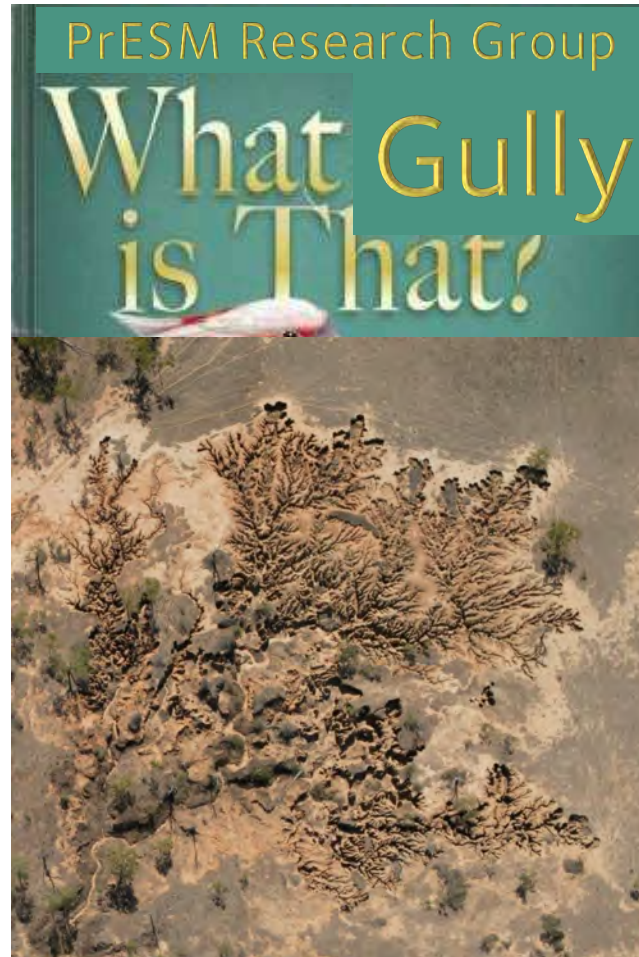


What Gully is That?

Towards a Classification Scheme for Erosion Gullies in Queensland

Robin Thwaites*, Andrew Brooks, John Spencer & Tim Pietsch

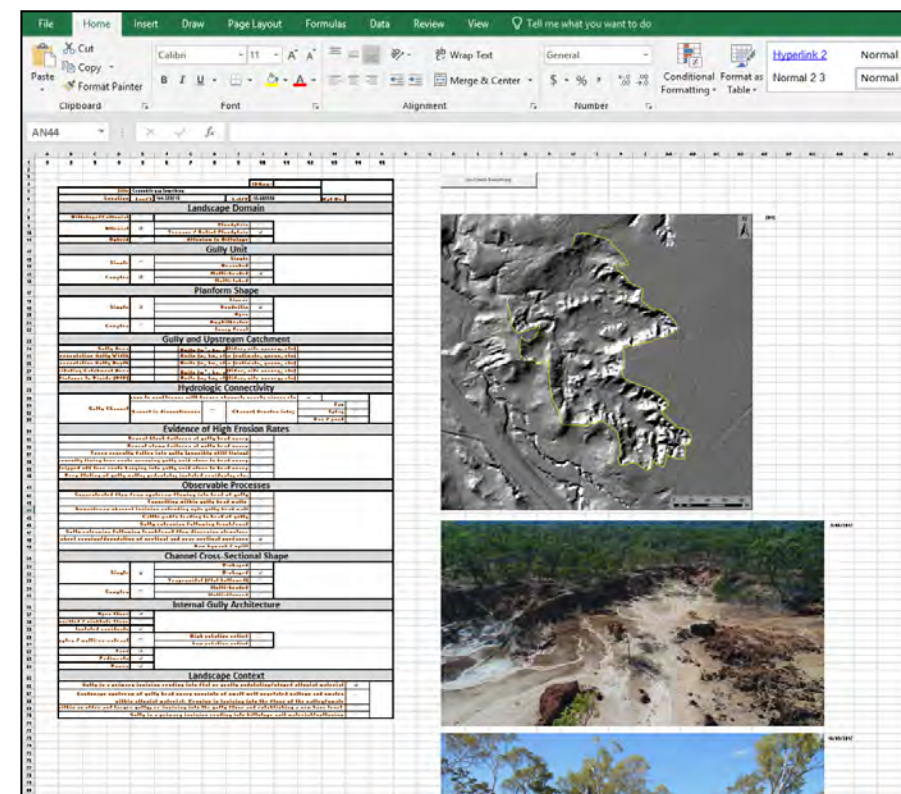


PrESM Research Group

What Gully is That?

Why?

- A scientific framework for gully description, classification, management;
- A generic communication and assessment tool;
- A decision support tool for prioritising gully systems for rehabilitation;
- To aid the process of catchment modelling for sediment flows and erosion sources;
- To serve and shape a statewide gully database.



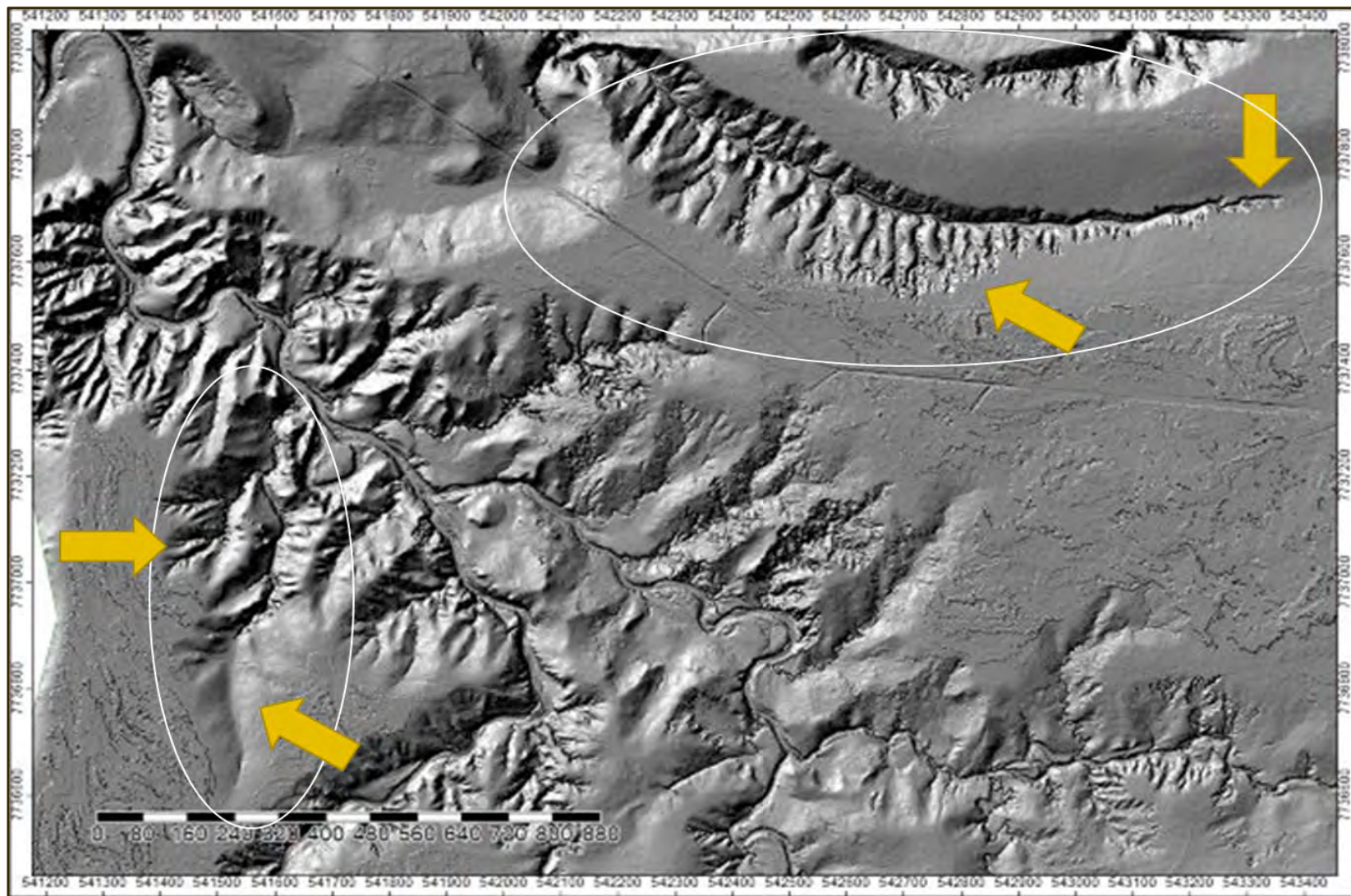
Concept

- Attribute-based
- Morpho-genetic, i.e. form-material-process
- Scale dependent (problematic)
- 3 integrated 'Components' – 5 Primary Classifiers – 5 Key Qualifiers
- Both qualitative and quantitative (some metrics)

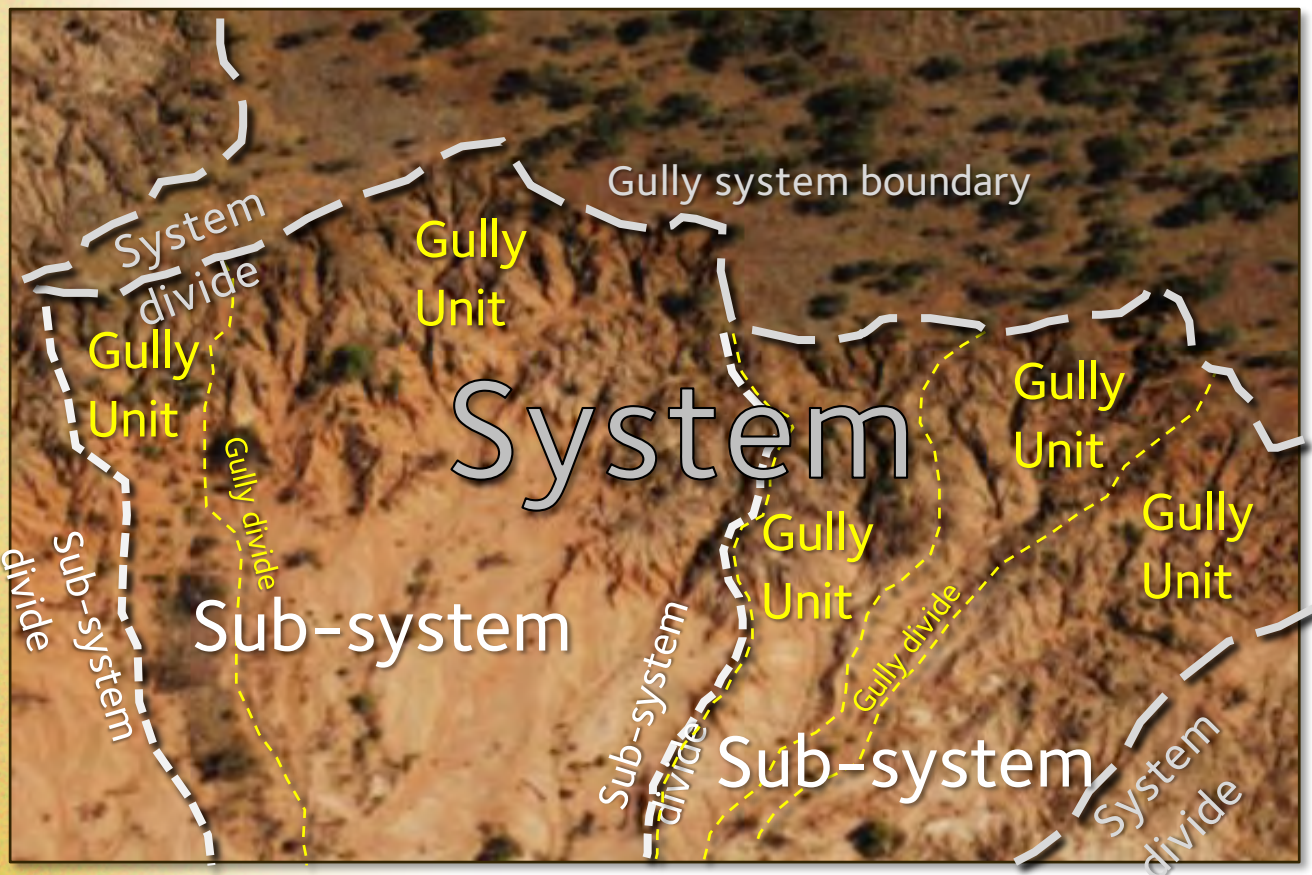
Primary Classifiers:	Mode of analysis	
	Office (RS/GIS)	Field
System Scale and Definition	✓	✓
Landscape Domain (Geomorphic setting)	✓	✓
Gully Pattern / Form (Plan-form morphology)	✓	na
Gully Catchment Dimension	✓	✓
Soil Materials	✓	✓
Key Qualifiers:	Office (RS/GIS)	Field
Climate/Rainfall region	✓	na
Gully Complexity	✓	na
Multi-form Development	✓	✓
Vegetation cover	✓	✓
Erosion activity (evidence and type)	✓	✓

✓ - Dominant activity ✓ - Supporting activity na – activity not applicable

Scale / System Definition



Scale / System Definition



1. Gully System



2. Gully Sub-system

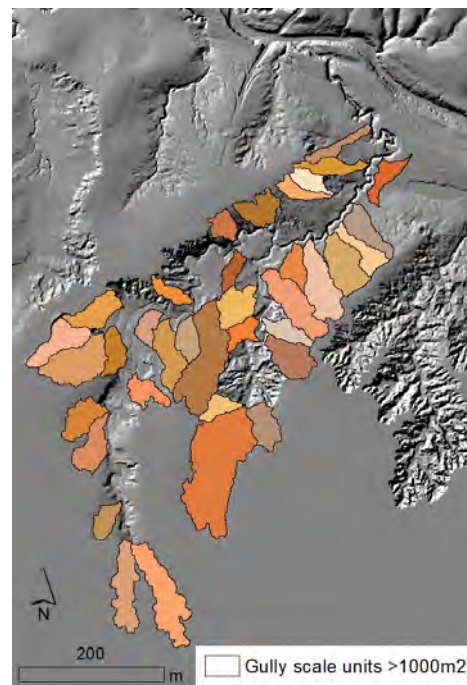
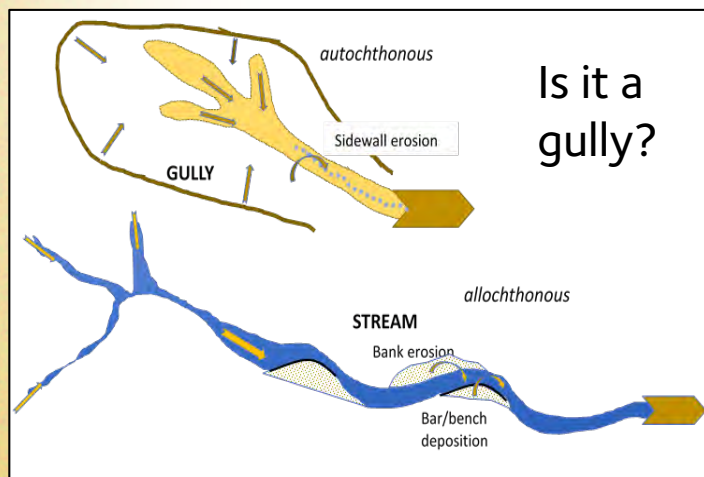


3. Gully Unit

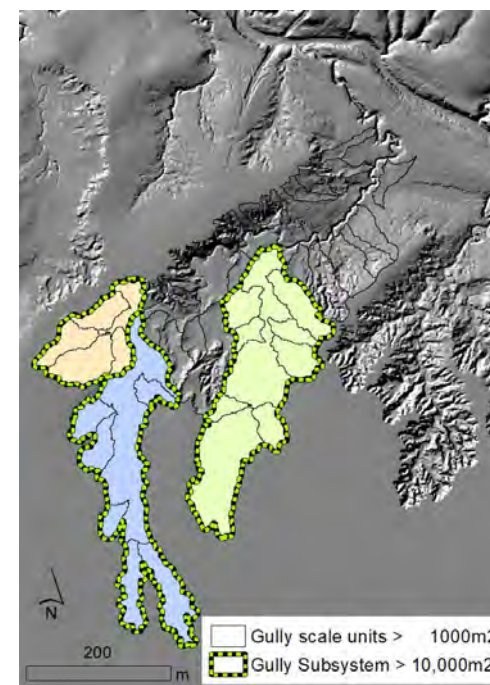
Scale / System Definition

Graphics courtesy of Graeme Curwen

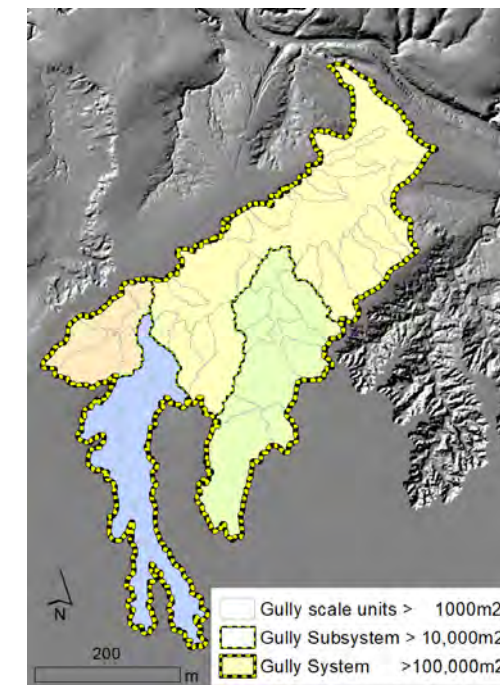
1. Gully Unit
 - Automated: $> 1000 \text{ m}^2$
2. Gully Sub-system
 - Automated: $> 10,000 \text{ m}^2$
3. Gully System
 - Automated: $> 100,000 \text{ m}^2$



- Gully unit scale



- Gully Sub-system scale

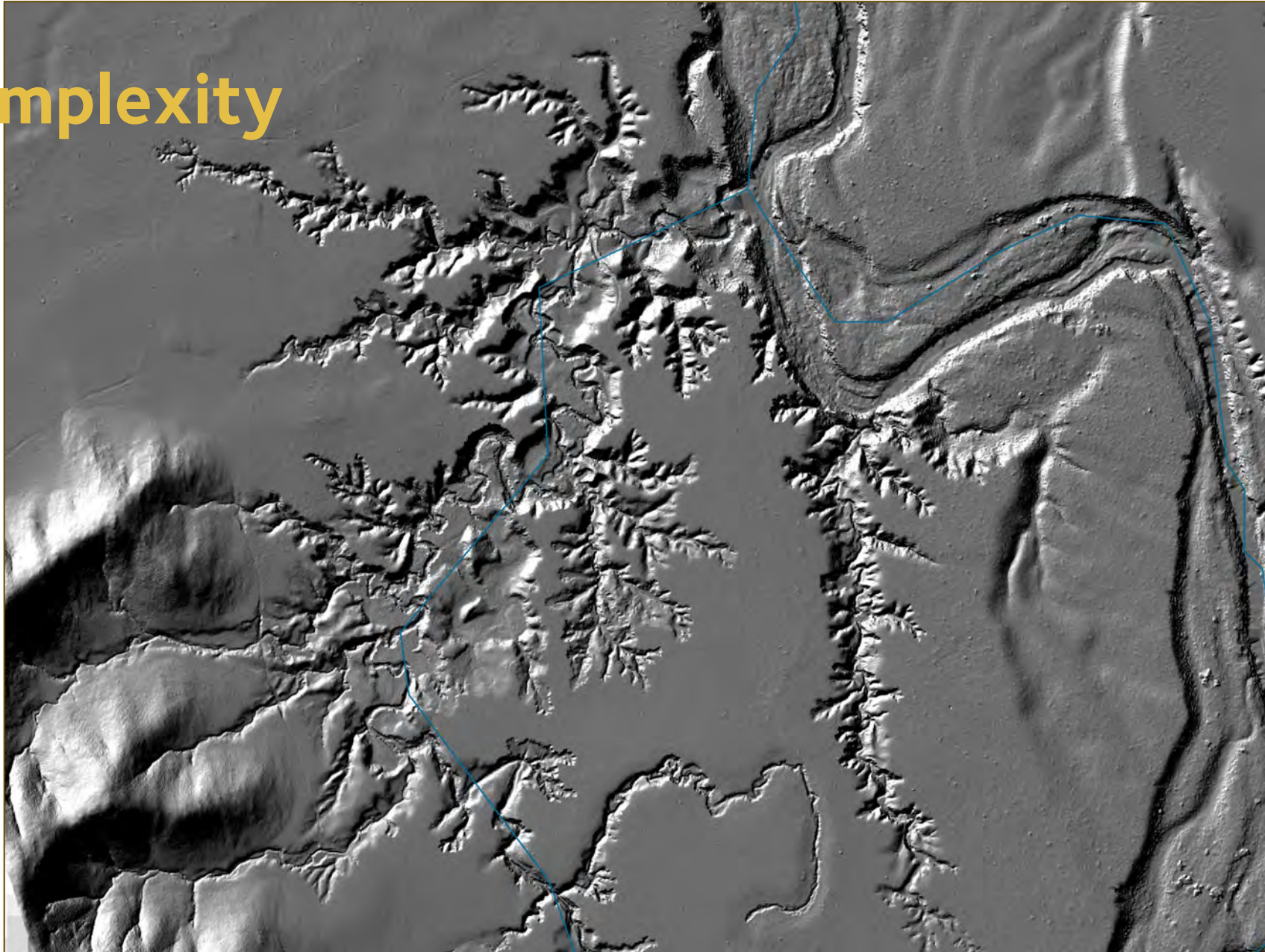


- Gully System scale

Nested hierarchy fundamental to automated mapping – Graeme Curwen

Gully vs Stream distinction – Justin Stout

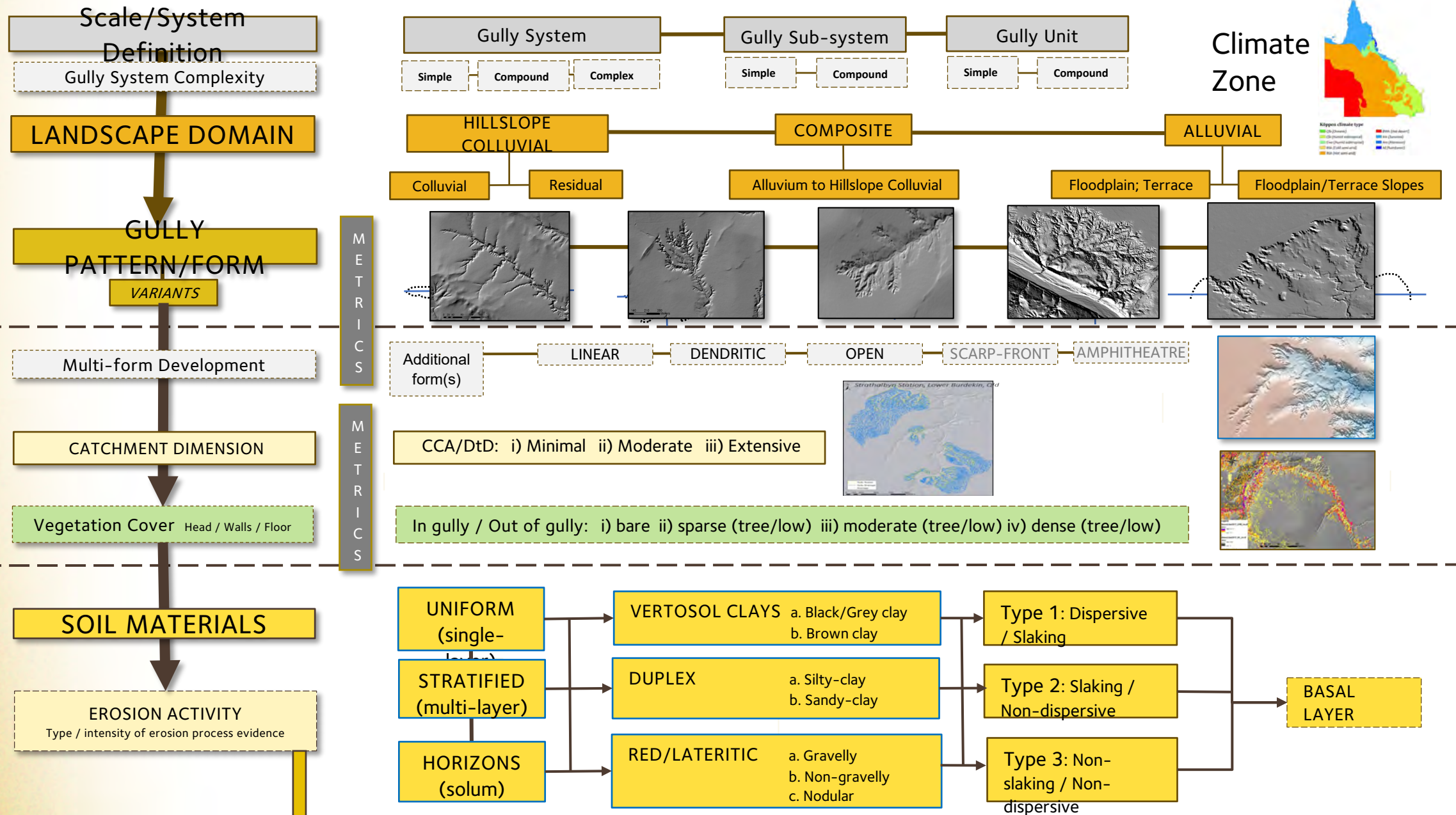
Gully Complexity



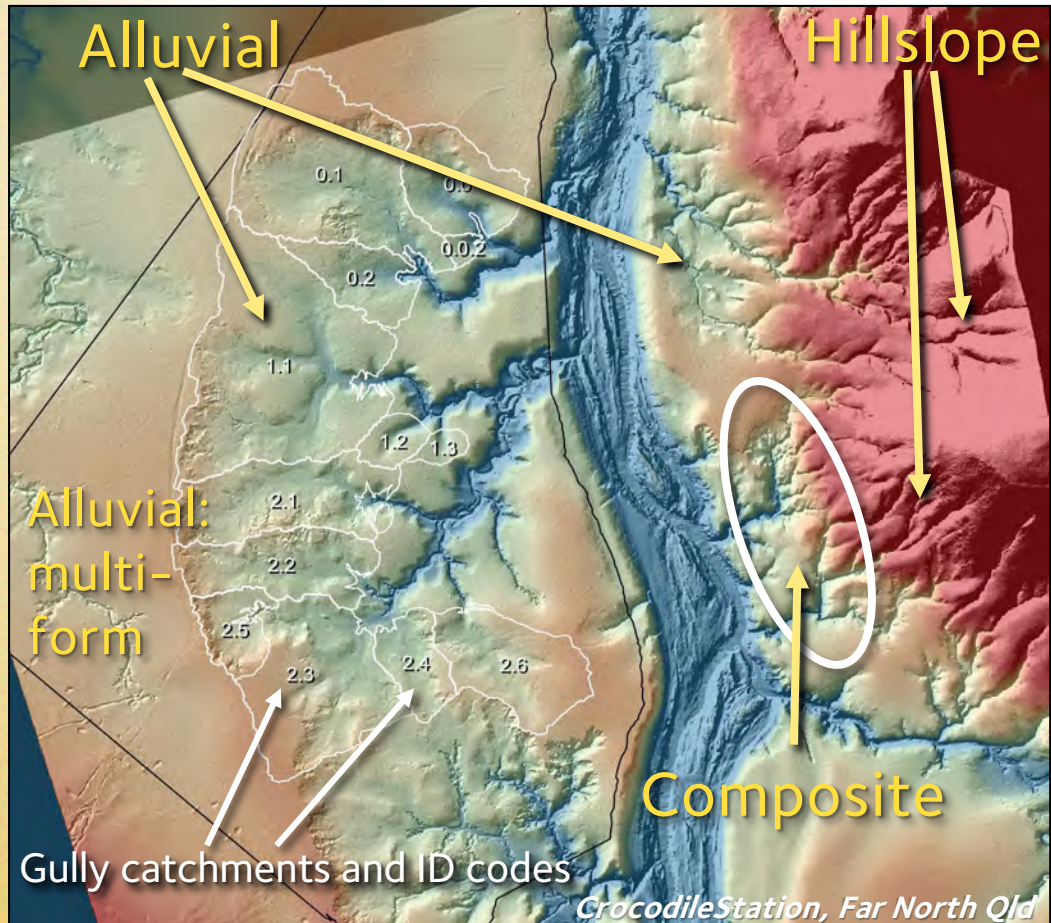
Remote Component

Remote-Field Component

Field Component



Landscape Domain



Crocodile Station, Cape York Peninsula, Qld

Hillslope Colluvial

- Colluvial
- Residual

Composite

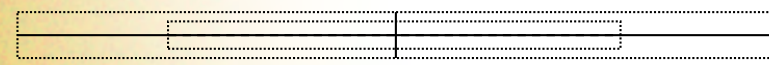
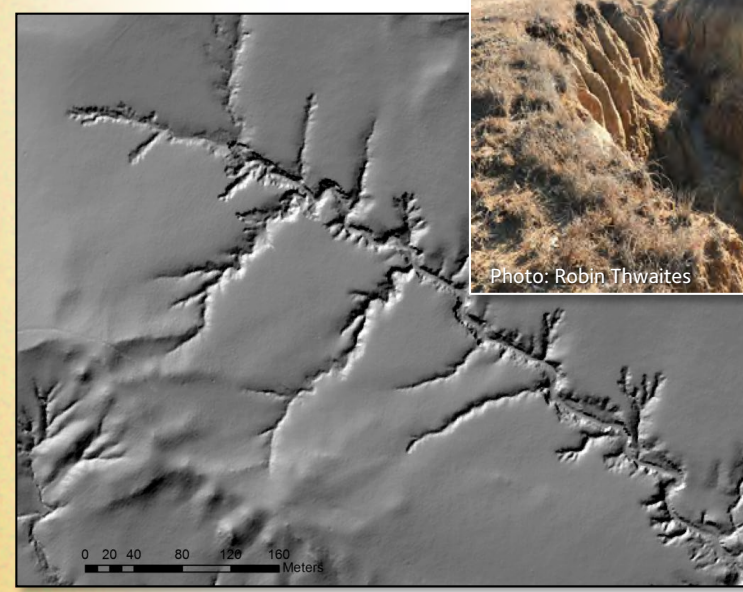
- Alluvial to Hillslope Colluvial

Alluvial

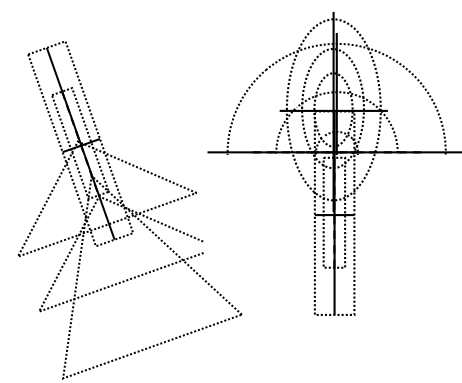
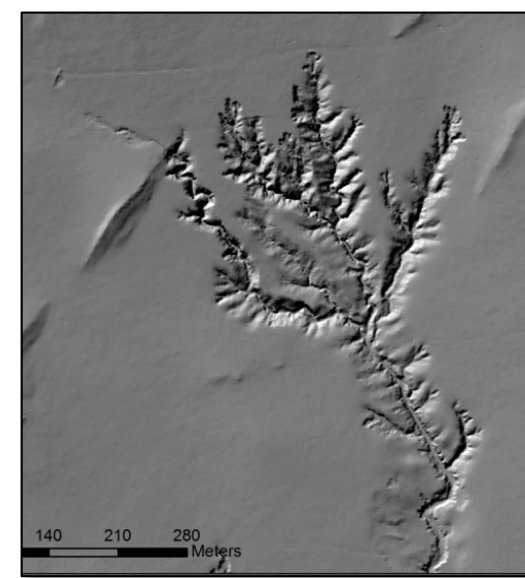
- Floodplain; Terrace
- Floodplain / Terrace Slopes

Gully Pattern / Form

LINEAR

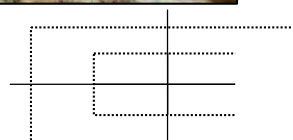
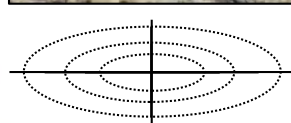
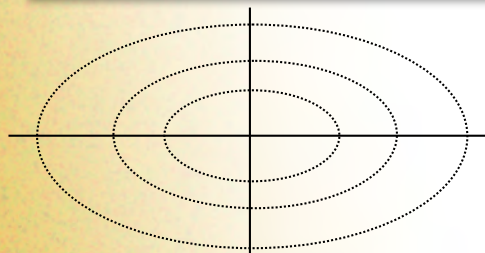
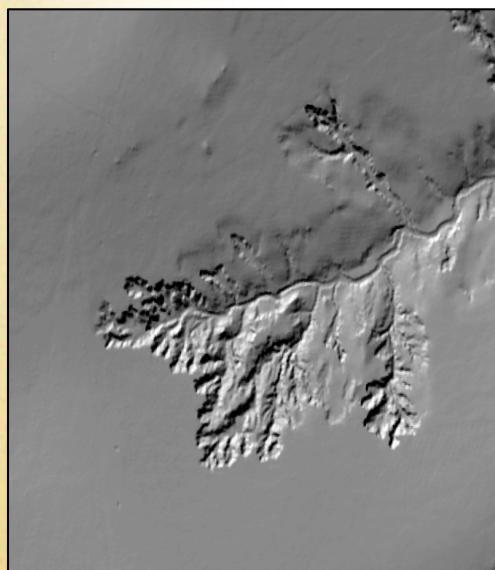


DENDRITIC

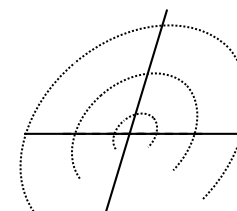
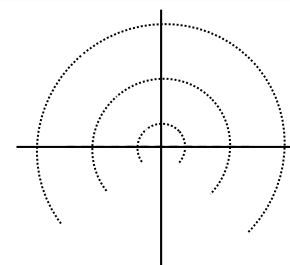


Gully Pattern / Form

OPEN



AMPHITHEATRE



Gully Pattern / Form

SCARP-FRONT

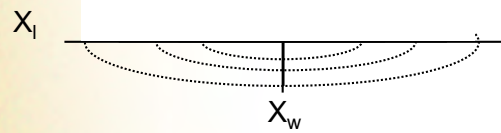
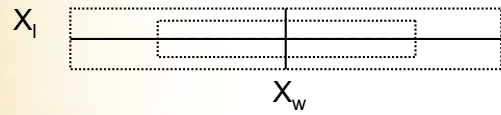


Photo: Robin Thwaites

SOIL MATERIALS - Fabric

STRATIFIED (multi-layer)



UNIFORM (single layer)



HORIZONS (solum)

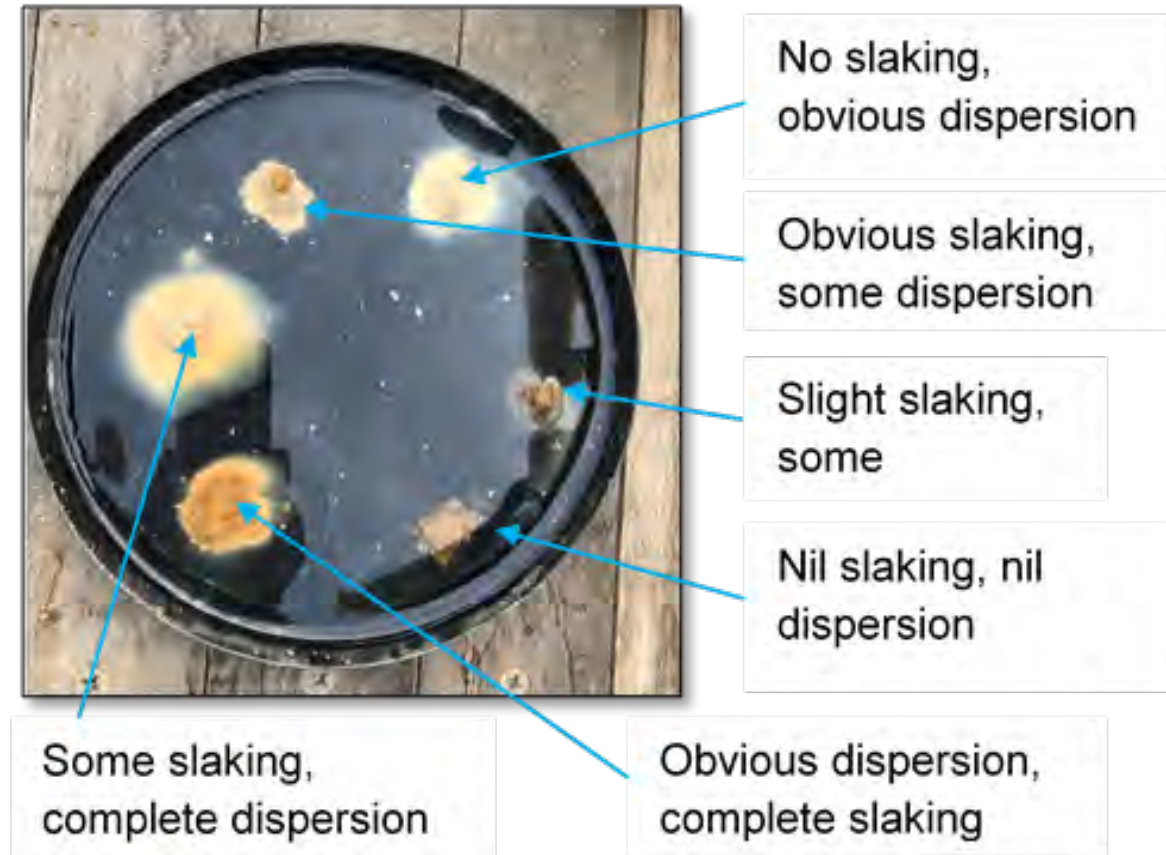


SOIL MATERIALS: Slaking / Dispersivity

Type 1: Dispersive / Slaking

Type 2: Slaking / Non-dispersive

Type 3: Non-slaking / Non-dispersive



Conclusions



This Classification allows us to capture morphological and functional groups of all gullies that allows us to:

- develop a management-specific Typology
- prioritize gullies for rehabilitation
- identify appropriate rehabilitation /management
- improve communication between landholders, extension, & scientists
- build better sediment budget models for catchments



Australian Government



National
**Environmental
Science**
Programme

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