The influence of species behavior on sampling design and data interpretation: a case study on invasive species

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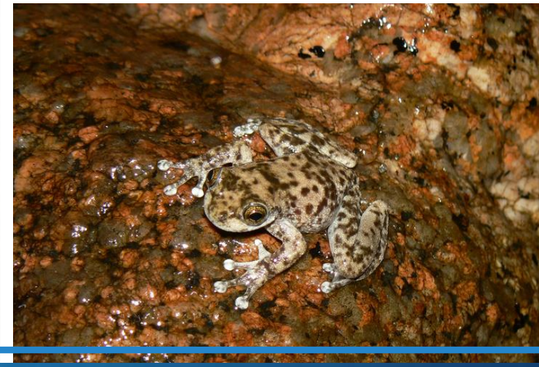
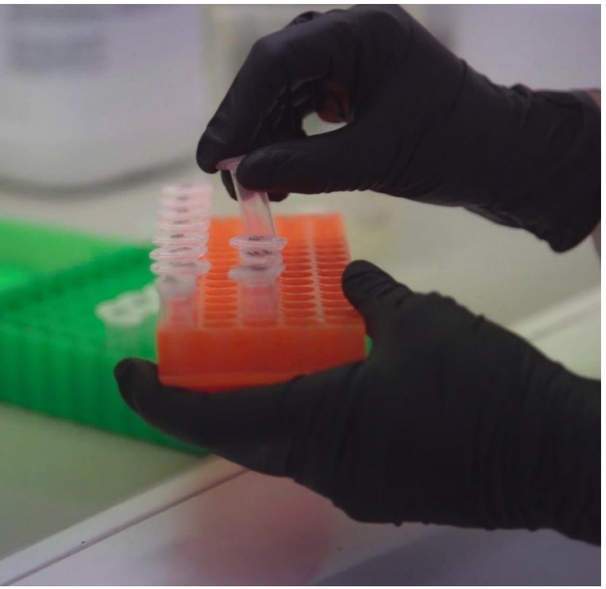
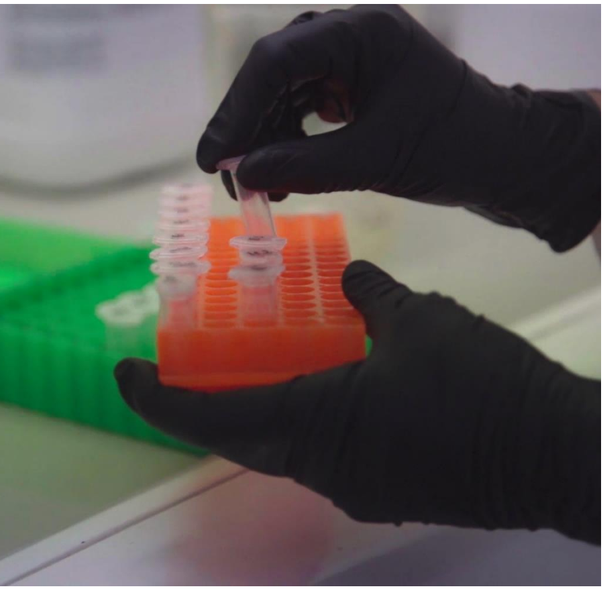




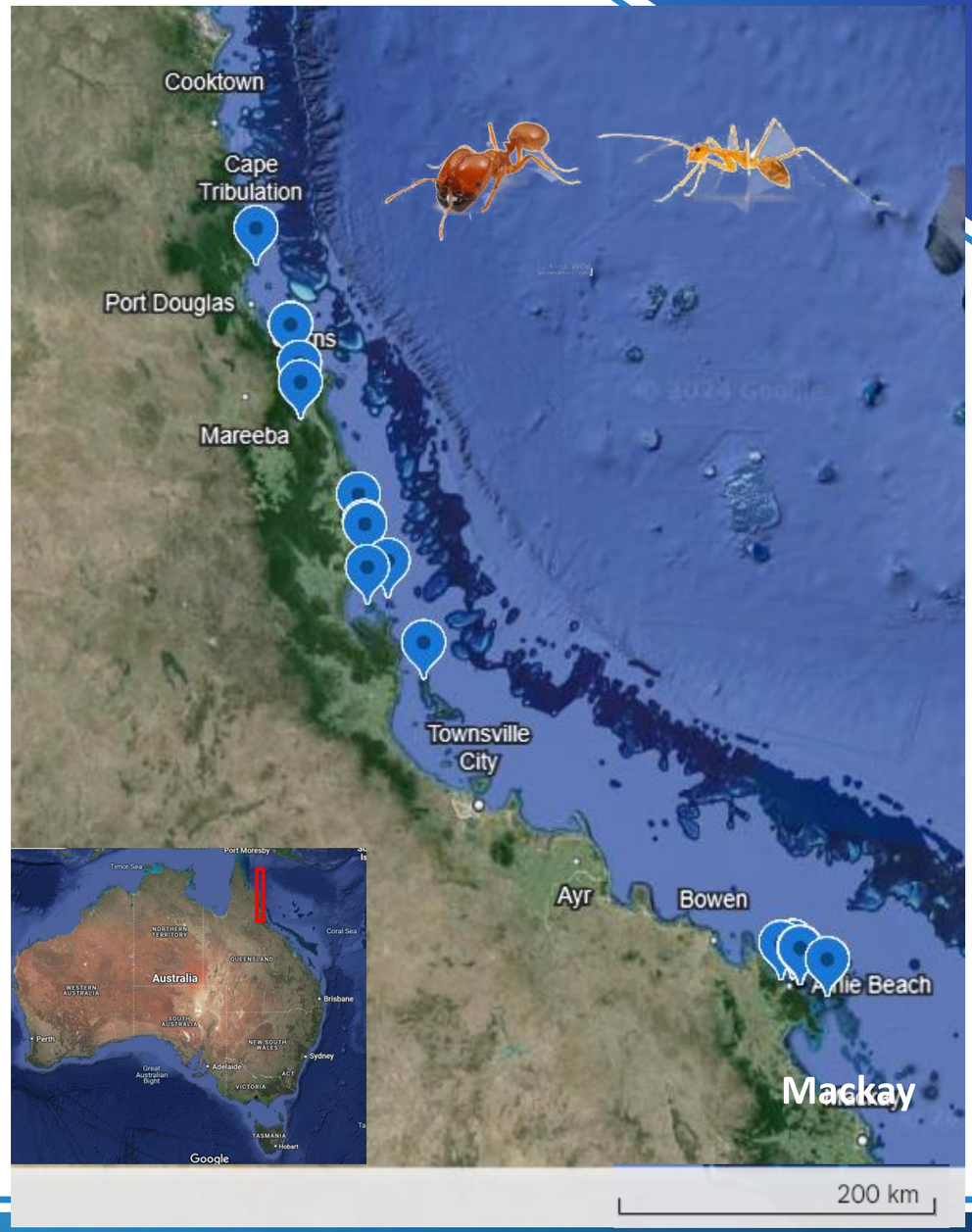
Not all ants are created equal...

Feature	Red Imported Fire Ant (RIFA)	Yellow Crazy Ant (YCA)	Electric Ant (EA)
Nest Type	Large soil mounds	No mounds, opportunistic nests	No mounds, opportunistic nests
Nest Depth	Deep underground (up to 2m)	Shallow nests	Shallow nests
Colony Structure	Territorial, distinct nests	Polydomous, interconnected nests	Polydomous, interconnected nests
Preferred Habitat	Open, sunlit areas, agricultural fields	Forested and open areas	Forested and open areas
Soil Dependency	High (needs soil for mounds)	Low (can nest in various locations)	Low (can nest in various locations)



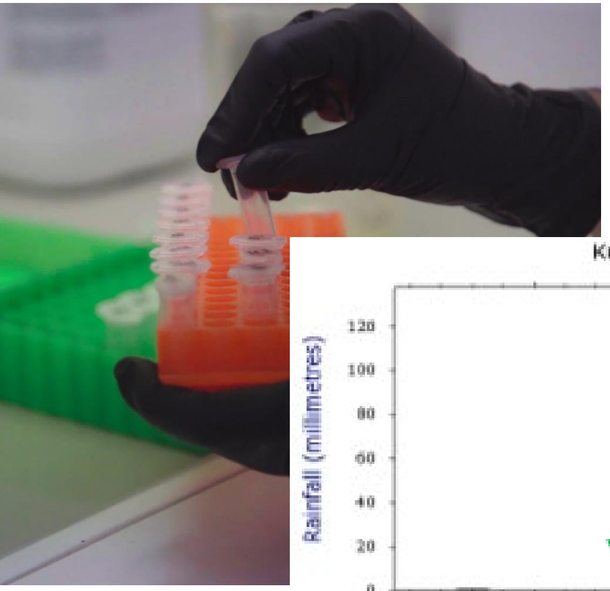
YCA and EA detection in soil

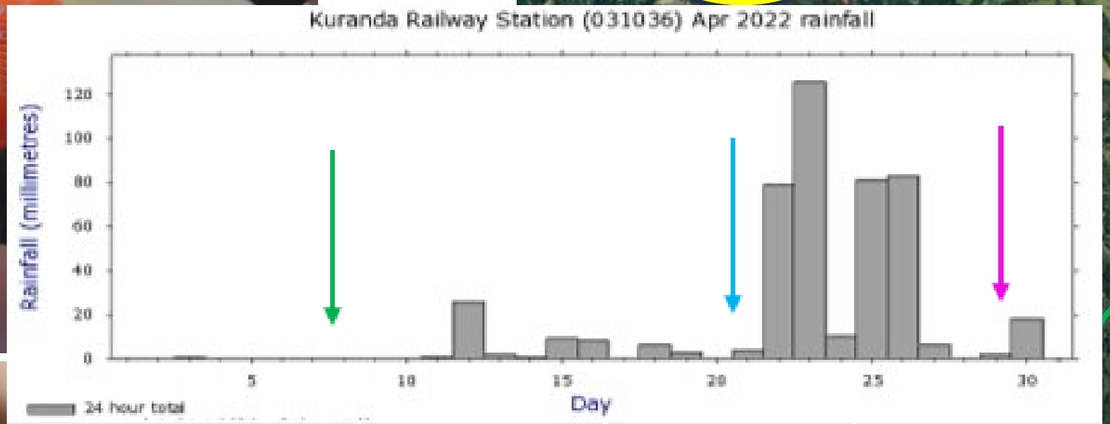
- 37 sites in GBR catchments and islands with confirmed, unconfirmed and no presence of invasive ants
- Ants were not expected and were detected: **3/41 = 7%**
- Ants were expected and were not detected (**FALSE NEGATIVES**): **7/17 = 41%**
- **WHAT TO DO ABOUT IT?** Refine sampling



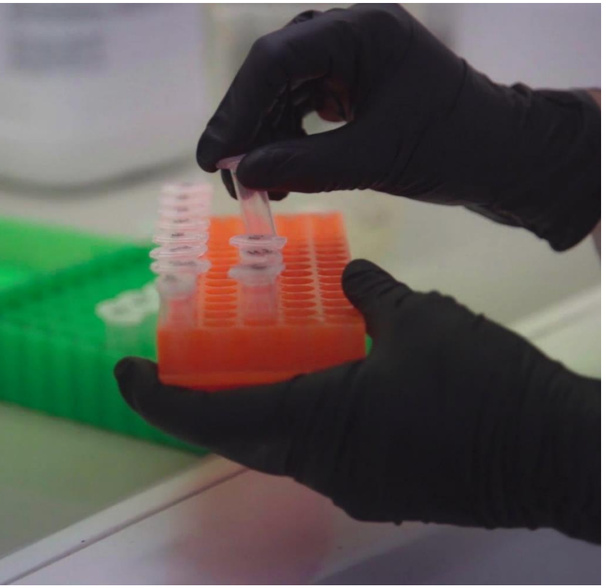
YCA detection in water

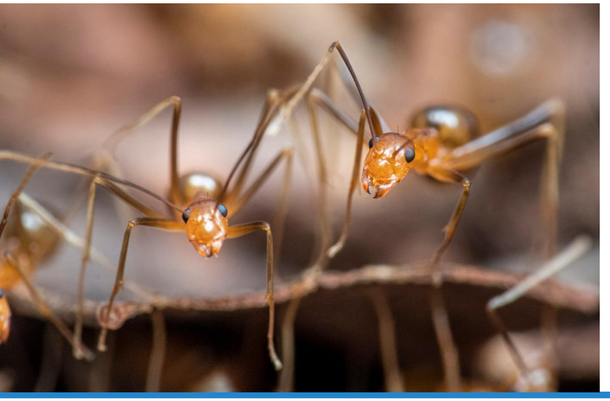
- 31 rivers and creeks in Cairns region (Wet Tropics)
- Many factors likely affect eDNA detectability





Site	Sampling date	% Positive field detections	% Positive tech detections
Little Road	20220408	0	0
Kuranda Bridge	20220408	0	0
Little Road	20220421	20	15
Kuranda Bridge	20220421	40	5
Little Road	20220429	40	7.5
Kuranda Bridge	20220429	0	0





RIFA detection in soil and water

- 5 locations in QLD with known infestations
- 5 sites within each location

- Soil samples: **4/5 = 80% FALSE NEGATIVES**
- Water samples: **19/20 = 95% FALSE NEGATIVES**

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