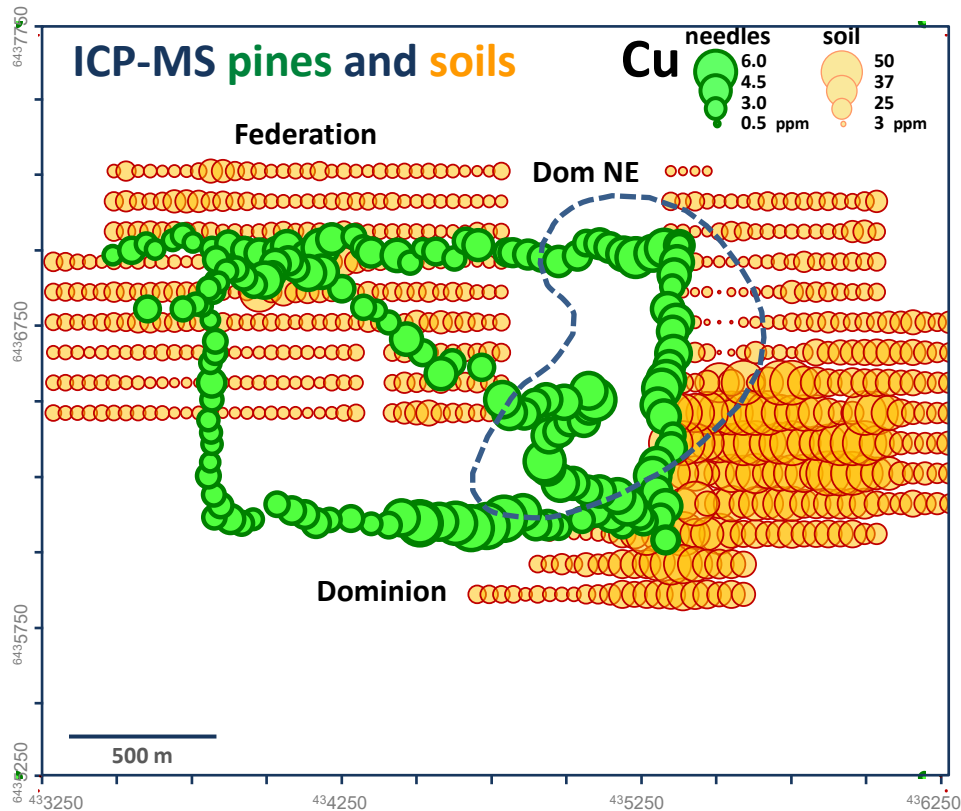


Mallee Bull

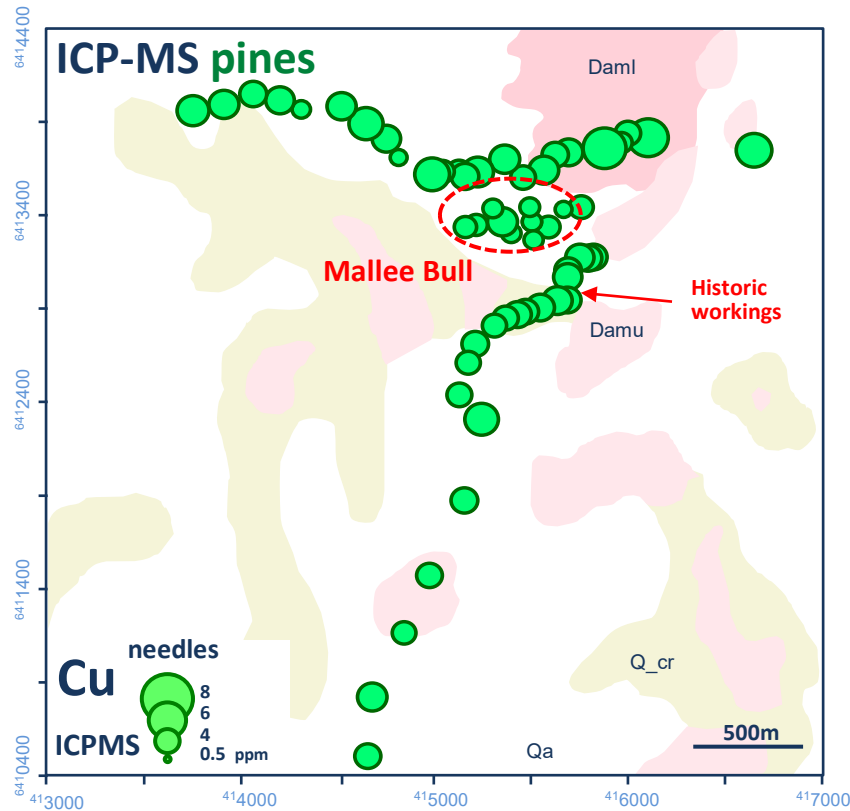




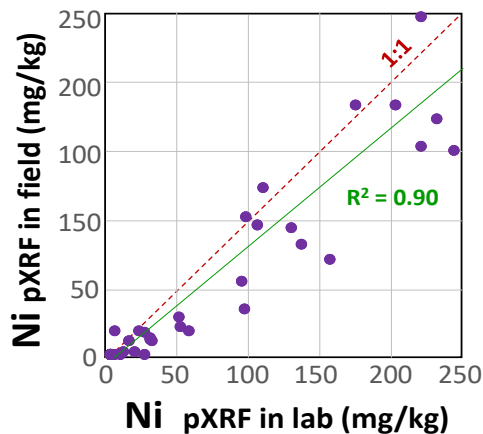
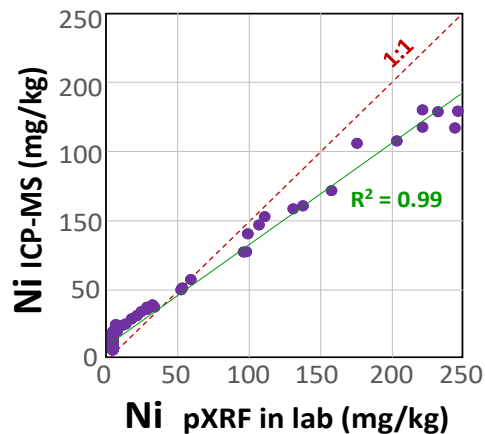
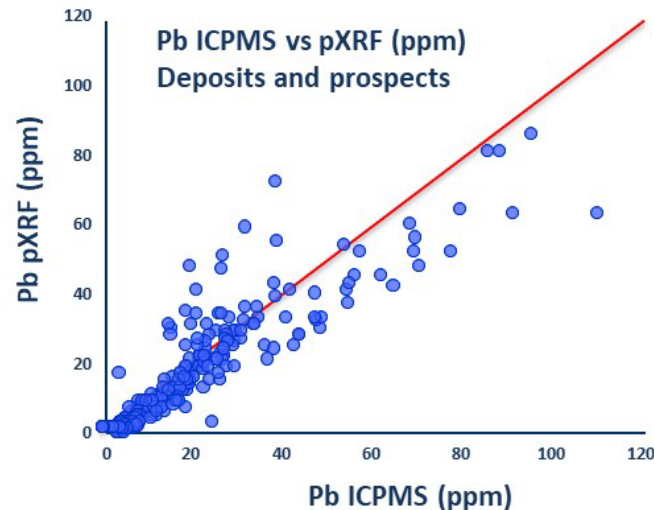
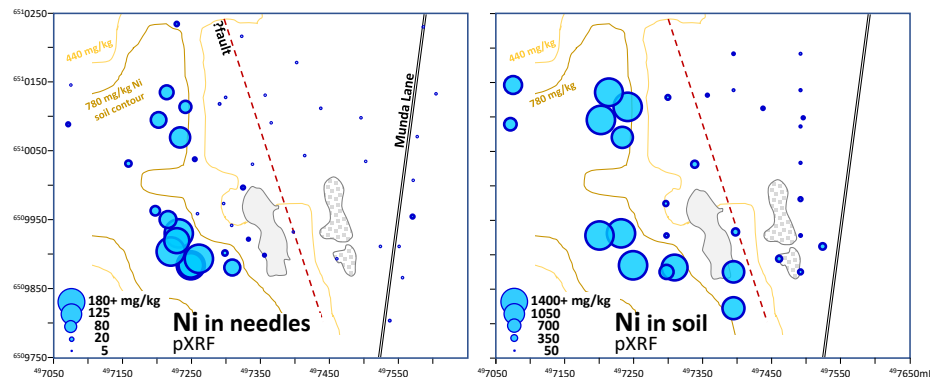
Federation



Mallee Bull



Miandetta Ni prospect



Element	pXRF Ave ppm	LOD	ICPMS Ave ppm	Contrast
Pb	<5	~5	0.4	100
Cu	8	10	4	25*
Zn	30	5	16	100
Ni	<5	<5	1.75	100
Au	-	-	0.0004	100
Mn	280	5	300	na
Fe	300	5	168	na

Cypress pines biogeochemistry → excellent contrast and vectoring
Pb and W → regional ore finder elements in Cobar (and elsewhere)?
Only uptake barriers are for Cu
Needles → an alternative to soils and other regolith materials in regional and follow-up exploration?

Rapid → sample spacing ~50-100 m at prospect scale (5 min/site)
Cost effective → *in situ* pXRF for Pb, Cu, Zn, Mn, Fe & Ni
Low DLs for ICPMS → understanding trace element uptake controls

pXRF directly on samples collected → a game changer

QR code links to previous presentations → see poster
Data available via MinView → end 2023

