

Seasonality And Plasticity In Plant Resource Use by Native Birds in Zealandia



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SANCTUARIES – BEYOND SPECIES RECOVERY

- restoring native species and rebuilding ecological communities
- recovery of ecological interactions as key indicator of restoration success
- long-term research can reveal how species respond to restored and changing environments
- provide opportunity to study ecological processes that are difficult to observe elsewhere



THESIS OVERVIEW

AIM: To investigate temporal patterns in avian ecology and behaviour in the context of natural and human-induced environmental variation across different ecological scales.



Bird-aircraft strikes



Bird-plant interactions

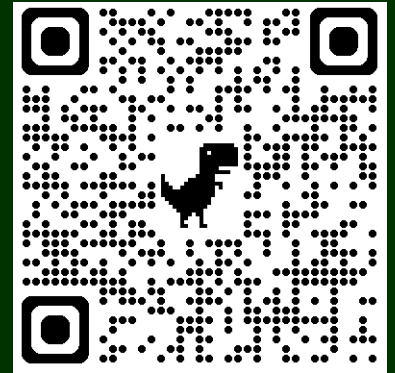


Kākā dietary plasticity



Kākā nocturnal behaviour

Seasonality and dietary diversity in flower and fruit consumption by native birds



Vaishnav & Burns (2025) *NZJE*



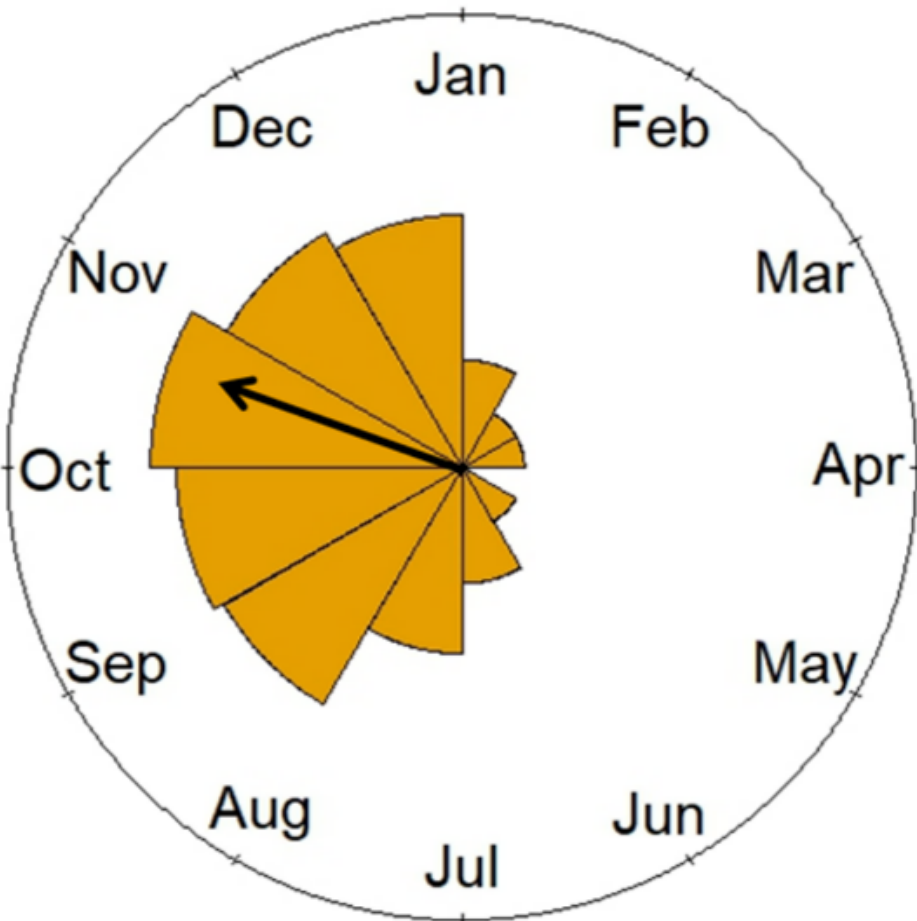
Q₁) Do birds show seasonal patterns in flower and fruit consumption?

Q₂) Are flower and fruit visits temporally separated throughout the year?

Q₃) Do birds use flower and fruit resources differently in terms of diversity and evenness?

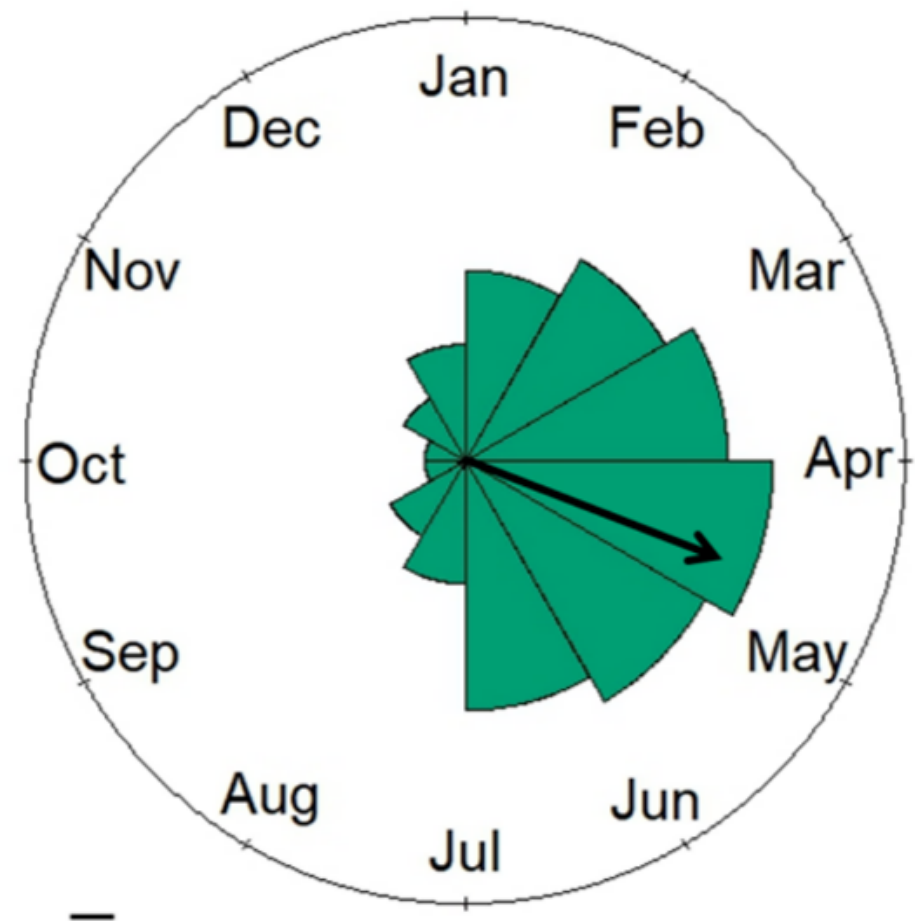
RESULTS – SEASONALITY OF VISITS

Flower visitation



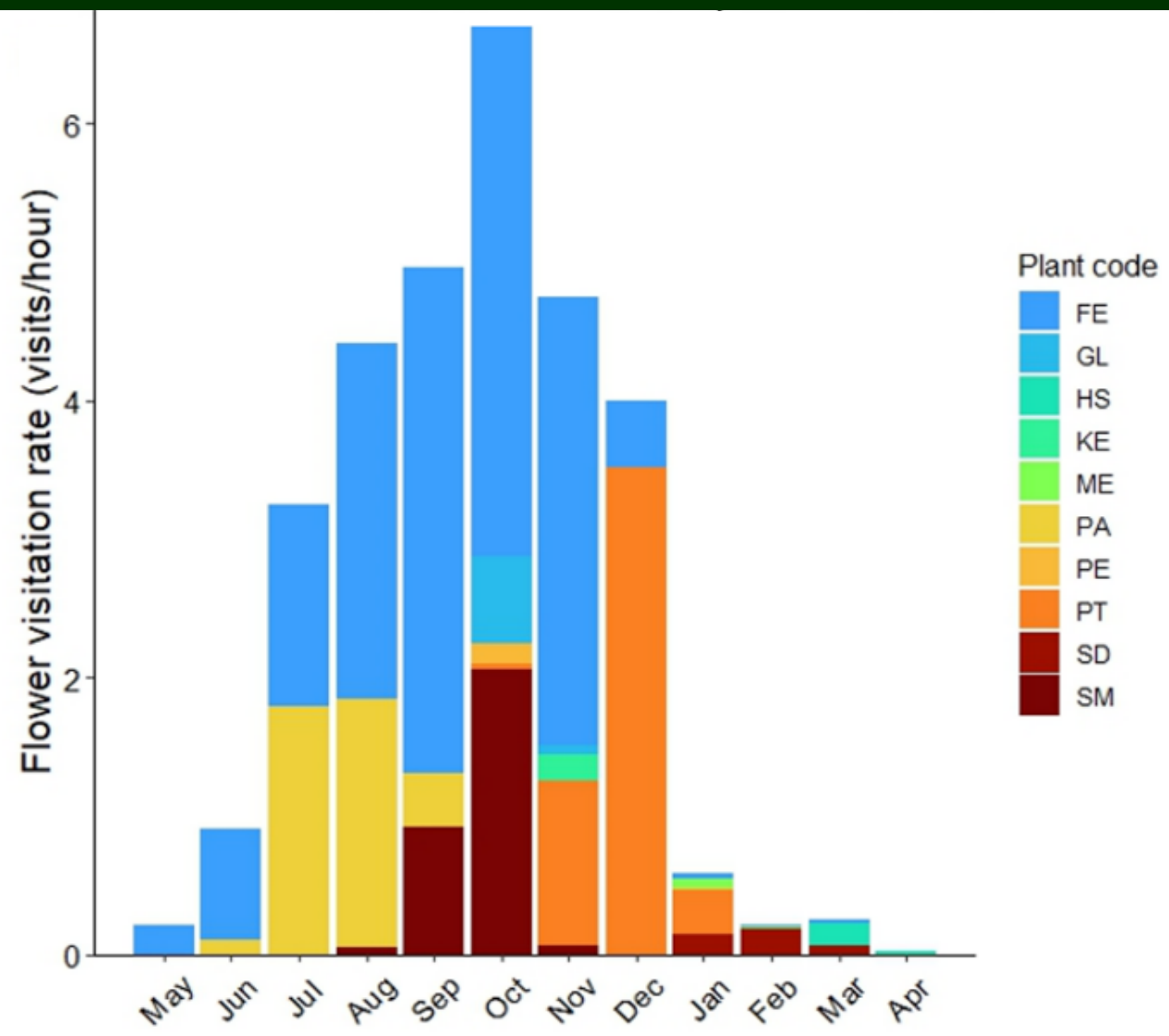
$$\bar{\theta} = 290.3^{\circ} \pm 56^{\circ}, n = 1327$$

Fruit visitation

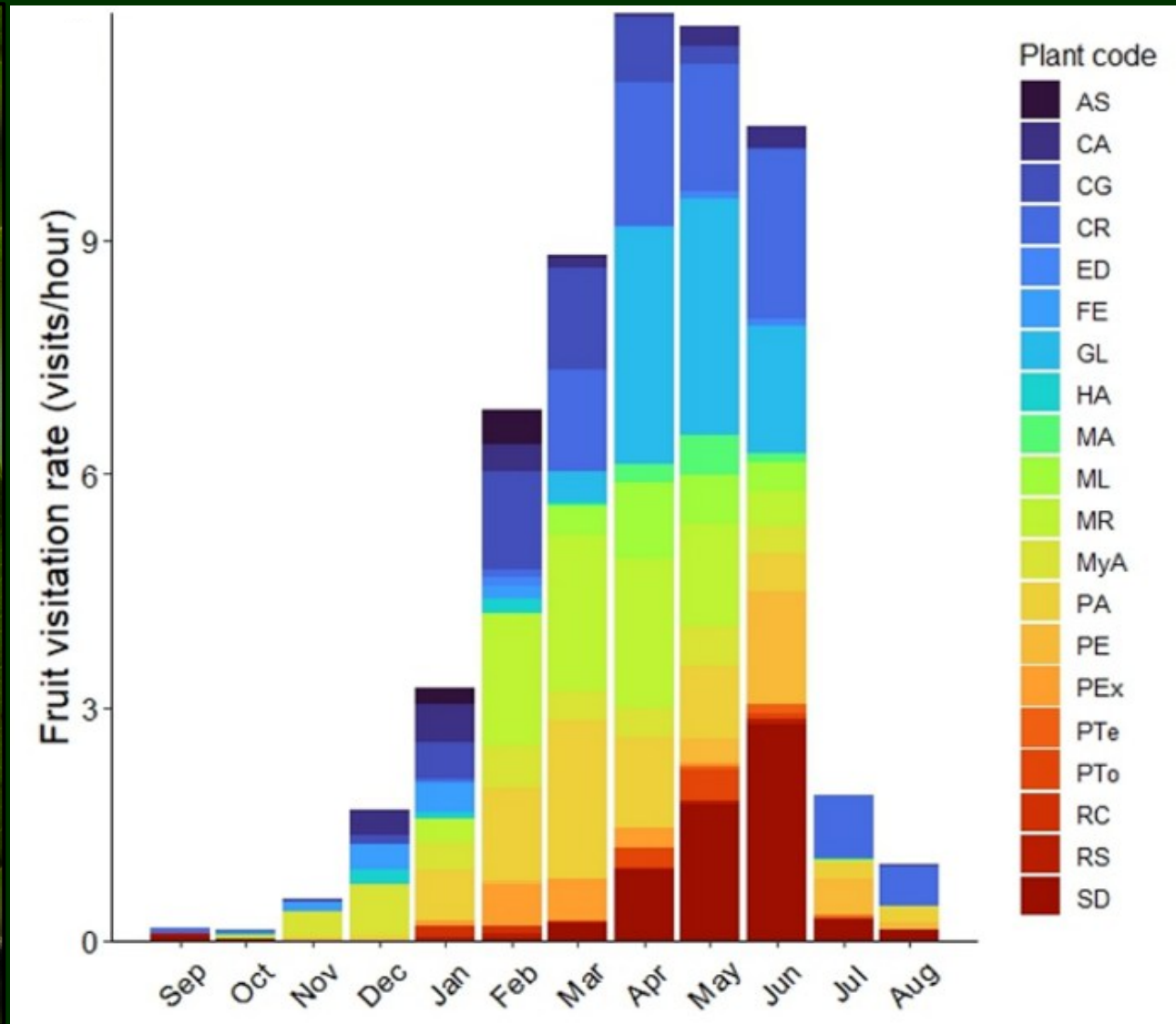


$$\bar{\theta} = 118.0^{\circ} \pm 57^{\circ}, n = 2886$$

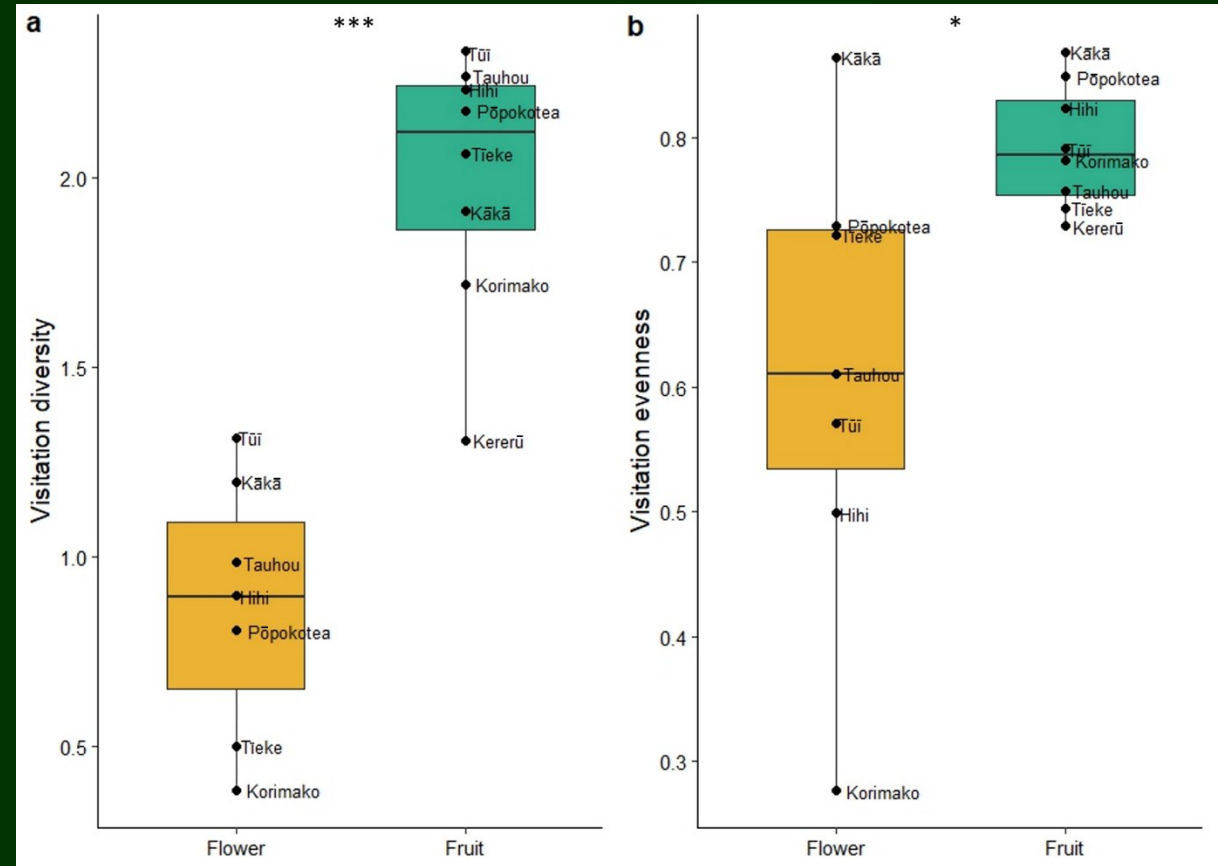
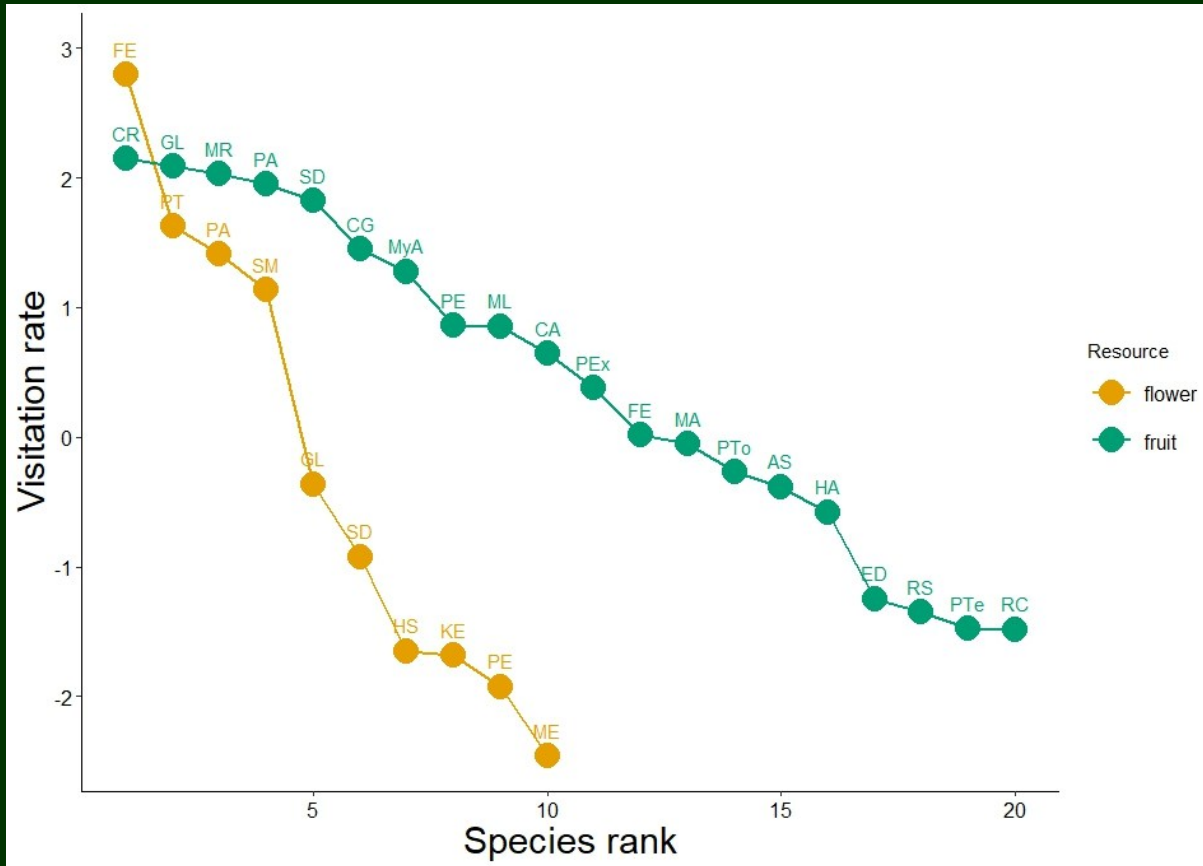
RESULTS – FLOWER VISITS



A close-up photograph of a dark-colored bird, possibly a cockatoo, perched on a branch and holding a small red berry in its beak. The bird has a white patch around its eye and orange-brown markings on its neck. The background is a soft-focus green forest.



RESULTS – DIETARY DIVERSITY AND EVENNESS

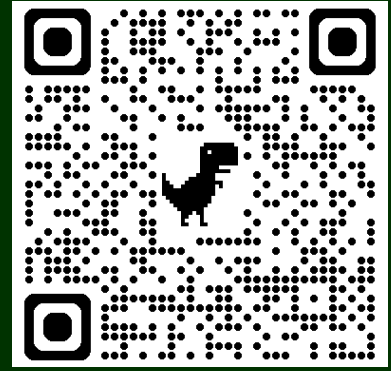


KEY TAKEAWAYS

1. Birds tracked seasonal changes in plant resources
2. Flower and fruit interactions differed in structure
3. Temporal partitioning may reduce competition among plants
4. Some plant species were disproportionately important
5. Long-term baselines are important for conservation



Seasonality and plasticity in the use of native and introduced plant resources by North Island Kākā



Vaishnav *et al.* (2026) *Ibis*



Photo: Riley 2001

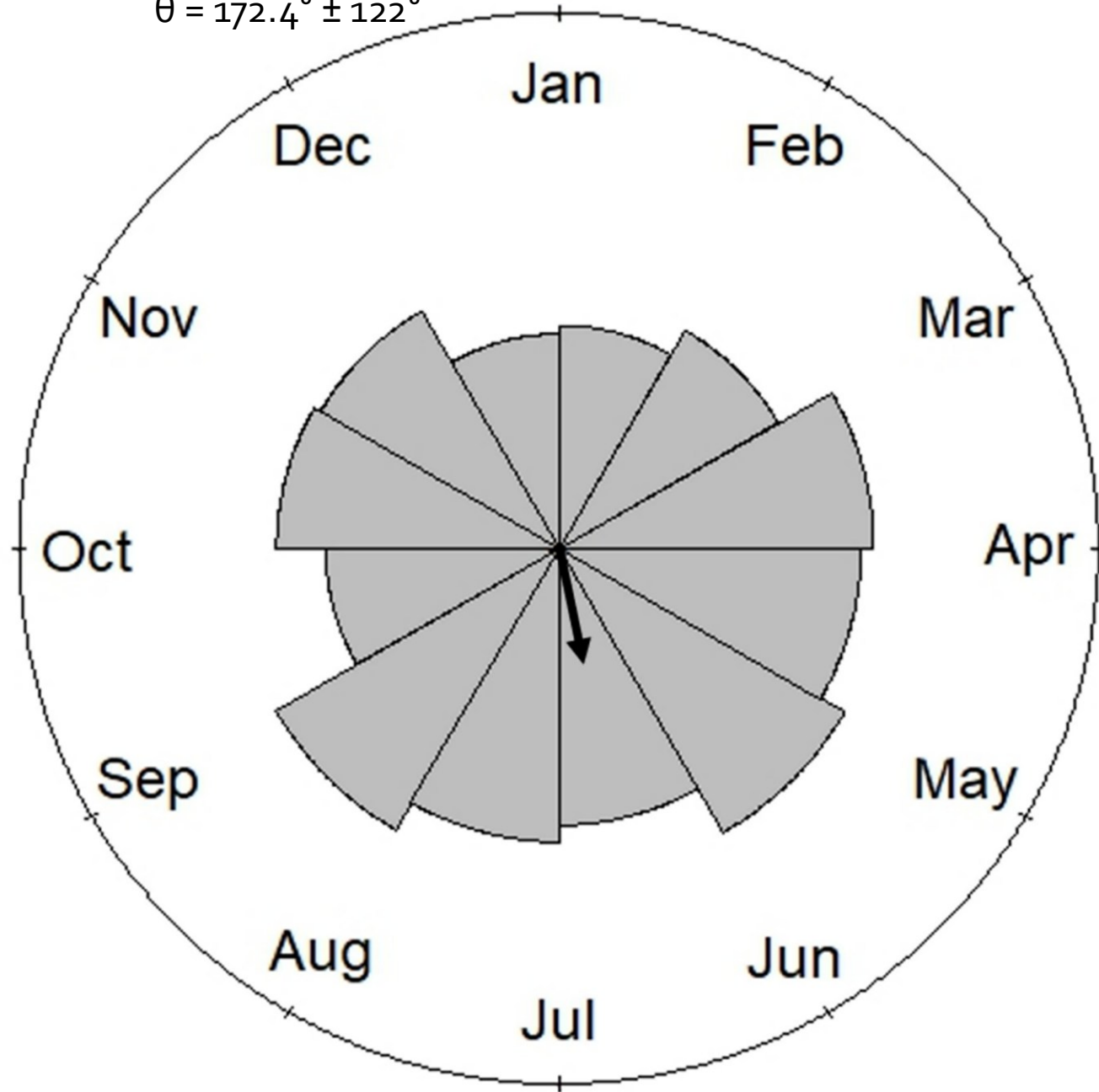
Q1. Do kākā show seasonal variation in diet and foraging activity?

Q2. Does dietary niche breadth change throughout the year?

Q3. How do kākā use introduced pine seeds relative to native food resources?

Kākā monthly foraging frequency (n=485)

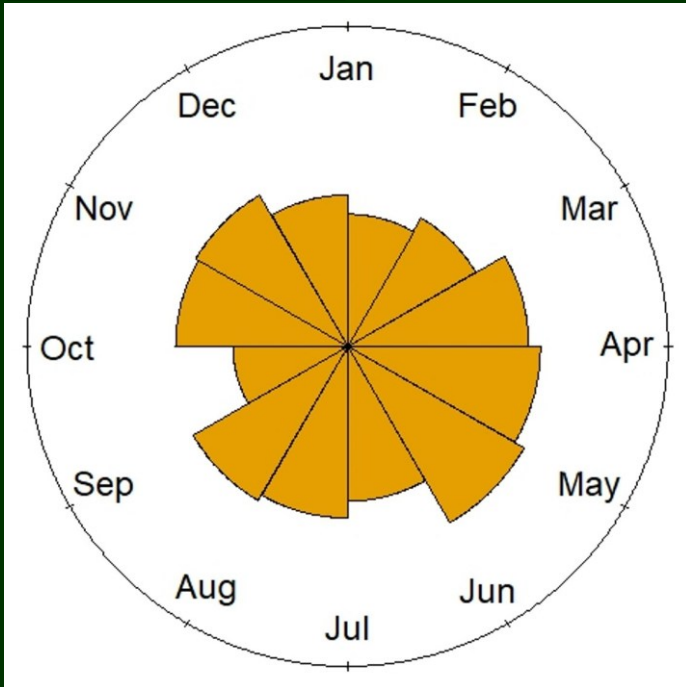
$$\bar{\theta} = 172.4^{\circ} \pm 122^{\circ}$$



RESULTS – FORAGING FREQUENCY

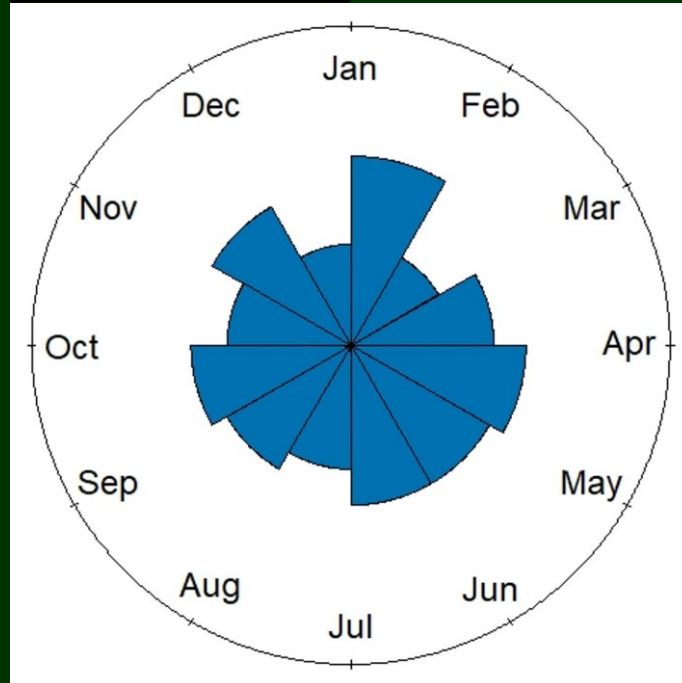
Kākā did not forage uniformly throughout the year and foraging frequency was higher for about half the year, between March and August

RESULTS – SEASONALITY IN RESOURCE USE



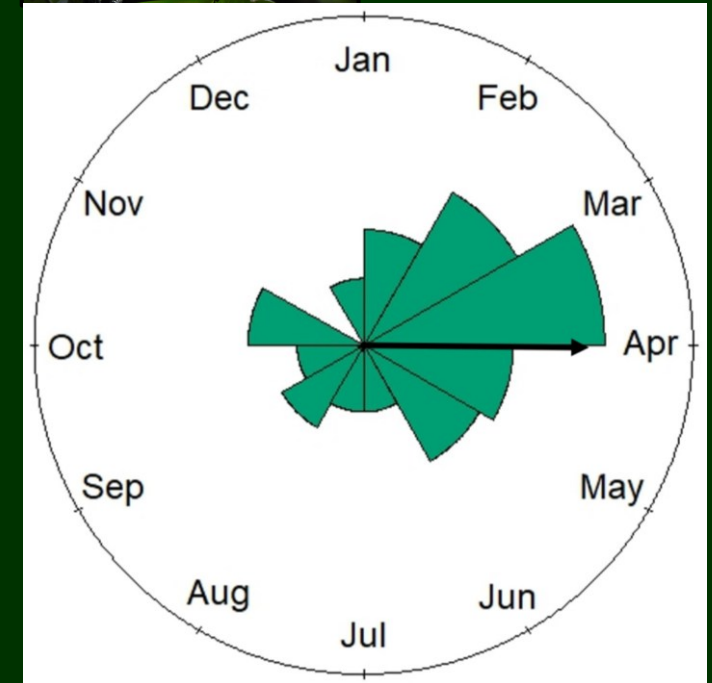
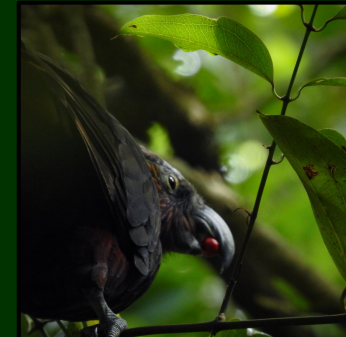
Wood-boring invertebrates

$$\bar{\theta} = 149.9^{\circ} \pm 135^{\circ}, n = 304$$



Pine seeds

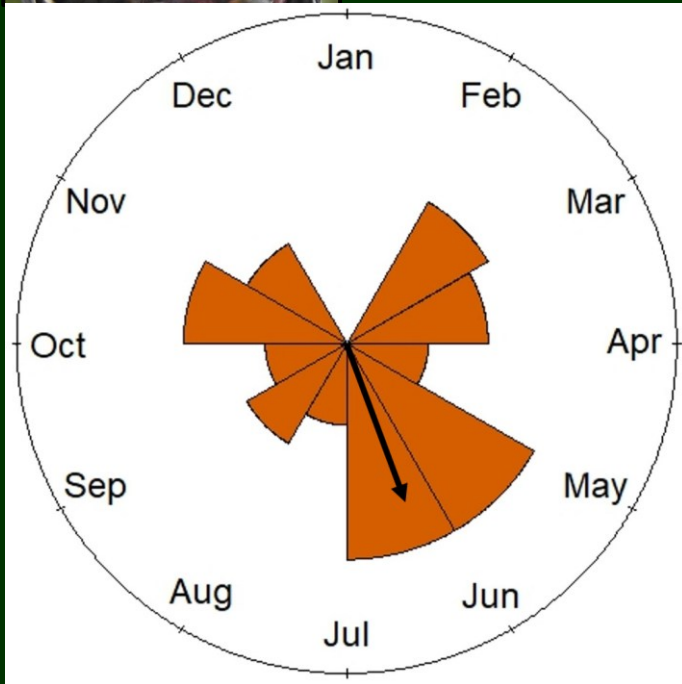
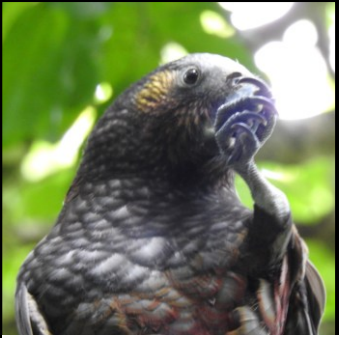
$$\bar{\theta} = 137.5^{\circ} \pm 125^{\circ}, n = 51$$



Fruit

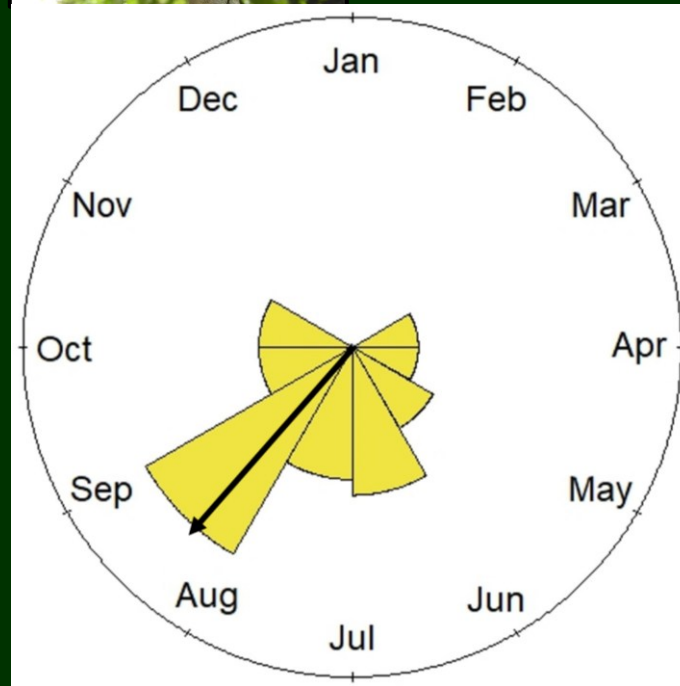
$$\bar{\theta} = 90.6^{\circ} \pm 69^{\circ}, n = 41$$

RESULTS – SEASONALITY IN RESOURCE USE



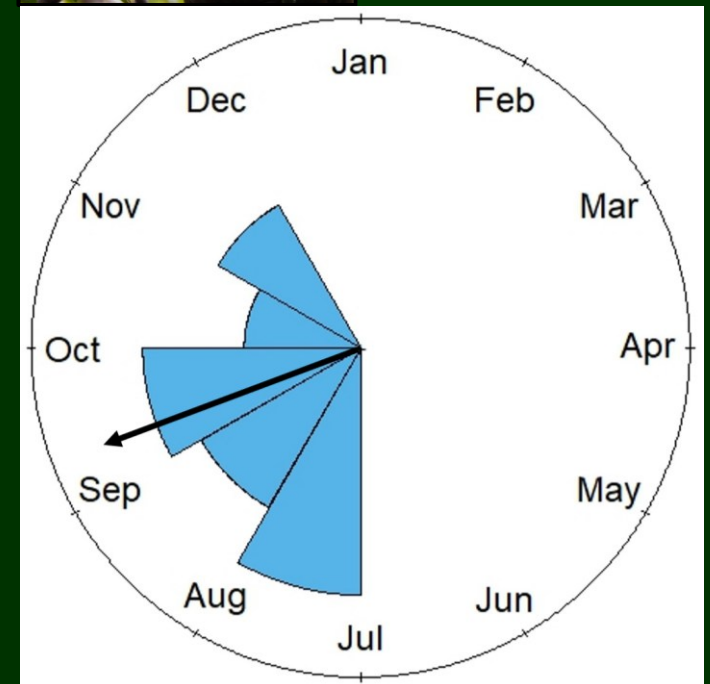
Ground-foraged seeds

$$\bar{\theta} = 162.9^{\circ} \pm 41^{\circ}, n = 32$$



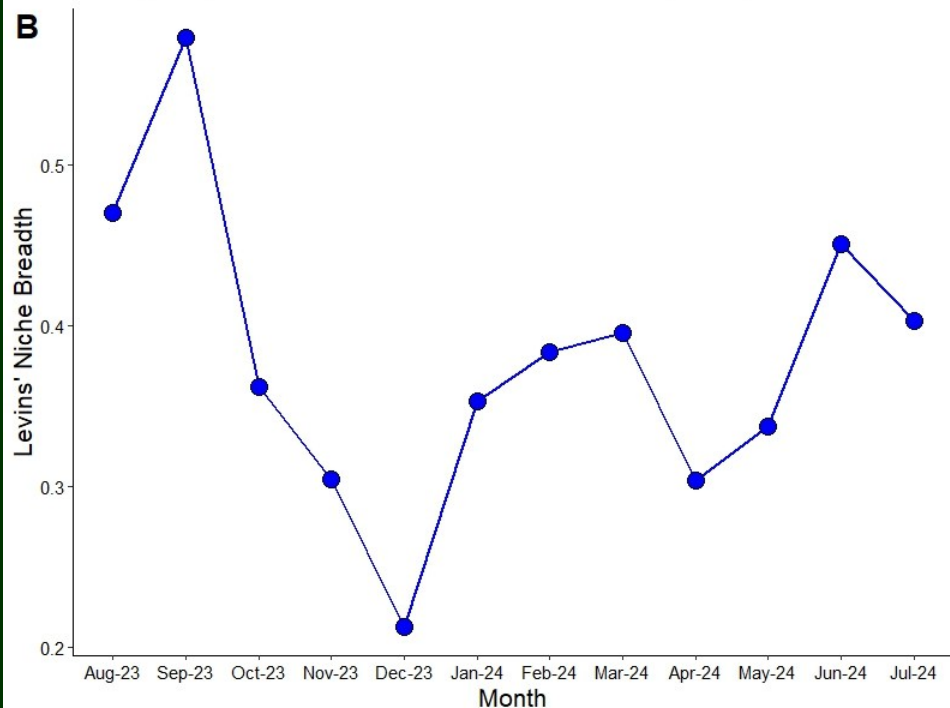
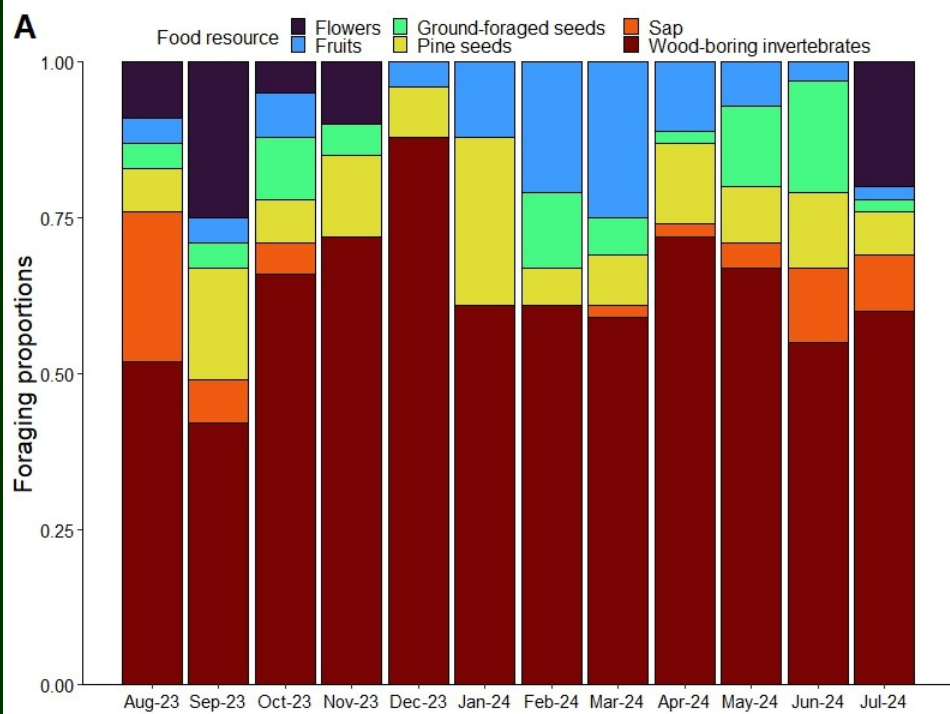
Sap

$$\bar{\theta} = 221.1^{\circ} \pm 48^{\circ}, n = 30$$



Flower

$$\bar{\theta} = 253.4^{\circ} \pm 96^{\circ}, n = 27$$



RESULTS – DIETARY NICHE BREADTH

- Dietary niche breadth was narrowest in December, when kākā foraged predominantly on wood-boring invertebrates
- Kākā foraged more generally on all resources in winter and early spring, with the widest niche breadth in September

KEY TAKEAWAYS

1. Kākā showed distinct seasonal patterns in resource use
2. Introduced pine seeds were consumed year-round
3. Dietary plasticity enables Kākā to exploit novel resources
4. Habitat modification may alter seasonal dietary switching
5. Understanding dietary plasticity is important for conservation



OVERALL CONCLUSIONS



- Ecological restoration extends beyond species recovery
- Seasonal interactions remain central to ecosystem function
- Behavioural flexibility may enhance resilience in changing environments
- Long-term research is critical for understanding recovery
- Sanctuaries offer natural experiments in ecological change and provide unique opportunities for ecological discovery

ACKNOWLEDGEMENTS



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Thank you all for listening!