



A Look at Frog Calling Patterns in Australia

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01

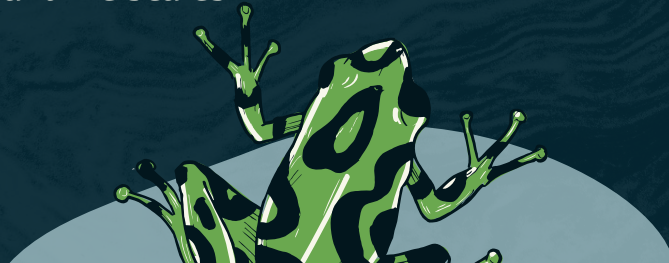
Introduction & Motivation

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- ~40% of amphibian species are threatened globally
- Frogs rely on calling behavior for reproduction
- Understanding frog call frequency helps with monitoring & conservation
- Australia has high frog biodiversity with species under environmental pressure

Motivation: Understanding frog calling behavior helps improve ecological monitoring and conservation efforts.

Research Question: How do calling patterns vary between species and tribes across daily and seasonal time scales?





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Introducing Our Data

Frog Dataset

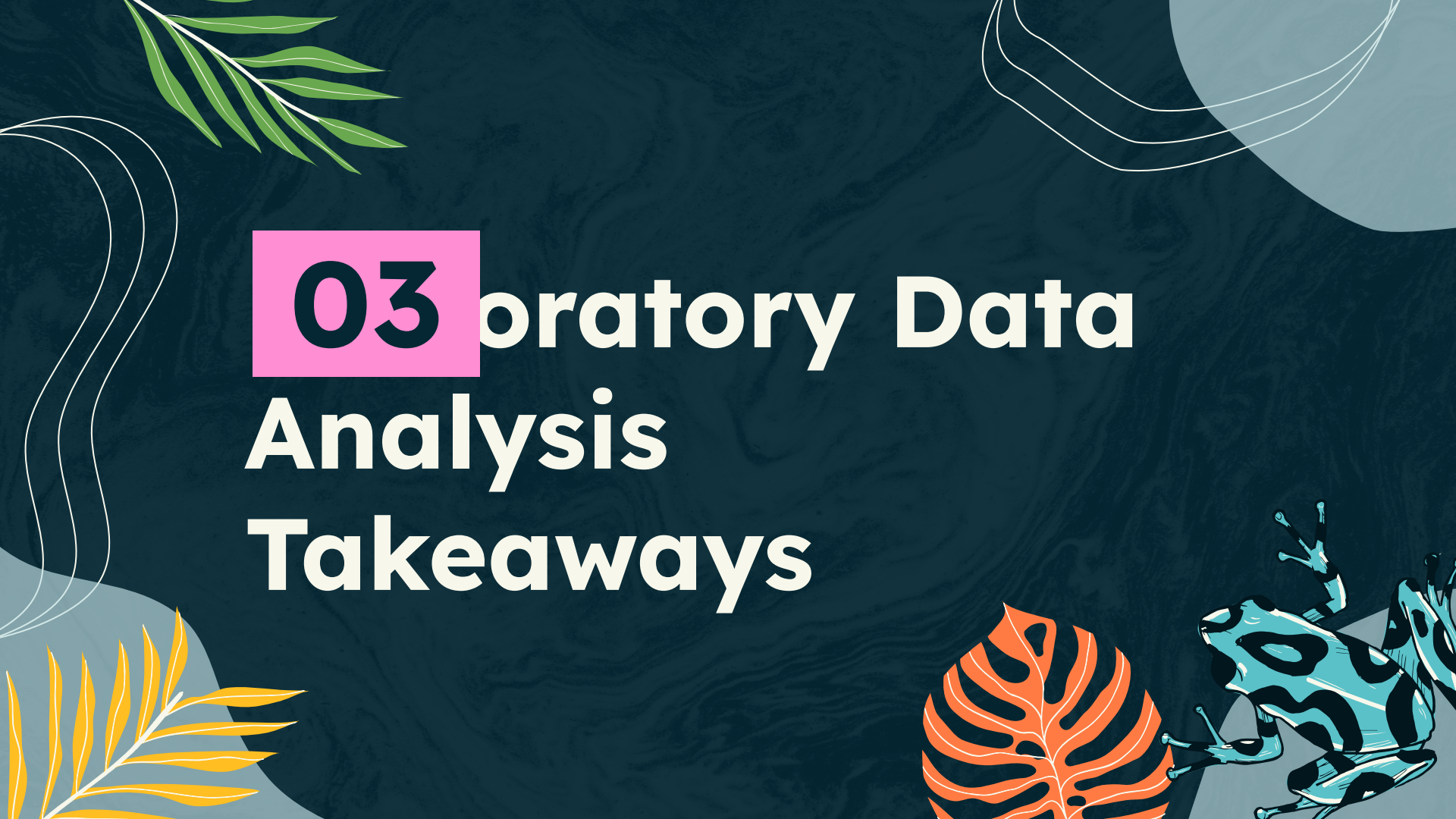
The **frog_data** dataset comes from two separate data frames from TidyTuesday database:

frogID_data : Users record frog calls via the FrogID mobile app (Australia, 2023). Experts verify each recording and assign a scientific name. (136,621 recordings)

frog_names : Compiled from field observations and peer-reviewed scientific publications from Australian Society of Herpetologists Official Species List (2025).

Variables used to answer our research question

scientificName	Indicates the species of the frog
eventDate	Date of frog recording which → Used to establish the aus_seasons variable.
tribe	Indicates the tribe which a frog species belongs to
eventTime	Time of recording → Used to establish the hour variable.
aus_season	Indicates seasonal period during which the call was recorded (spring, summer, autumn, or winter)
hour	Hour of recording (military time ranging from 0-24)



03 Laboratory Data Analysis Takeaways

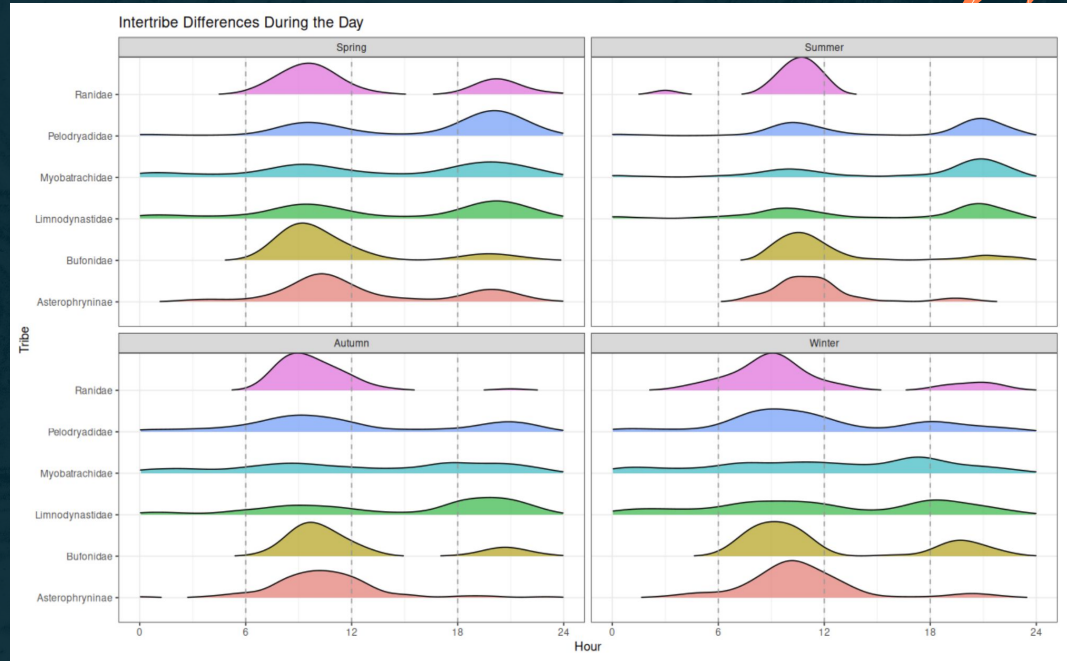
Initial Inter-tribe Comparison

- Following a top-down investigation of temporal calling
 - Comparison Between Different Tribes
- Main Patterns:
 - Most tribes follow similar trends in calling patterns throughout the day and year
 - Extent of calling greatly differs

I. Seasonal Differences

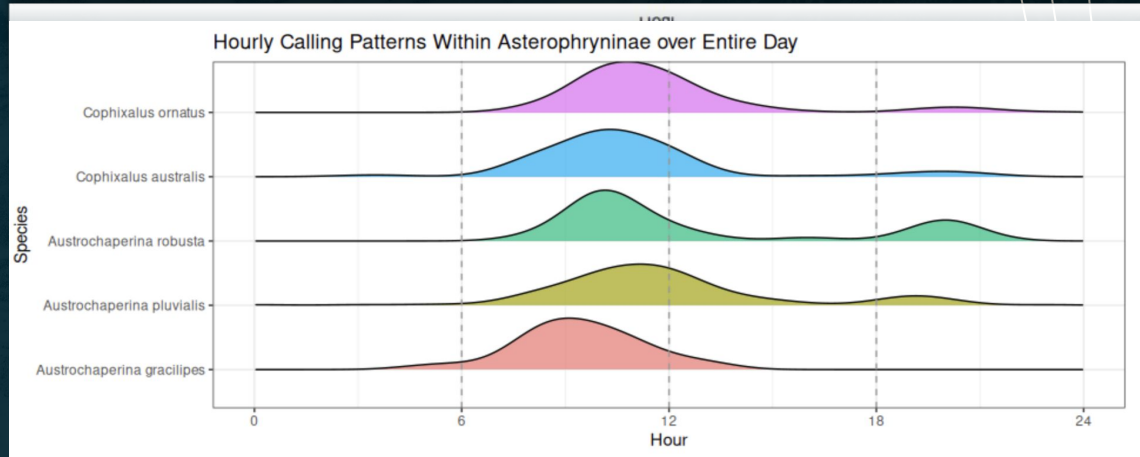
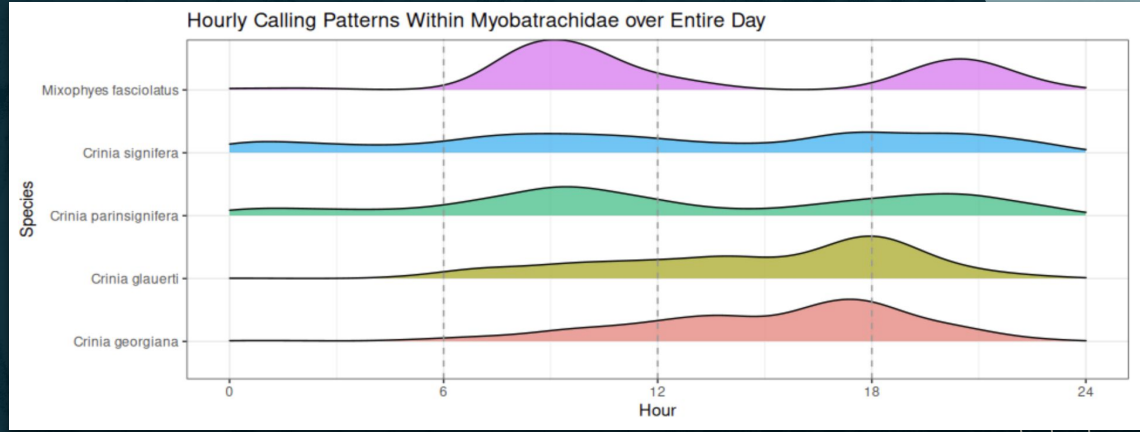
A. Not Many Temporally

B. Noticeable change in calling activity of certain hours



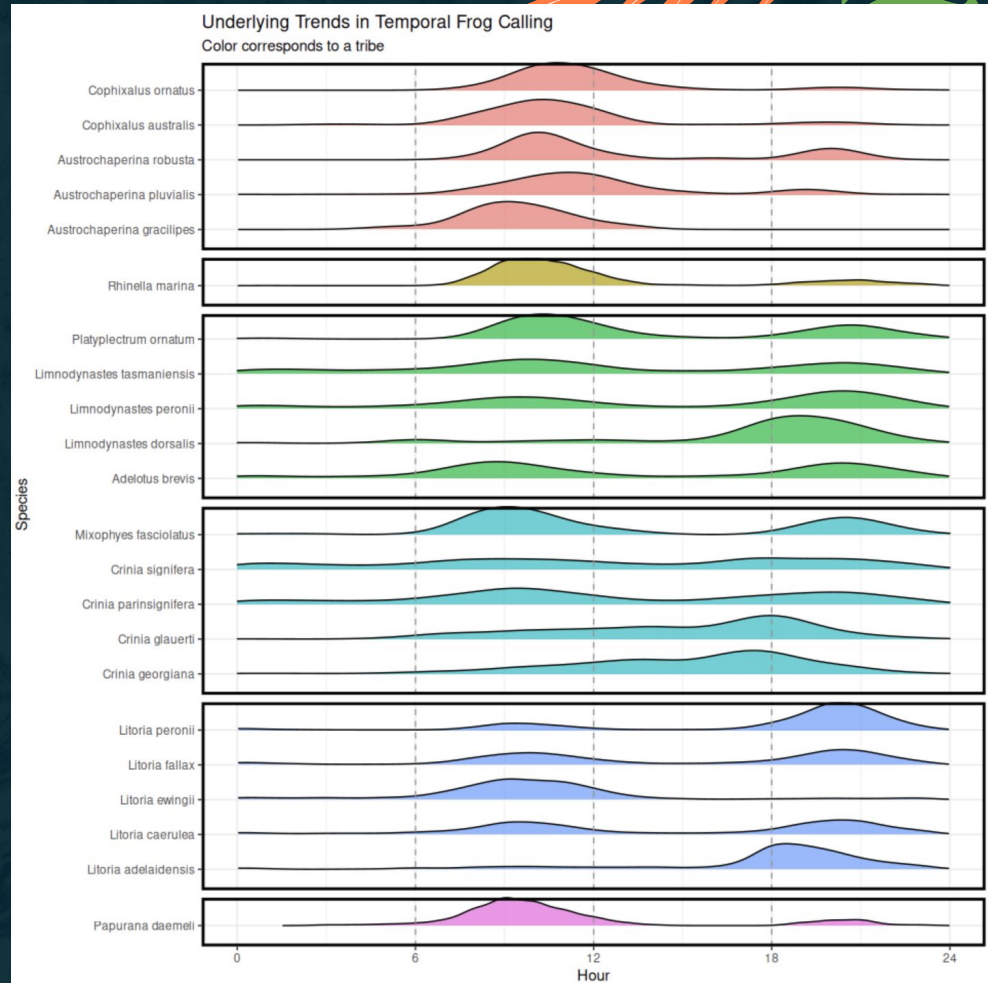
Subsequent Intra-Tribe Comparisons

- Look at how calling patterns differ between species in same tribe
 - Picked 5 most recorded species
- Minor differences in the timing of some calls
- **Main Takeaways:**
 - 1. Relative frequency of occurrences match
 - Broader temporal patterns match



Emerging Patterns

- **Intra vs. Intertribal Callings**
 - Differences between both
 - Species in same tribe occupy more similar temporal niche
- **Daily Calling Patterns**
 - Most species have main calling period between 6am and 12pm
 - Many have later period around 6pm to 12am
- **Seasonal Calling Patterns**
 - No drastic shift in timing
 - Slight change in extent of calling recorded





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Discussion & Conclusions

Key Conclusions

- Species within the same tribe tend to share similar calling windows- although variation is still present
- Different tribes show more distinct timing patterns especially when peak activity occurs
- Calling behavior does appear to be shaped by both taxonomic grouping (tribe) and time (daily and seasonal)- patterns do not appear random



Implications & Limitations

- Understanding calling timing can help optimize monitoring and conservation efforts (e.g., surveys during peak activity hours)
- An improved understanding of tribe-level patterns may allow for more efficient species detection
- Observations depend on when and where users recorded calls (citizen-science data)
- Exclude ~9000 recordings with unknown tribe observations which limits the strength of our conclusions as well
- The Ranidae and Bufonidae tribes included only one recorded species which limited our intra-tribe comparisons



Thank you!

