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Research Program

Project 3.3

The importance of peripheral areas of the Wet Tropics for conservation of biodiversity

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Aims:

1. Survey peripheral rainforest areas for missing & endangered frogs and other wildlife
2. Assess disease and recovery of endangered frog species
3. Assess current status of rainforest stream frogs in Wet Tropics & Eungella
4. Inform management and policy



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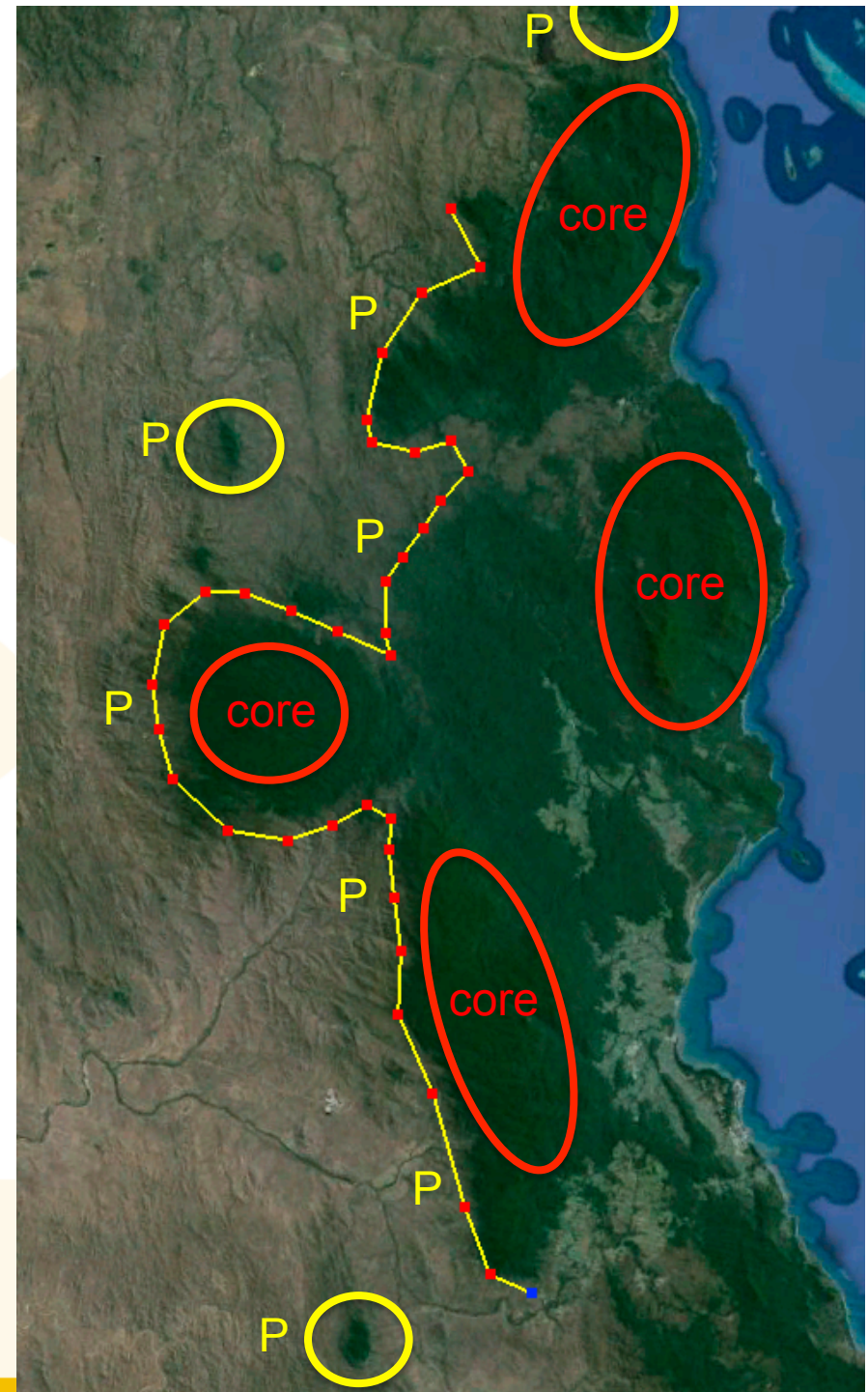
What are 'peripheral areas'?

Core: main rainforest areas

Peripheral: around the edge & isolates

Peripheral areas are:

1. Dry western edge of Wet Tropics & Eungella
2. Wet forest outliers to Wet Tropics & Eungella

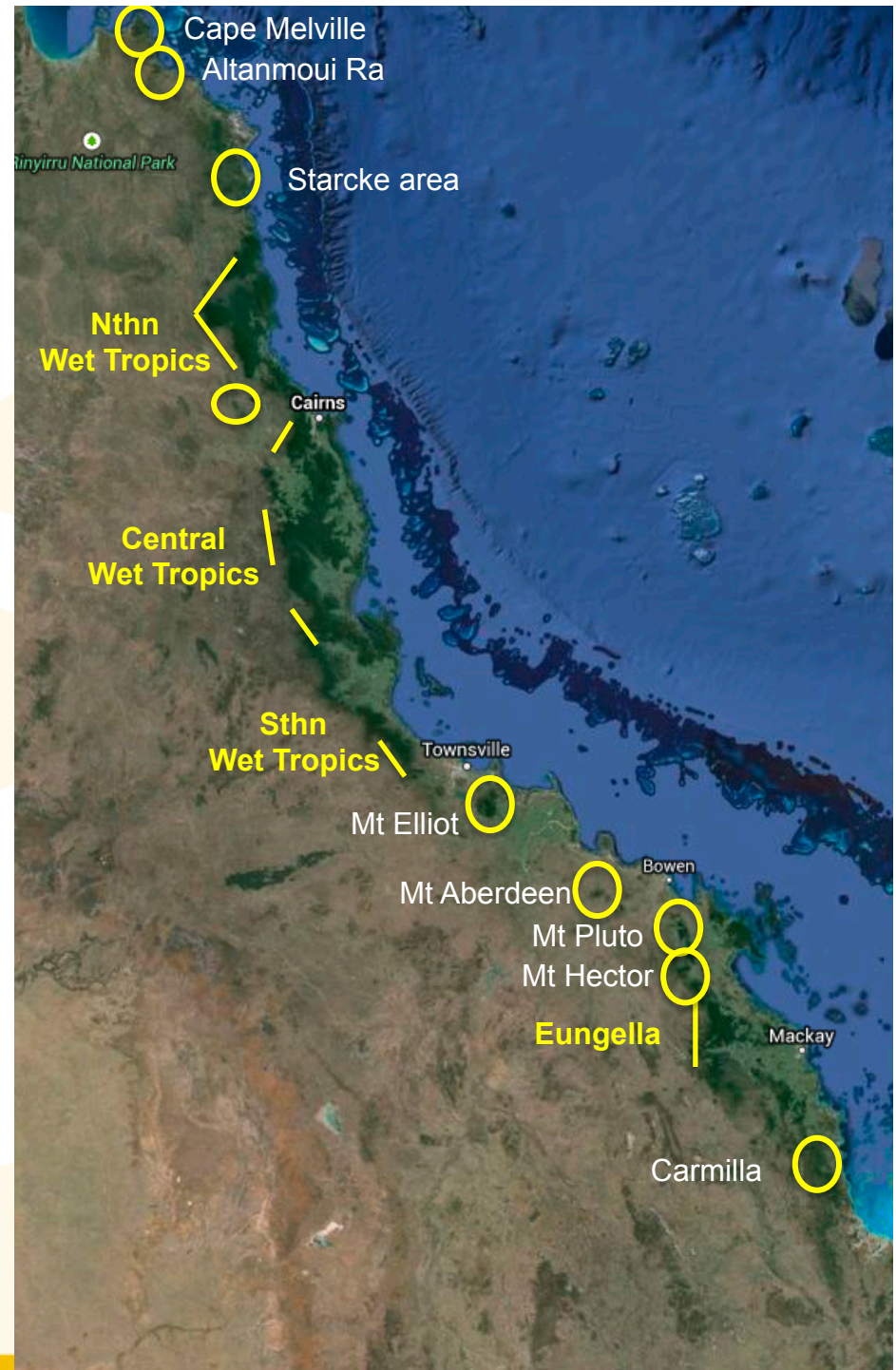




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Map of peripheral areas targeted

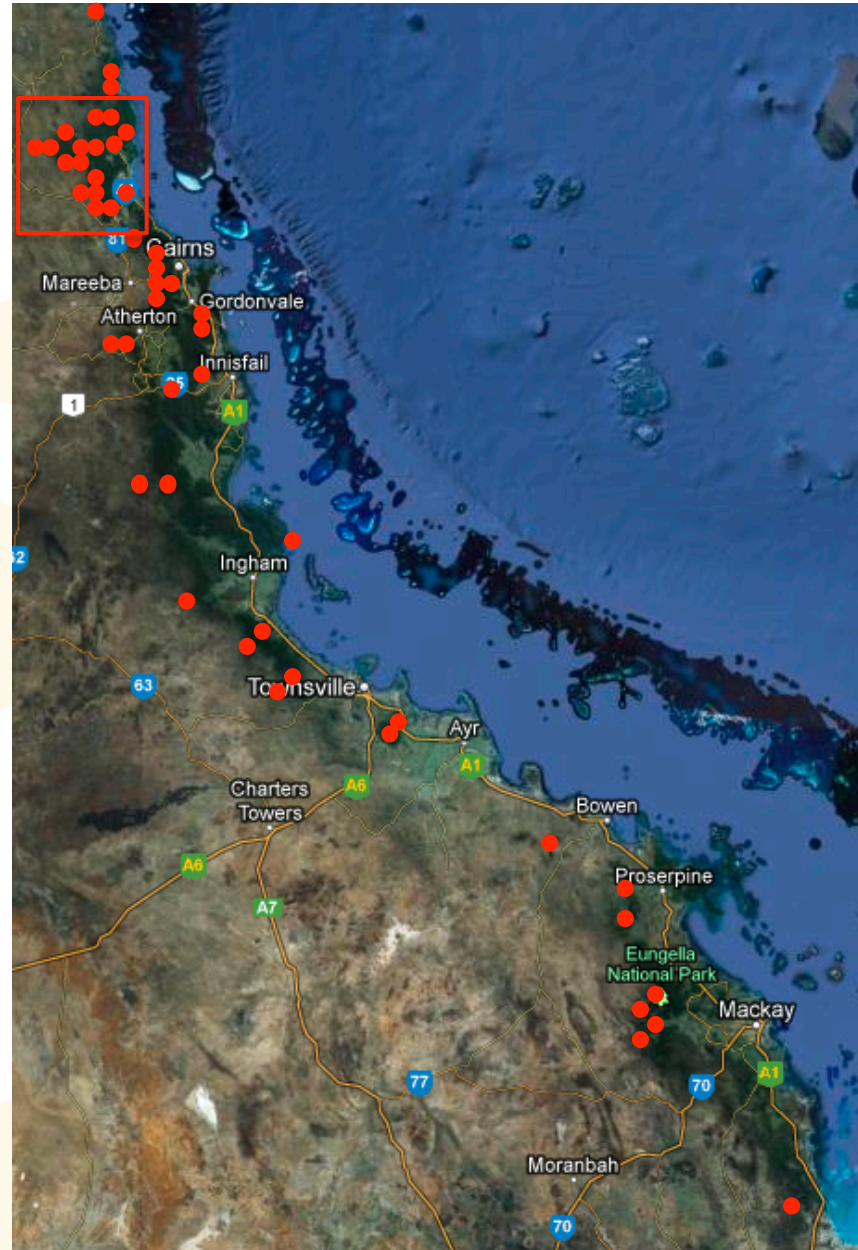
Essentially N, S & W
of the Wet Tropics & Eungella

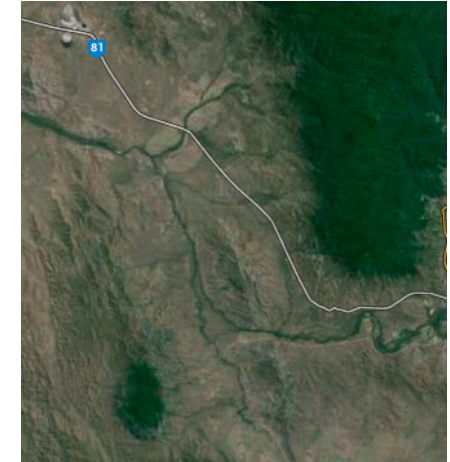




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Survey sites completed



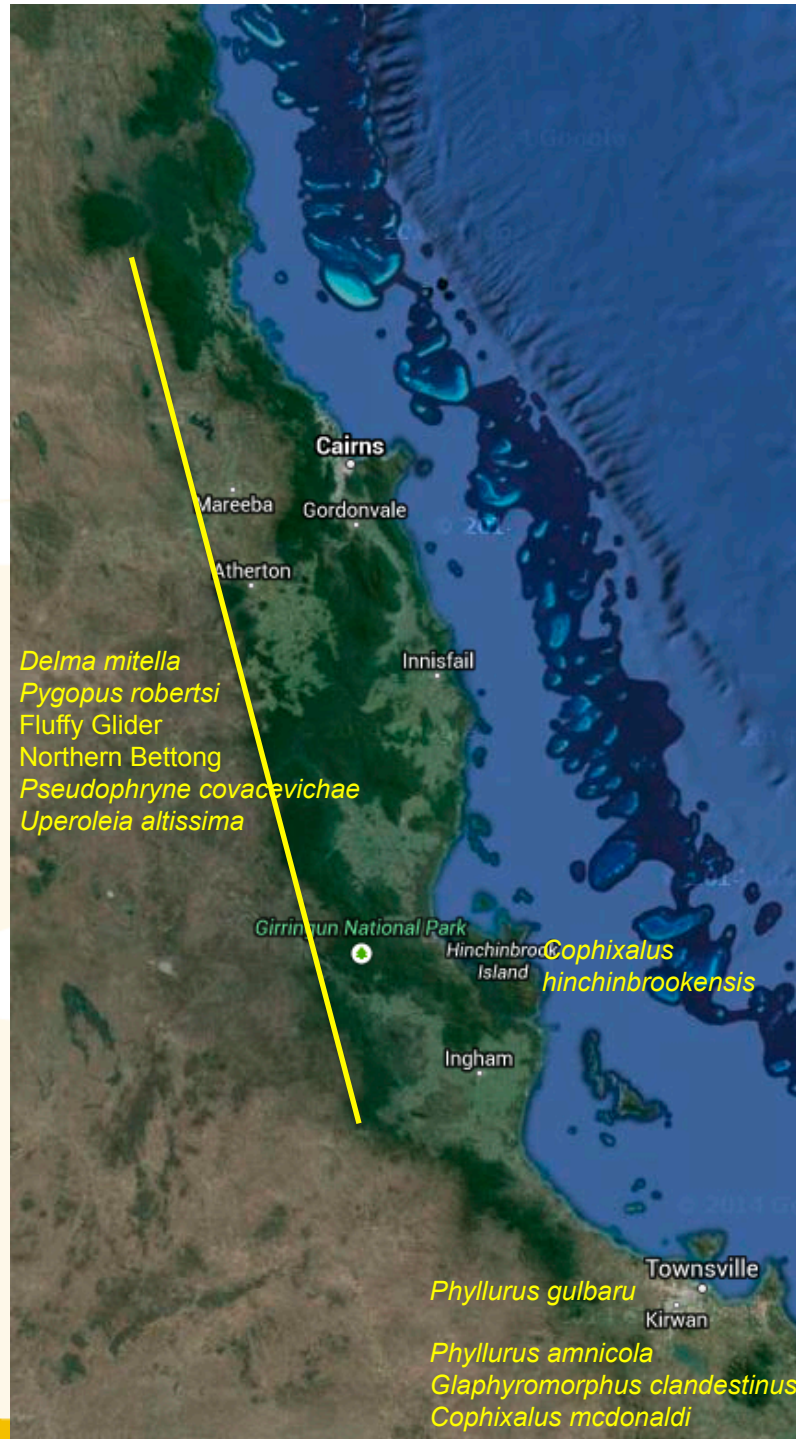


Why are peripheral areas important?

- They have unique species and communities
- Populations exist under different environmental conditions:
 - abiotic (climatic – temperature, rainfall, seasonality)
 - biotic (species interactions – competition, disease)
- Areas of current evolution – adaptation to different climatic conditions, etc.
- Important to retain variation within species for resilience to future change
- Isolates are like islands – lack of connection may be good for evolution or isolation from factors like disease
- Poorly surveyed



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Rainforest frogs have declined globally

Principally due to chytridiomycosis disease caused by the 'chytrid' fungus (*Batrachochytrium dendrobatidis*)

Over 100 frog species have gone extinct in last few decades – probably more.

Chytrid probably African origin, spreading globally

Infects keratin: frog skin, tadpole mouthparts

Ultimately overcomes frog, leading to death

Populations decline suddenly, often in a single year

Frogs hit hardest in cool, wet environments





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Australian rainforest frogs have been hit hard

Many species declined suddenly through the 1980s and 1990s

Rainforest stream frogs worst hit, particularly in the uplands (> 500 m)

Wet Tropics:

Extinct?: *L. nyakalensis*, *T. acutirostris*, *T. rheophilus*

Declined: *L. lorica*, *L. nannotis*, *L. rheocola*, *L. dayi*

Eungella:

Extinct?: *Rheobatrachus vitellinus*

Declined: *T. eungellensis*, *T. liemi*, *Adelotus brevis*



Dead *Litoria serrata* in Wet Tropics



Rheobatrachus 'giving birth'



Taudactylus liemi, Eungella

Frog declines in the Wet Tropics – patterns of persistence

Lowland rainforest (*L. nannotis*, *L. rheocola*, *L. dayi*)

Peripheral dry forest areas (*L. nannotis*, *L. rheocola*, *L. lorica*)

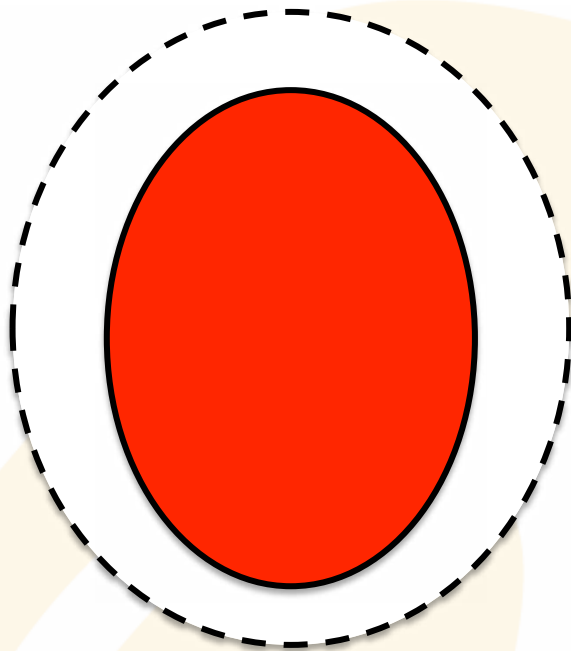
Some endangered frogs can survive chytrid under warmer conditions





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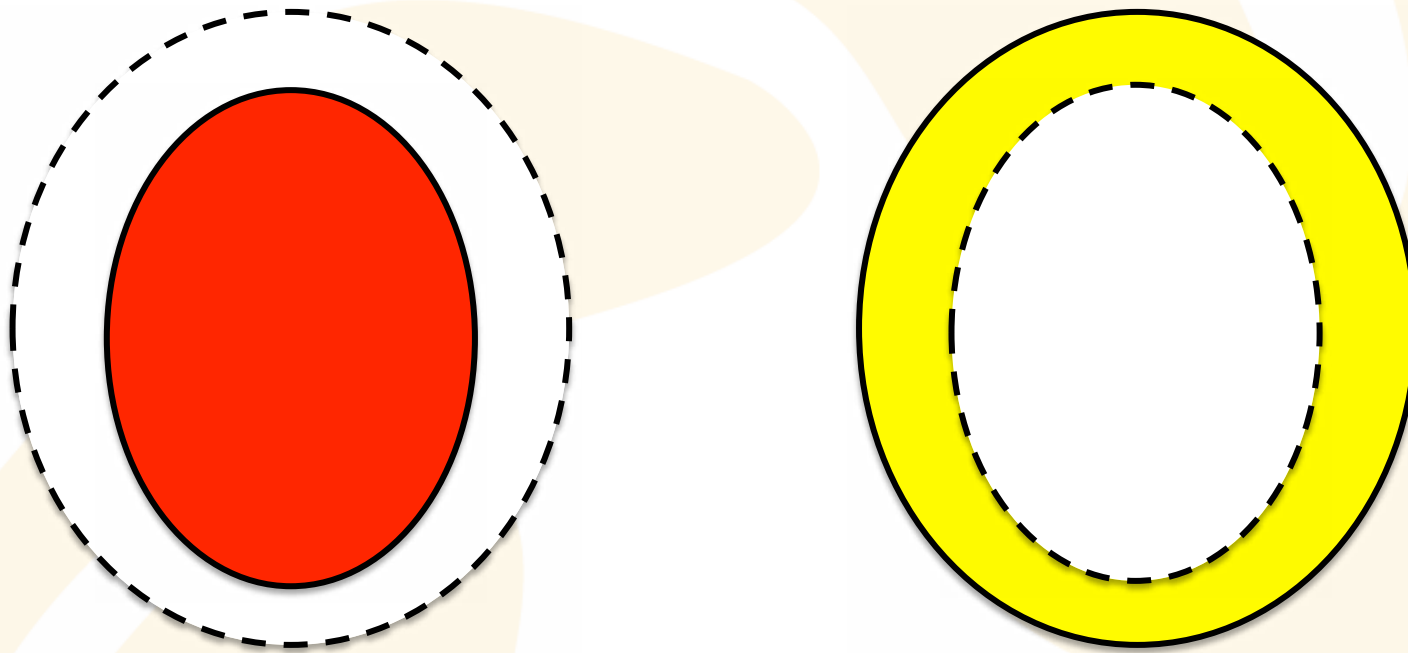
We typically think of threatened species contracting to core areas (e.g., contracting up mountains due to climate change)





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Frog species persisted on peripheries

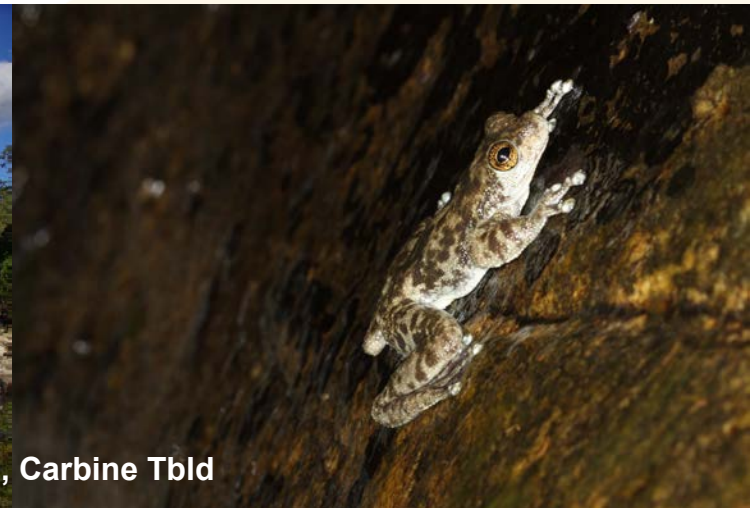


The Armoured Mistfrog (*Litoria lorica*)

Missing for 16 years – rediscovered in 2008

Single known population, occurs in dry forest on Carbine Tableland

Persisting with chytrid fungus; probably due to warmer environmental temps
(Puschendorf, Hoskin et al. *Cons Biol.* 2011)



Focus today on threatened frogs and northern Wet Tropics

Reminder of aims:

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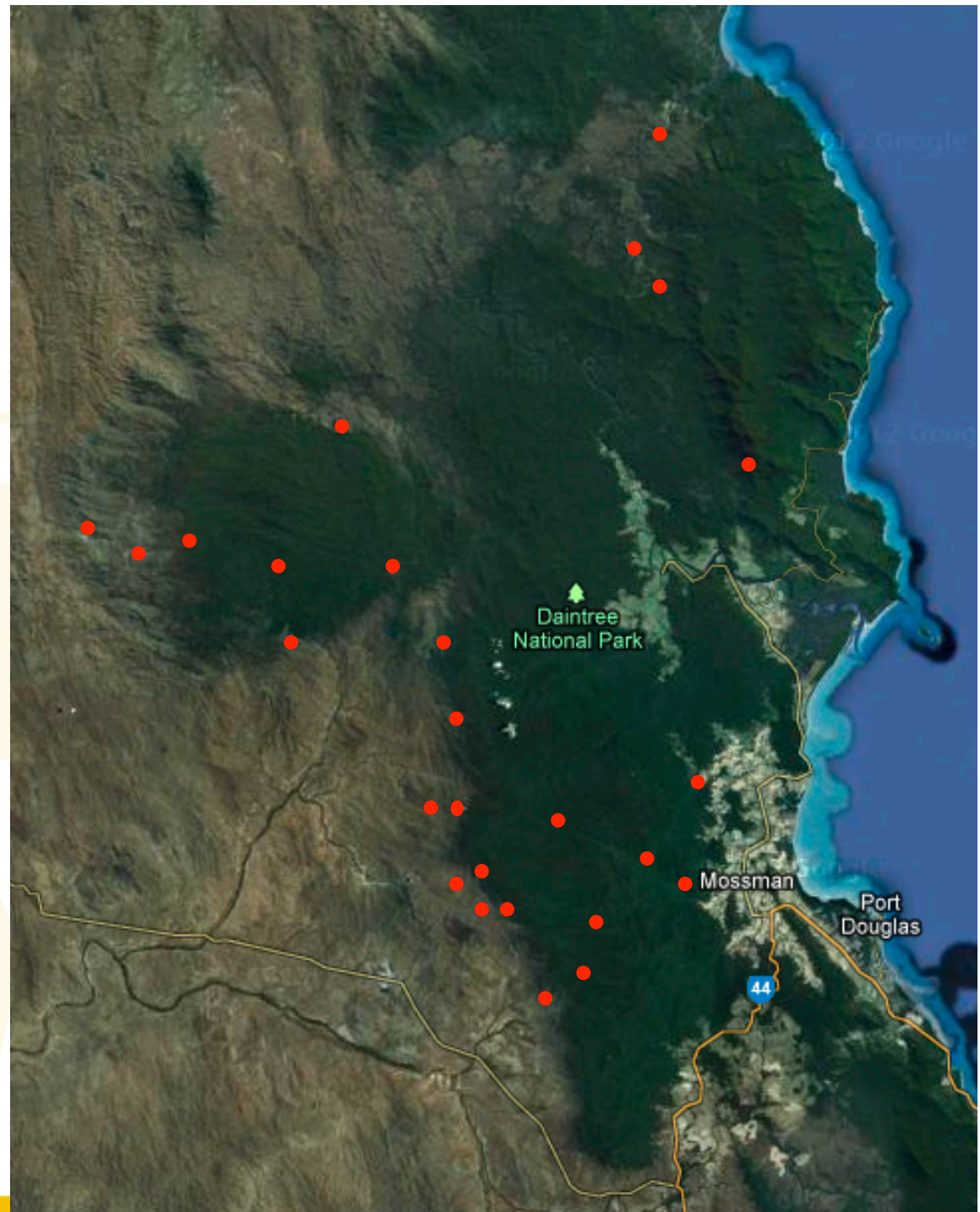
Threatened frogs persist at peripheral western sites

L. nannotis at nearly all sites

L. rheocola at some sites

L. dayi at some

Very high densities of *L. nannotis*
at dry sites, even up to 1000 m

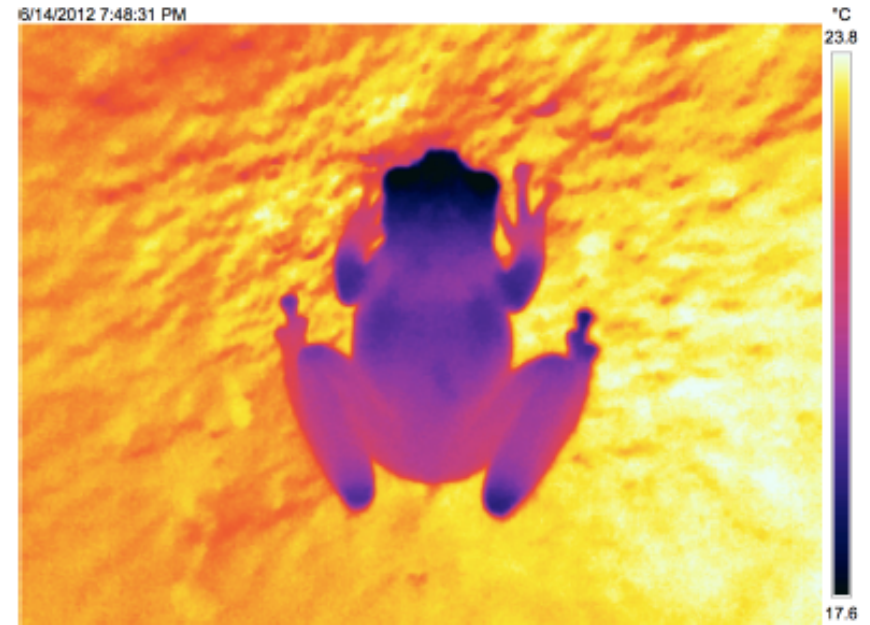




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Hot rocks = hot frogs

**Persistence at hotter, drier sites
despite high chytrid prevalence**





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Recovery of some species back into high altitude rainforest

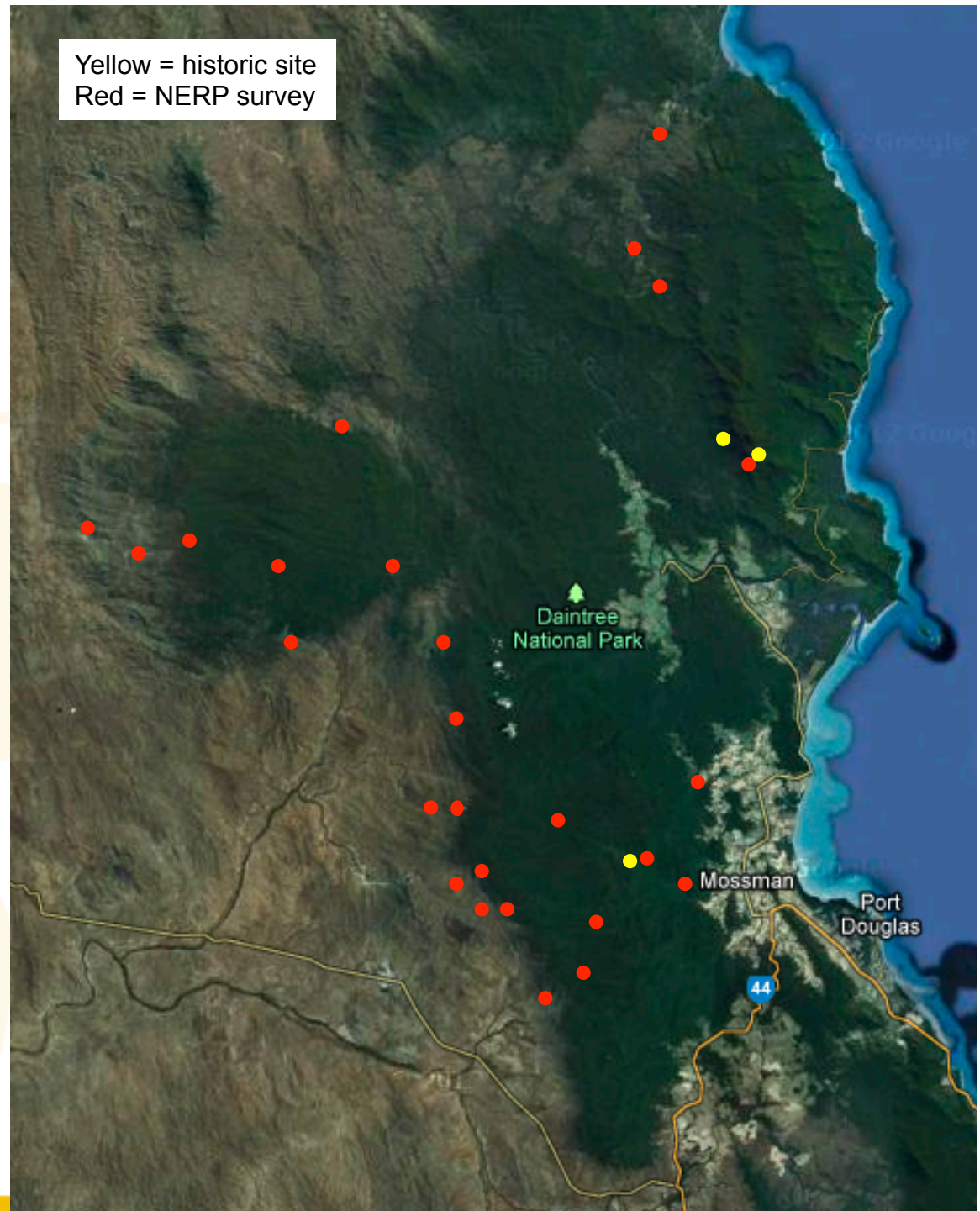
L. nannotis & *L. rheocola* now back at
some upland sites on the western
Carbine Tableland

This suggests some level of immunity
has evolved that is allowing frogs to
tolerate chytrid under cooler conditions

The Armoured Mistfrog (*Litoria lorica*)

No other populations found

Almost certainly restricted to a
single population



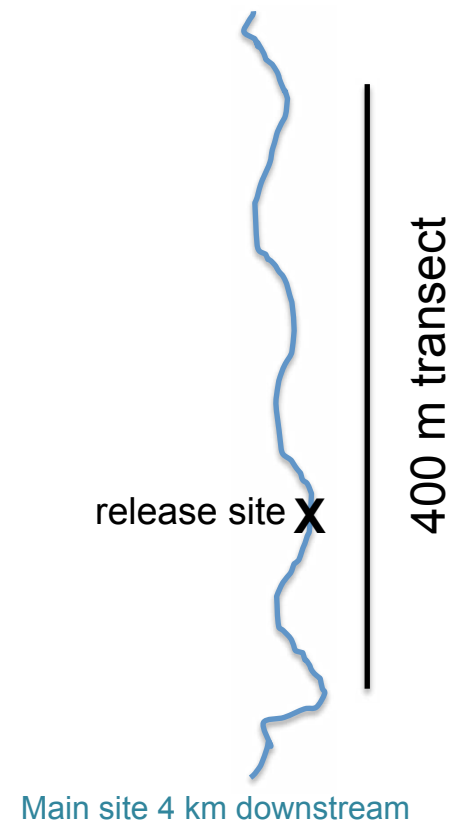
Reintroduction of *L. lorica* to establish a 2nd wild population

40 frogs (20 males, 20 females) moved early Sept 2013

Most females gravid

Moved to another long-term transect 4 km upstream

Collaboration with EHP & Western Yalanji Aboriginal Corp.



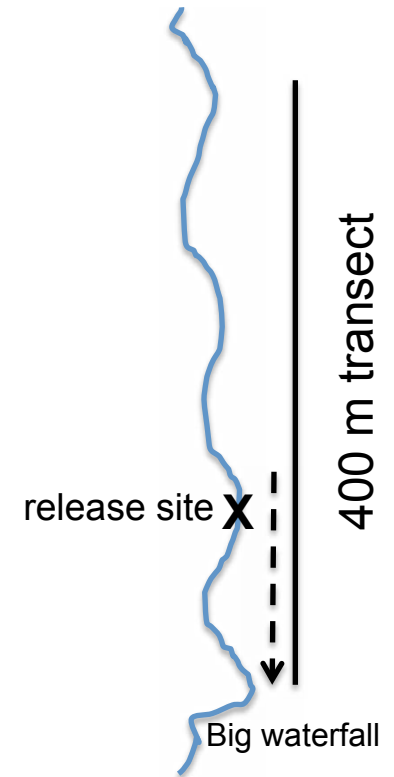


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Reintroduction: monitoring to date (1 year)

Some *L. lorica* have survived their first year

Including gravid females—presumably 2nd clutch



Is the Northern Tinker frog (*Taudactylus rheophilus*) extinct?

Not looking good

Call recorders deployed at historic sites



Photo: M. Cohen



Implications for policy and management

Keep monitoring populations to assess persistence and recovery, and the mechanisms underlying this

In particular, keep monitoring *L. lorica* populations & assess reintroduction success

Potential role of reintroductions as a tool in frog conservation

Change EPBC listings of some threatened frog species

Peripheral areas are vital for the long-term resilience of the Wet Tropics
- peripheral pops may best respond to future change

Manage these areas and work with neighbours (TOs, AWC, cattle properties)

Maintain links between habitats/populations to enable recolonisation

Acknowledge impact of diseases and invasive species – biosecurity issue

THANK YOU

NERP for funding

JCU, EHP and QPWS

Megan Higgie, Anders Zimny

QPWS: David Sherwell, Sam Dibella, Brendan Malone,
Andrew Millerd, Andy Baker

EHP: Alastair Freeman, David Murphy
Western Yalanji Aboriginal Corporation



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