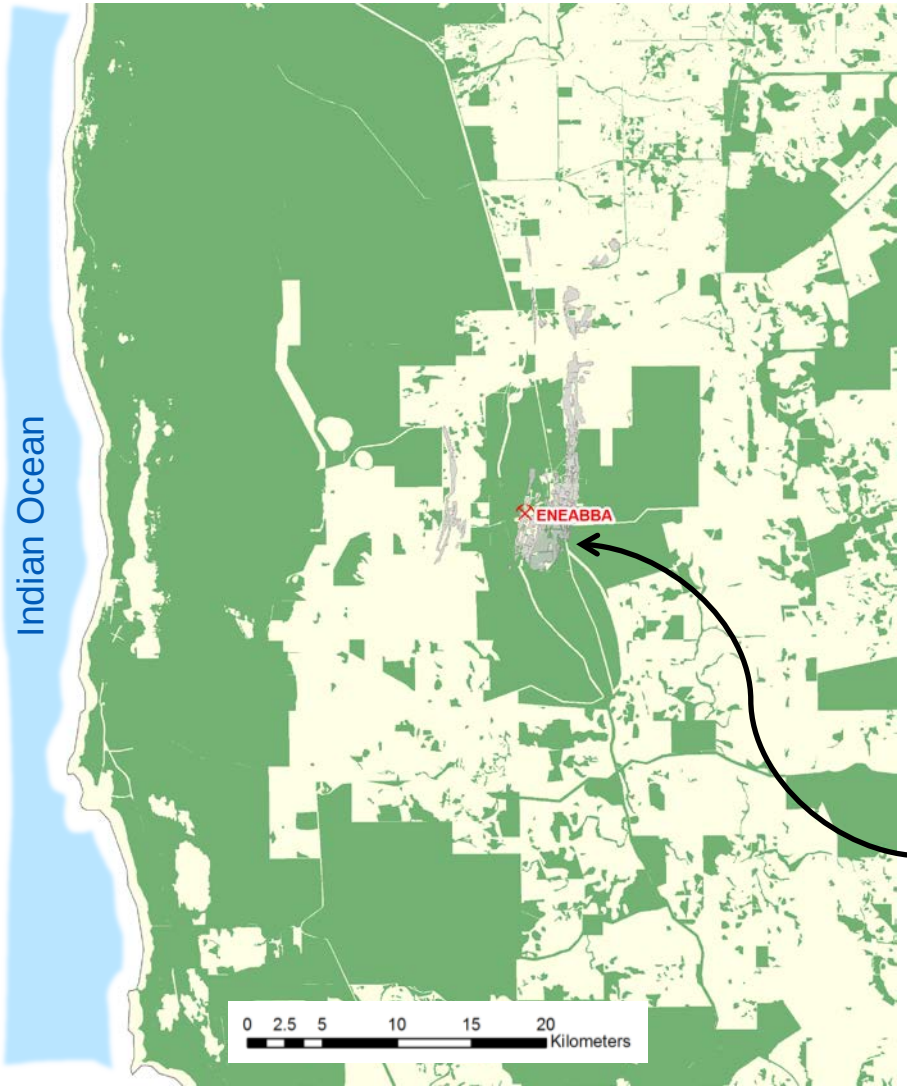
Innovation in Re-vegetating after Mineral Sands Mining

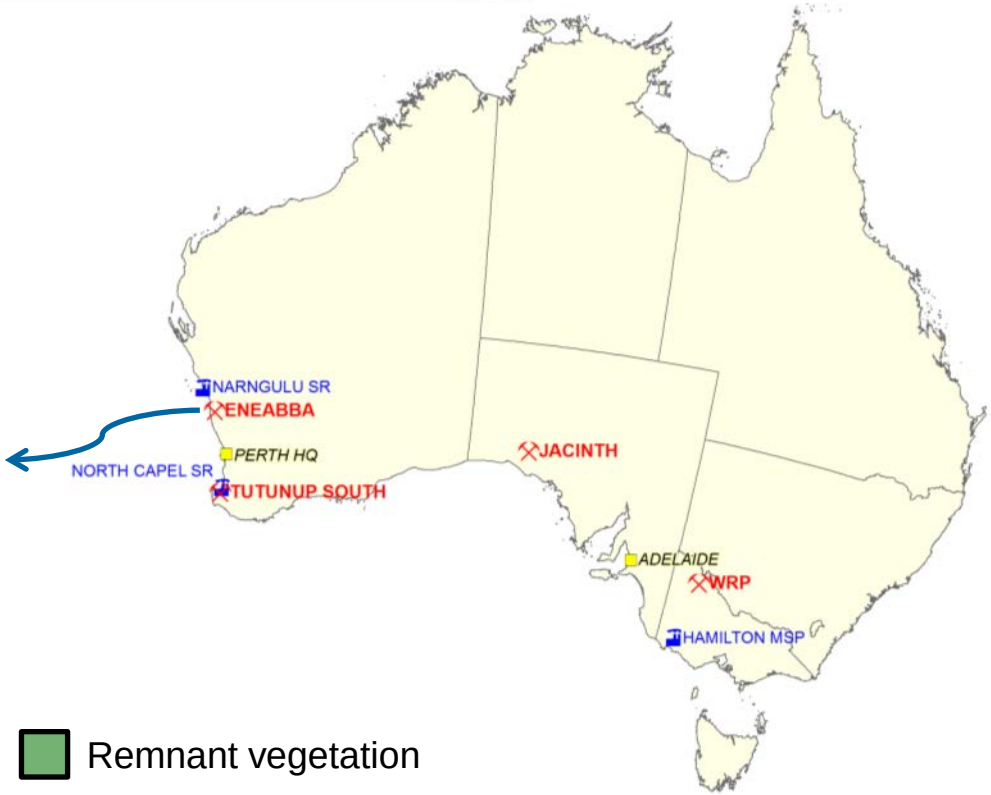
RIAWA

Setting the Standards

20–21 September 2016

Eneabba Mineral Sands Mine





Remnant vegetation

Cleared for agriculture

Mining history
~1,600 ha native vegetation rehabilitated since 1977
~700 ha native rehabilitation planned

Kwongan – the Challenge for Rehabilitation

- High botanical diversity
- Recalcitrant species
  - Restionaceae, Cyperaceae, Dilleniaceae, Ericaceae

Undisturbed kwongan on sand over laterite

Other Rehabilitation Challenges

- Soil stability
  - mulch application (ceased)
  - cereal rye nurse crop (ceased)
  - use of soil crusting agents (Gluon, Terolas)

Wind erosion at Eneabba during summer

Other Rehabilitation Challenges

- Seed potential
  - accurate assessment of field versus nursery emergence
  - trialling of seed coating as delivery system for dormancy breaking and plant growth promoting treatments

Germinating seedlings in a seed coating trial

Vegetation Direct Transfer (VDT)

- The transfer of vegetation with intact soil ‘sods’
- Practiced in New Zealand on manuka-scrub for > 10 years
- Successfully demonstrated with wetland vegetation
- Potentially useful for dryland recalcitrant species found in kwongan

VDT at Eneabba in 2012

Vegetation and 30–40 cm of the intact topsoil profile was excavated…

…and transferred to a ripped subsoil surface

1.6 hectares transferred

Cost effective!

VDT Experimental Treatments

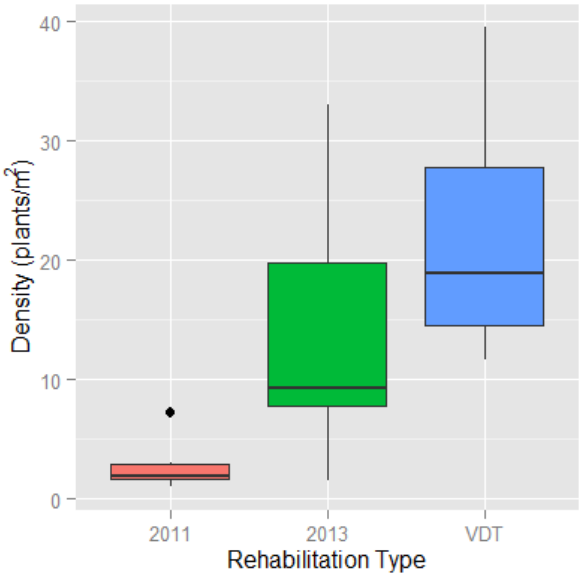
- Experimental treatments applied to the vegetation to test plant survival
  - intact vegetation (control)
  - slashed vegetation
  - ‘Envy’ transpiration blocker
  - slashed vegetation plus ‘Envy’ transpiration blocker
- No substantial differences between treatments

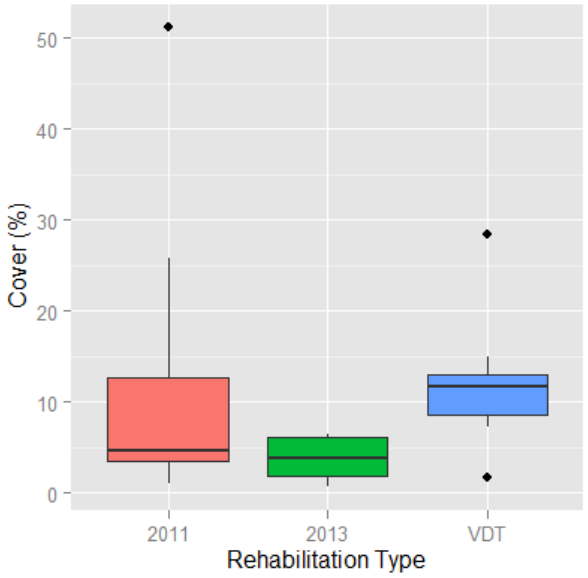
VDT 2012

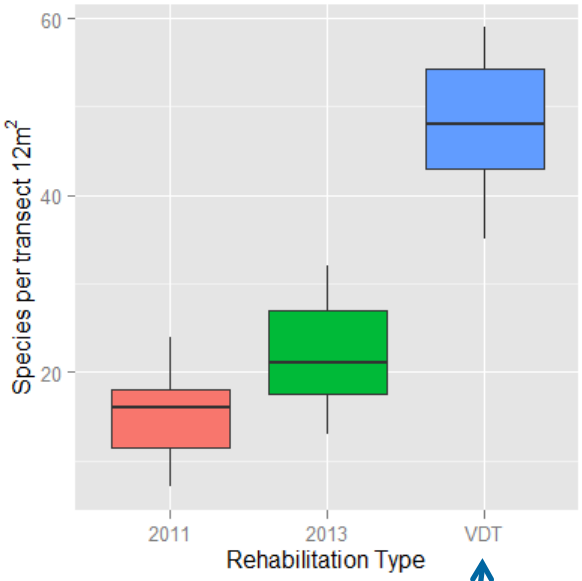
VDT 2016

Density, Cover and Species Diversity

VDT performance exceeds standard rehabilitation practice after three years when compared using simple vegetation metrics







Species diversity is **2.5–3 times greater** over the same spatial scale

Species Diversity

- Total species recorded in VDT
  - 87 species in 2012
  - 117 species in 2013
  - 150 species in 2014
  - 148 species in 2015

Recalcitrant Species Survive VDT

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Synaphea spinulosa subsp. *spinulosa*
Scaevola sp.

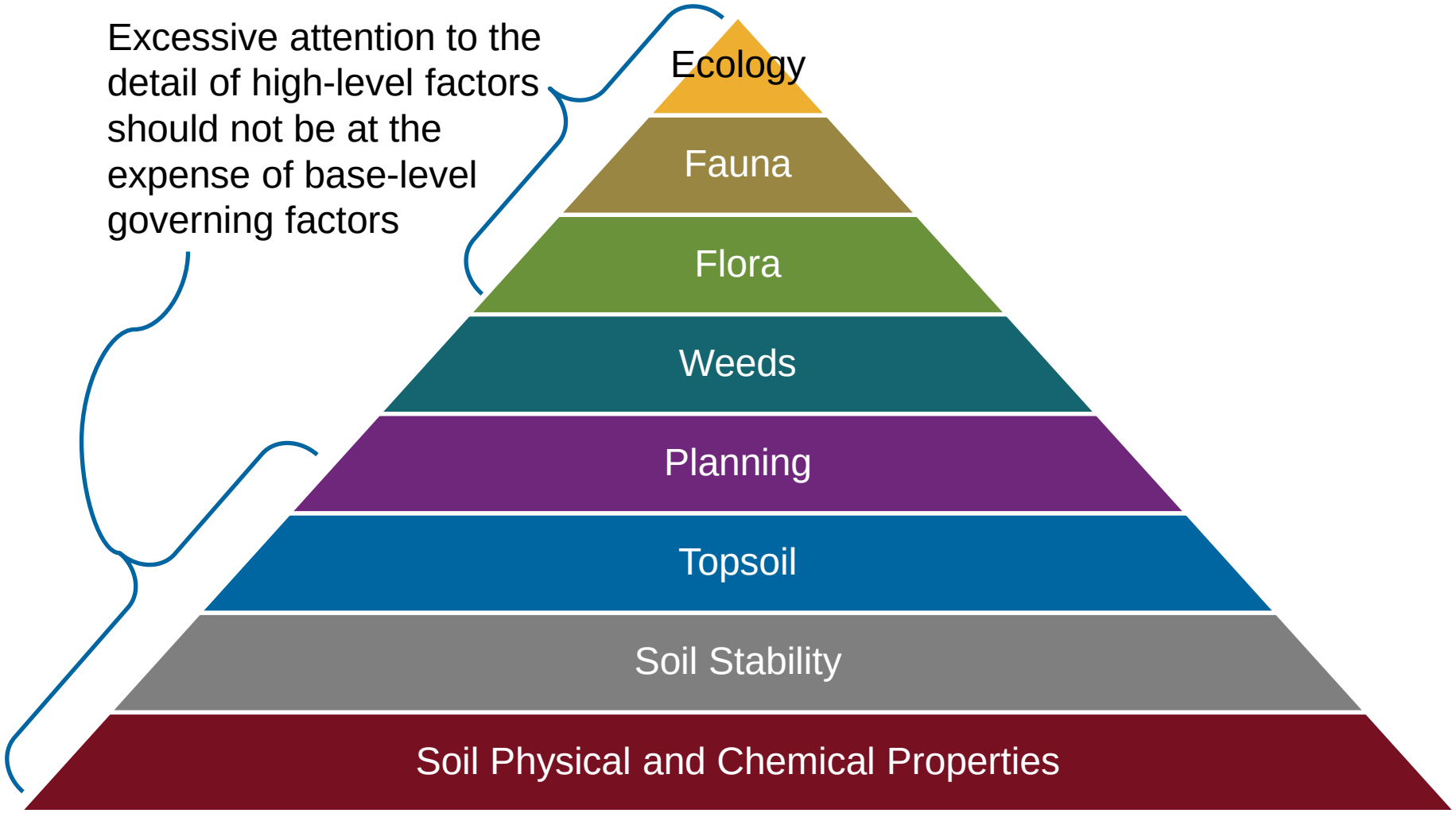
Recalcitrant Species Survive VDT

Recalcitrant Species Survive VDT

Why Does VDT Work?

- Biotic reasons
  - rootstock preserved allowing re-sprouting species survival (many recalcitrant)
  - seed bank preserved
  - soil microbiology preserved
  - organic material preserved
- Abiotic reasons
  - soil compaction absent
  - soil structure preserved
  - surface stability achieved

Operational Factors for Rehabilitation Success



Iluka Resources Limited

www.iluka.com

For more information, contact:
Mark Dobrowolski
Principal Rehabilitation Scientist
mark.dobrowolski@iluka.com
+61 (0) 477 703 289