

The significance of gully erosion as a dominant source of sediment pollution to the Great Barrier Reef; and the challenge ahead to reduce it.

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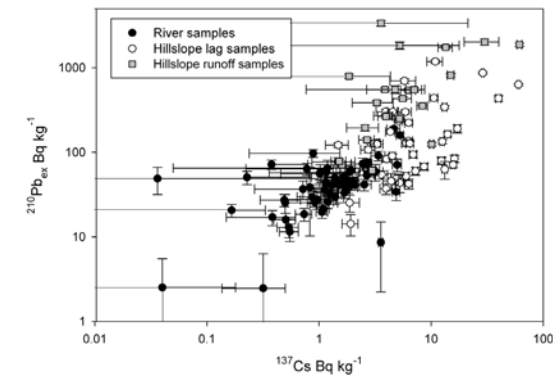
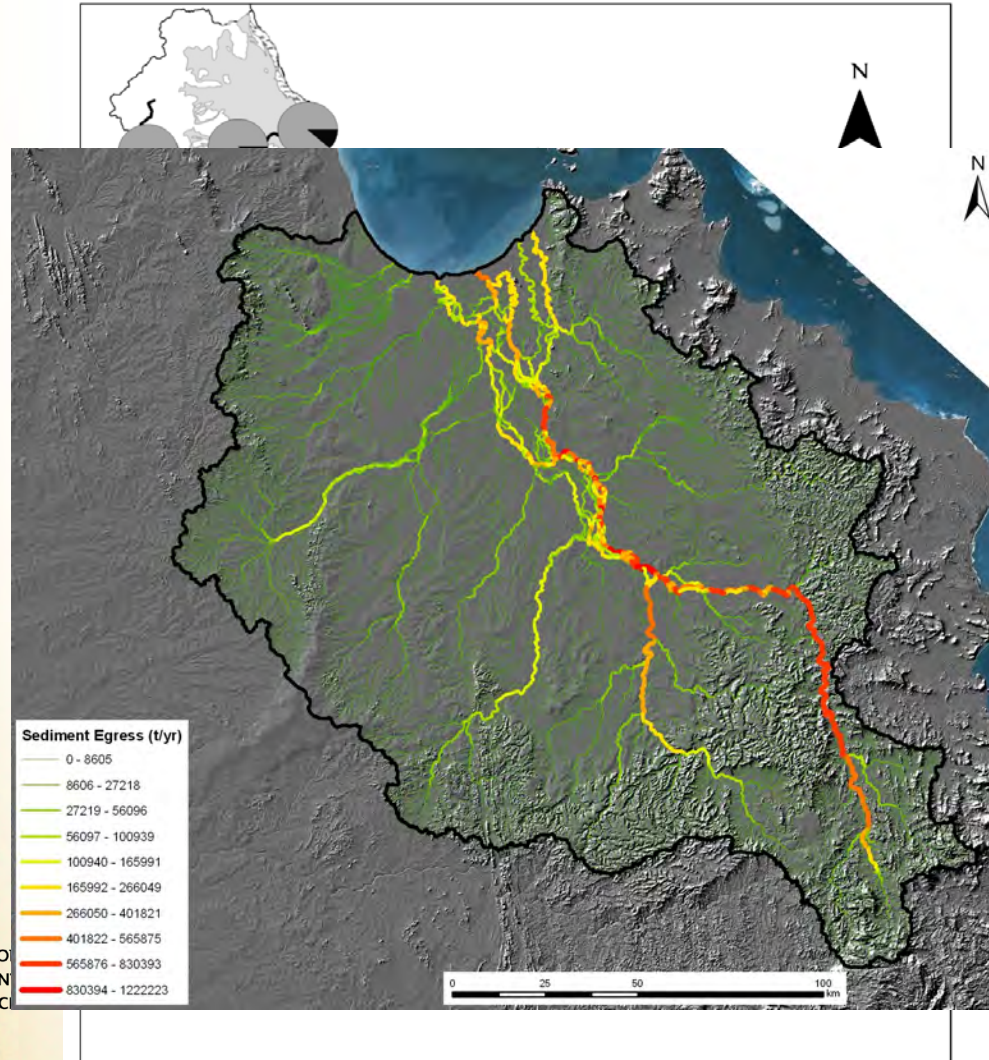
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Hillslope vs channel erosion

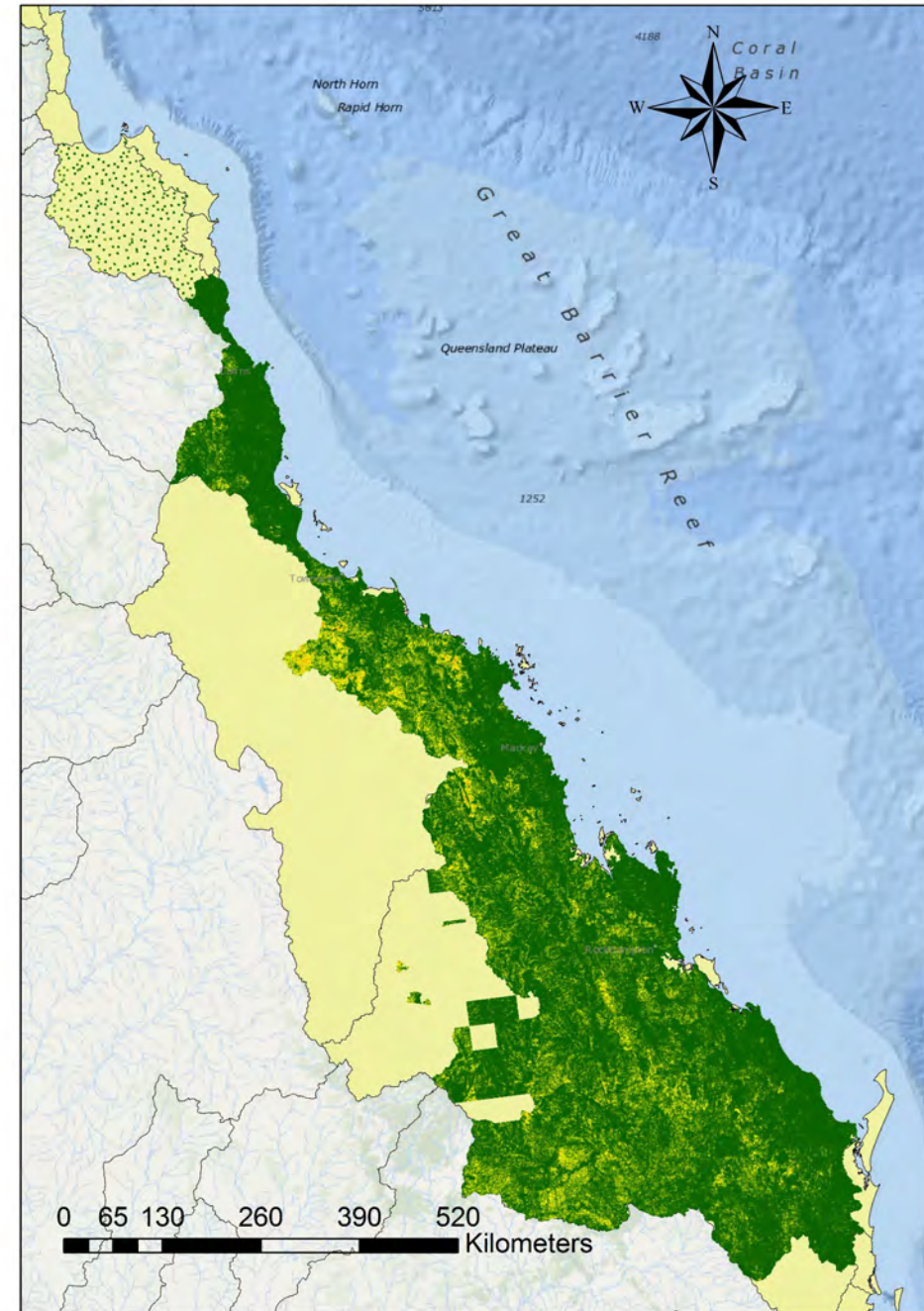


- Fallout radionuclides (Cs-137 and Pb-210ex)
 - widely used to determine the relative contribution of hillslope and gully/channel erosion to stream sediments
- Normanby ~ 89% sub-surface
- Similar story in most GBR and northern Australian rivers

So how many gullies and where are they?

- Differentiating **streambank** from **gully erosion** requires that we map and characterize gullies.
- To date **DNRME have mapped ~55%** (241,238 km²) of the GBR catchments (437,354 km²) at 100m resolution (24,123,800 obs)
- This equates to:
 - ~ 145,071 km of gullies (for the 55% mapped)
 - Or perhaps ~ **263,000 km** across whole area

= Daunting Rehab Task!



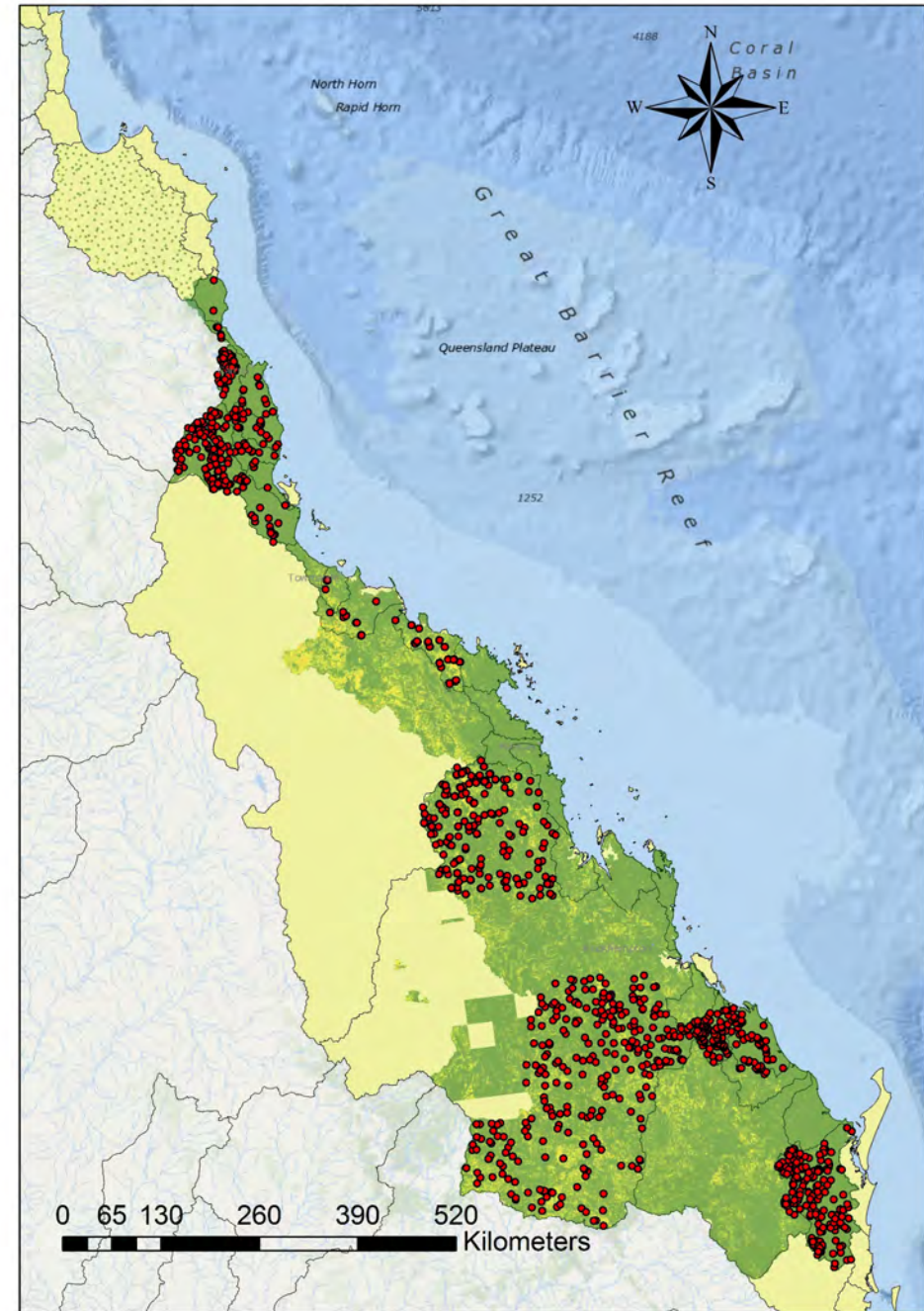
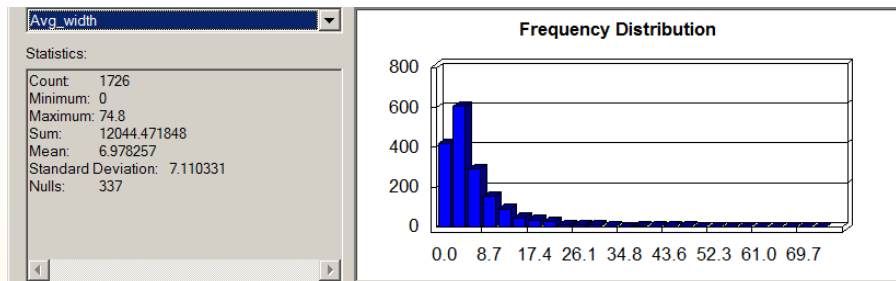
Source – DNRME gully density mapping

But is it really that Daunting?

- If we convert to an area (av. width 3.5 – 7.8m)
- => 92,300ha - 153,300 ha
- This = **0.21% - 0.35%** of the total catchment area

Still quite Daunting if all gullies are equal – but are they?

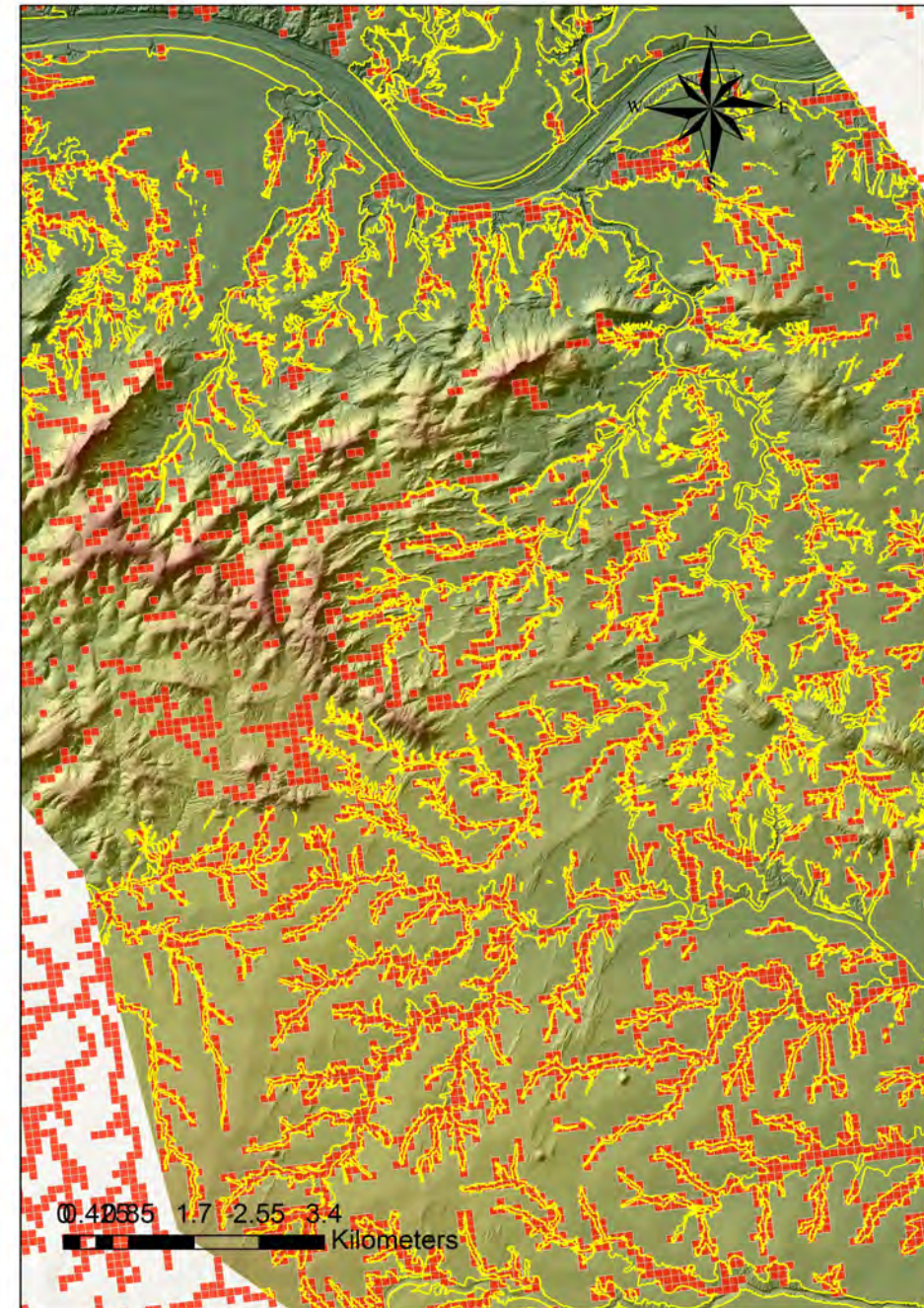
Width data
highly
skewed



Source – DNRME gully density mapping

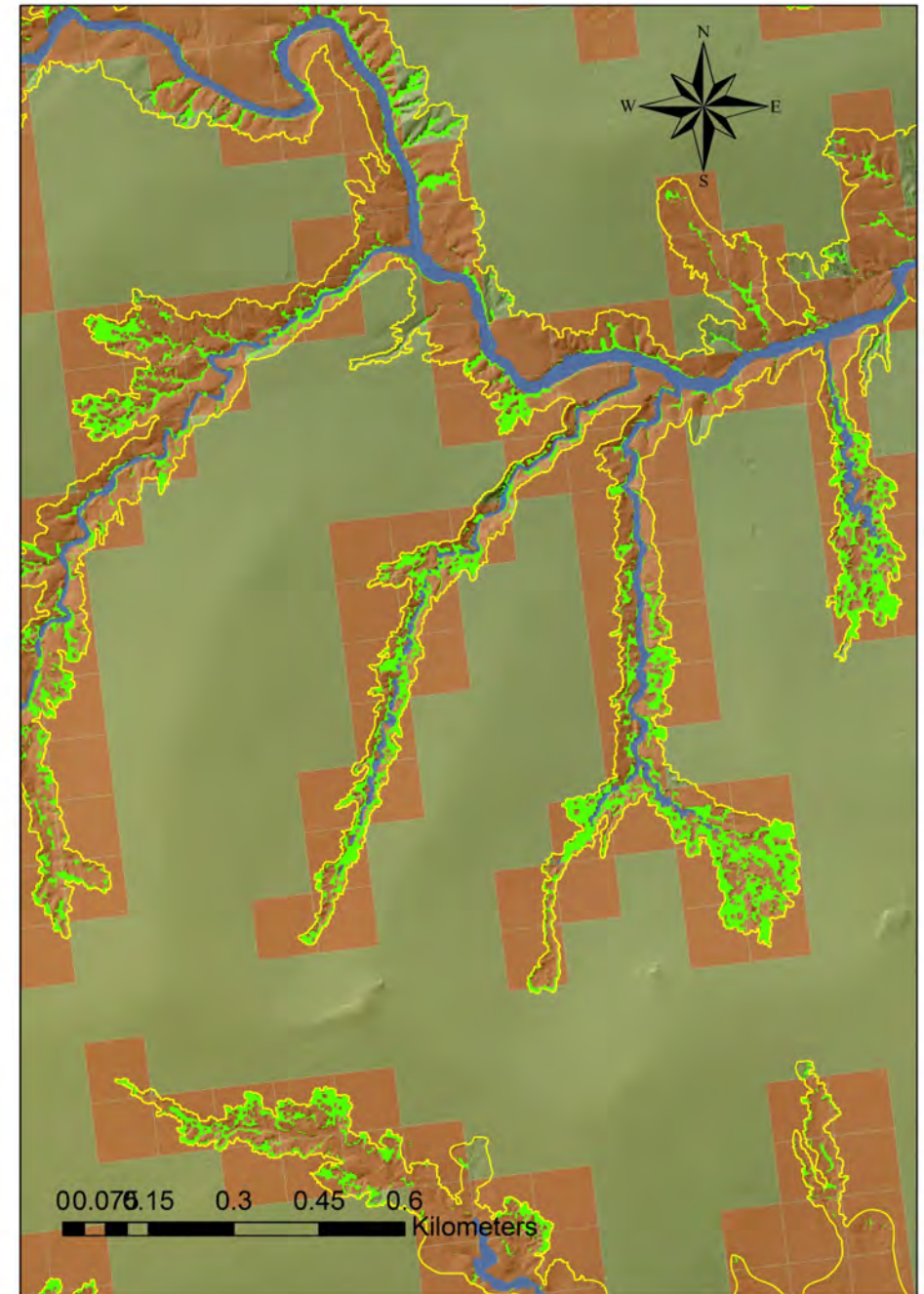
Need to take a closer look

- Now moving to LiDAR based gully mapping.
- Good agreement between 100m P/A data
- But many gullies cover large area (so not linear gullies).



Comparison at higher reslt'n

- Many mapped “gullies” probably more akin to channels
- Not all gullies equal – only some parts active. NEED to CLASSIFY
- Priority subset requiring active management much smaller again.
- Small subset of highly active gullies contribute a disproportionate load



High degree of variability in gully form..



Need to classify

Many mapped gullies likely to be ephemeral channels



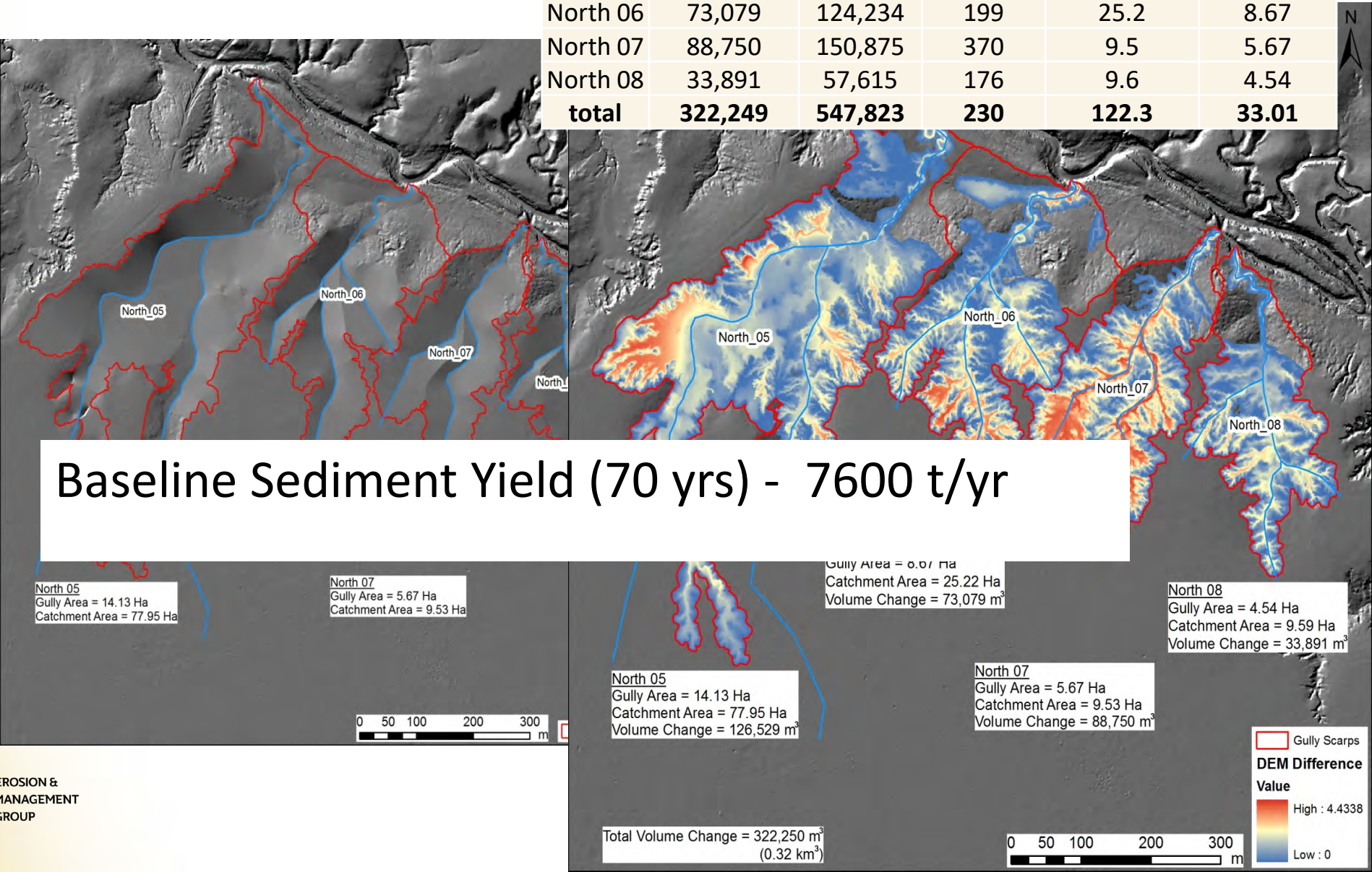
Highly active alluvial gullies

- Small subset of highly active gullies like these contribute a disproportionate load

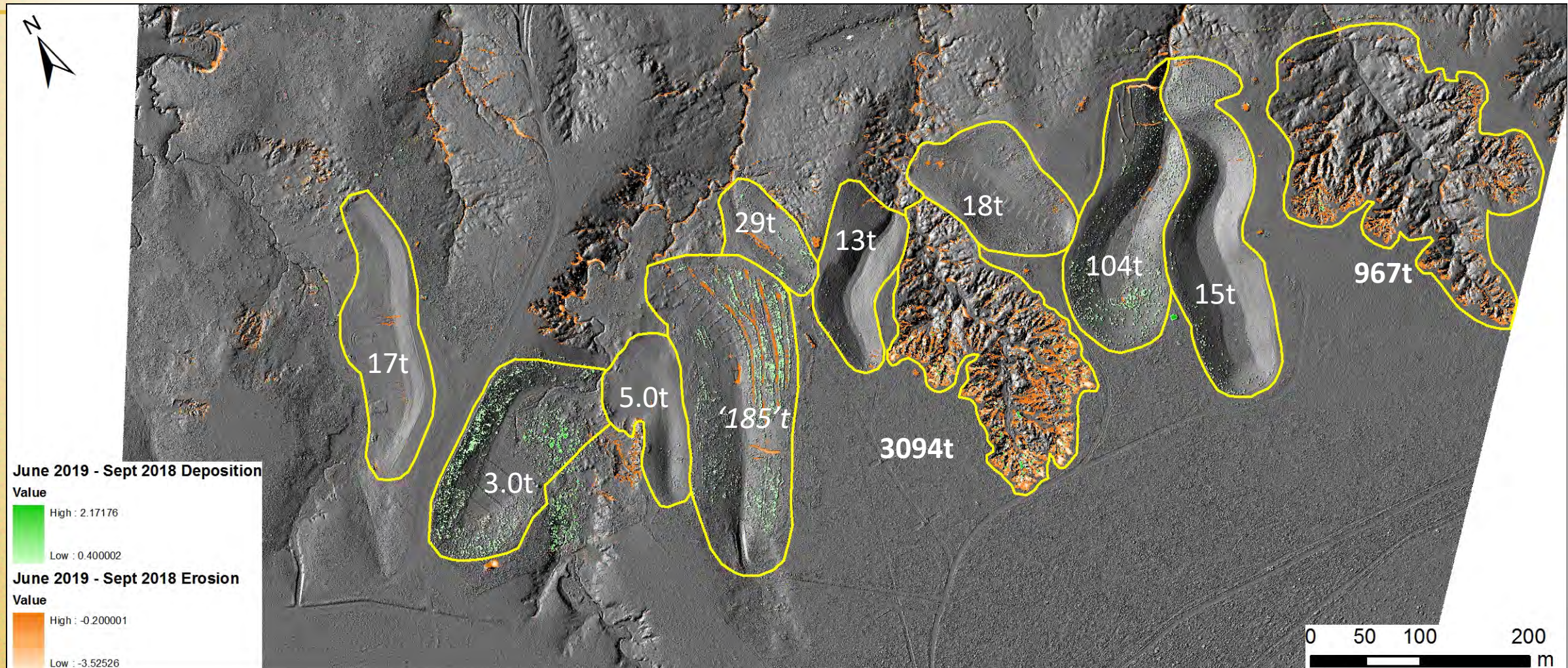


Erosion volume reconstruction

Gully Name	Volume Change (m ³)	change (t)	sed yield (t/ha/yr)	Gully Catchment Area (ha)	Gully Scarp Area (ha)
North 05	126,529	215,099	211	78.0	14.13
North 06	73,079	124,234	199	25.2	8.67
North 07	88,750	150,875	370	9.5	5.67
North 08	33,891	57,615	176	9.6	4.54
total	322,249	547,823	230	122.3	33.01



10cm LiDAR DoD (2018/19) Strathalbyn - erosion



Task with focus on high yielding gullies

GBR mean annual sed yield	9.9	Mt/yr
“Anthropogenic load”	7.87	Mt/yr
Total gully yield (assuming 45% gully)	3.54	Mt/yr
Total gully area (av est)	122,800	Ha
Av gully yield	28.8	t/Ha/yr
Typical high yielding site	230	t/Ha/yr
If 50% of total yield comes from high yielding gullies, total are of rehab =	7,700	Ha

= 0.018% of land area

= Far less Daunting Rehab Task!

Thank You



Australian Government



**Tropical
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Queensland Government



**LANDHOLDERS
DRIVING CHANGE**
BURDEKIN MAJOR INTEGRATED PROJECT