

Winter Lovin'? Sex and Season Influence Daily Activity Patterns in a Freshwater Turtle Species

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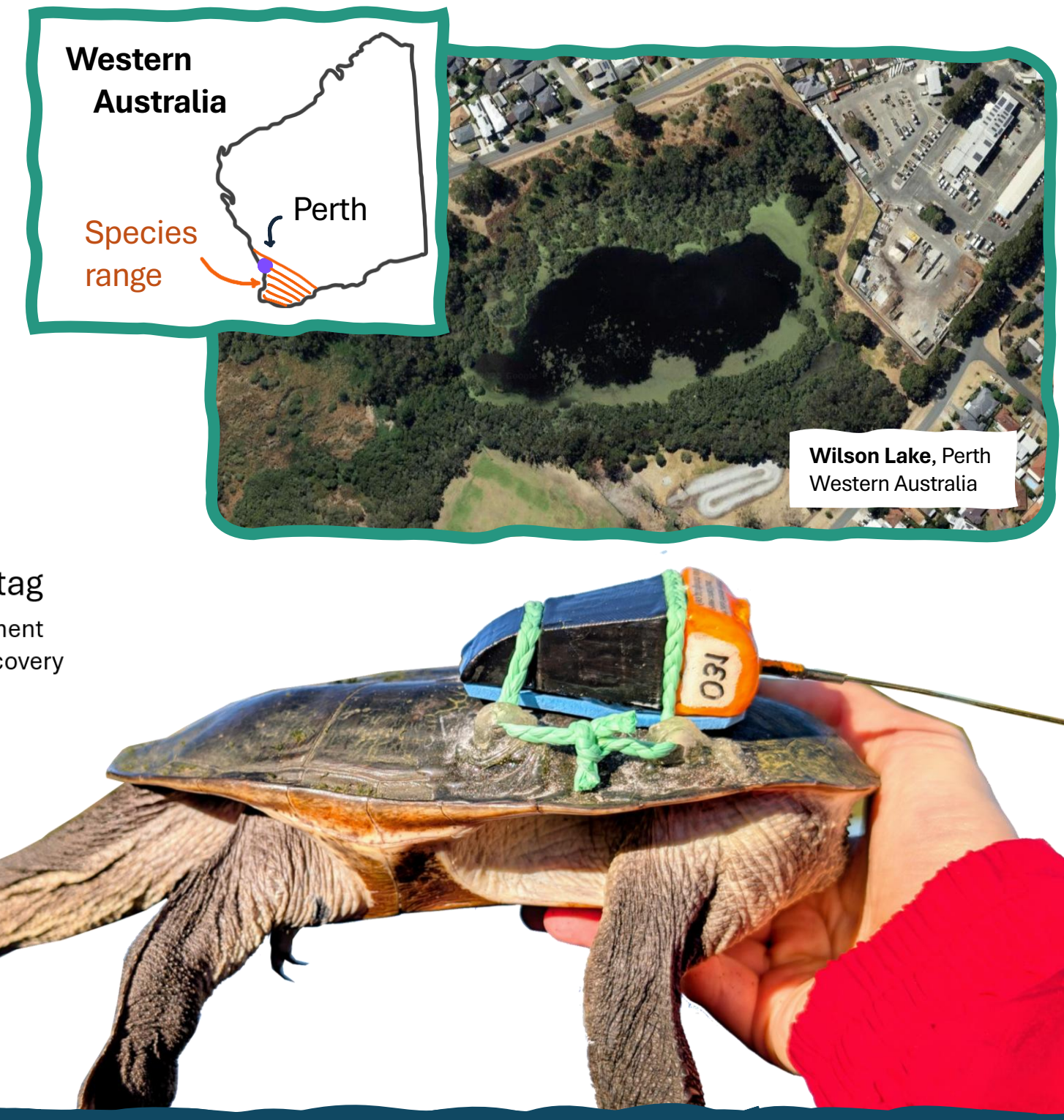
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We acknowledge the Wadjuk People of the Noongar Nation, the traditional custodians of the wetlands and rivers on which this research takes place, and the first to study and conserve the Booyi.

Why? Investigating seasonal activity patterns of southwestern snake-necked turtles (Noongar; Booyi, *Chelodina oblonga*) helps predict how this near threatened turtle species will react to the anticipated effects of anthropogenic climate change. Sex differences enhance this knowledge further by giving insight into varying metabolic requirements and behavioural differences within the species.

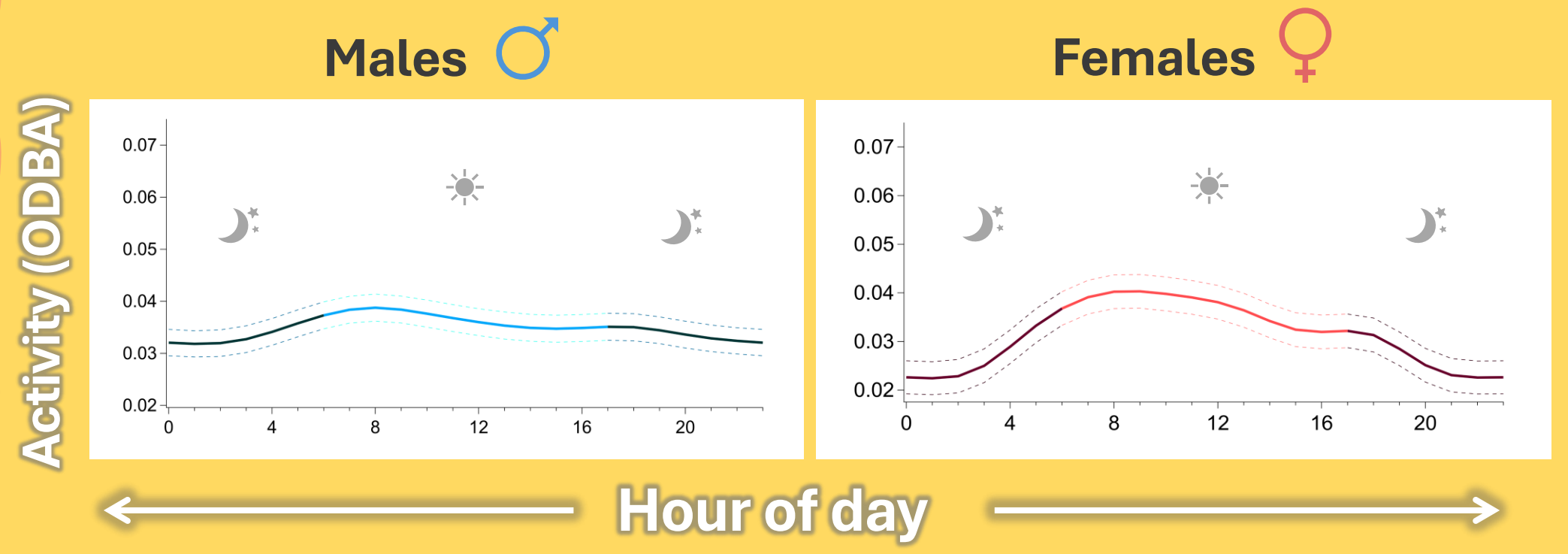
How? We tagged 51 turtles with animal-borne sensors that record turtle activity across the 6 Noongar seasons between 2024-2025, tagging male, female and gravid female (egg carrying) turtles for sex comparisons.

Where? This study was conducted in Wilson lake – a freshwater, urban wetland located in Perth's outer suburbs and connected to one of the city's two major rivers; the Canning River (Noongar; Djarlgarro Beelieer). Due to having water year-round, this wetland was ideal for a seasonal study on this species.



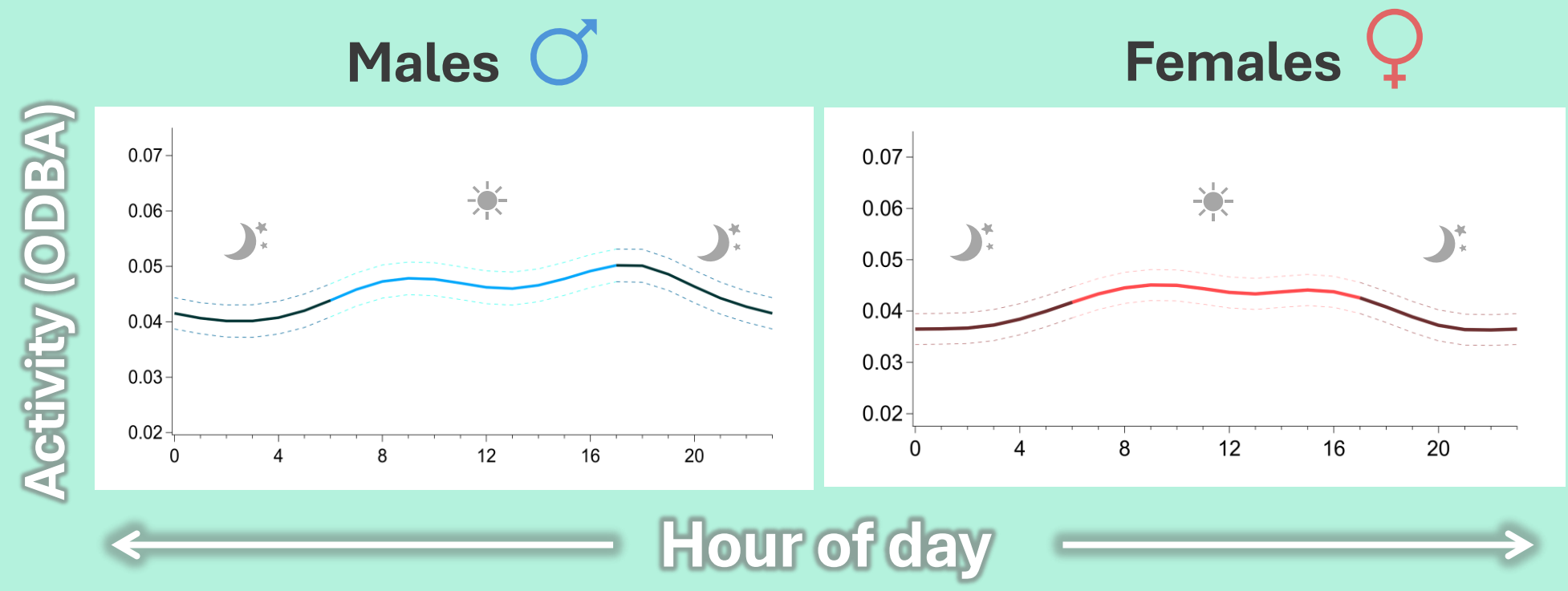
Results

Bunuru
February to March
Hottest season
Aestivation



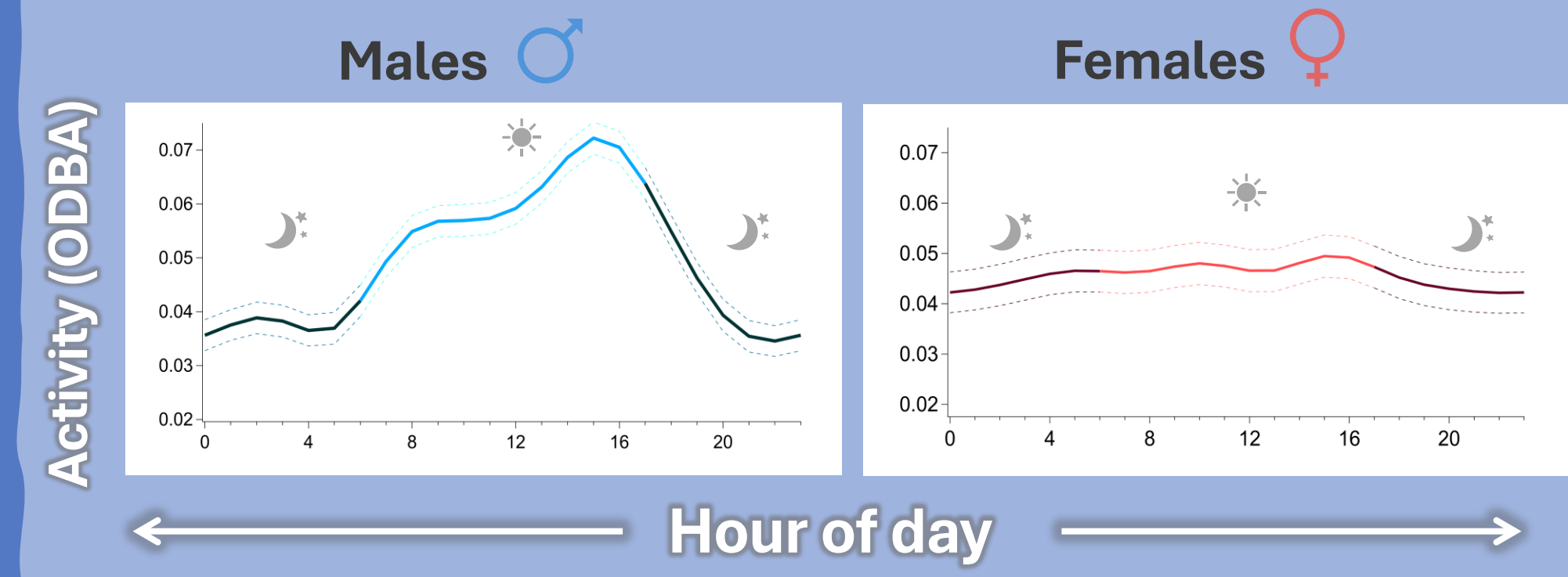
- Females had more variation in their activity patterns than males.
- Lowest activity season** for both sexes.
- In non-permanent wetlands, this would be when turtles bury themselves and aestivate (reptile version of hibernation).
- Patterns for both sexes' **diurnal** (high activity in the daytime and low at night).

Djeran
April to May
First rains, end of aestivation



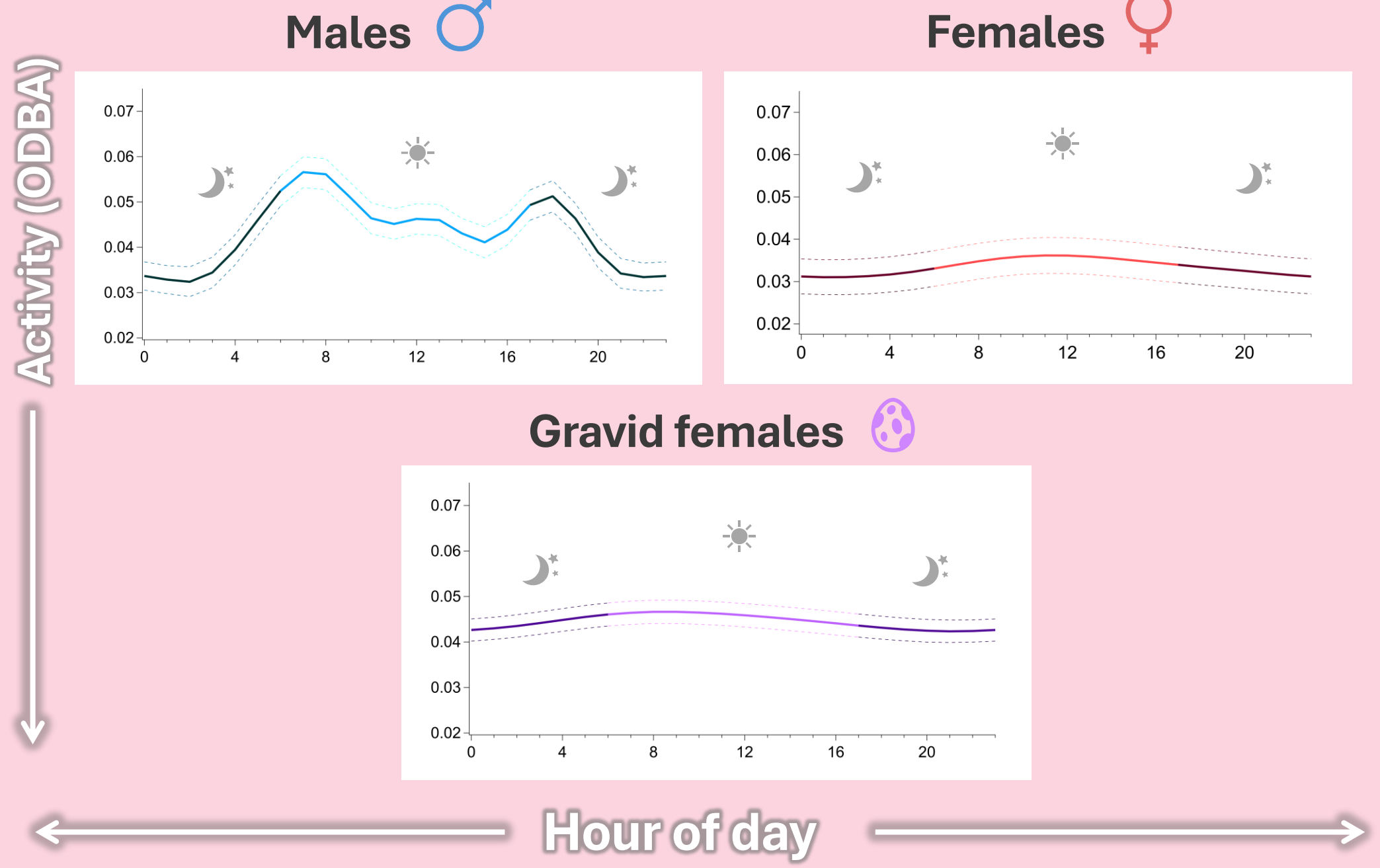
- Activity increasing** from previous season.
- Patterns still **diurnal**.
- Males shift from highest activity in the morning to in the evening.

Makuru
June to July
Coldest season
Breeding/follicle development



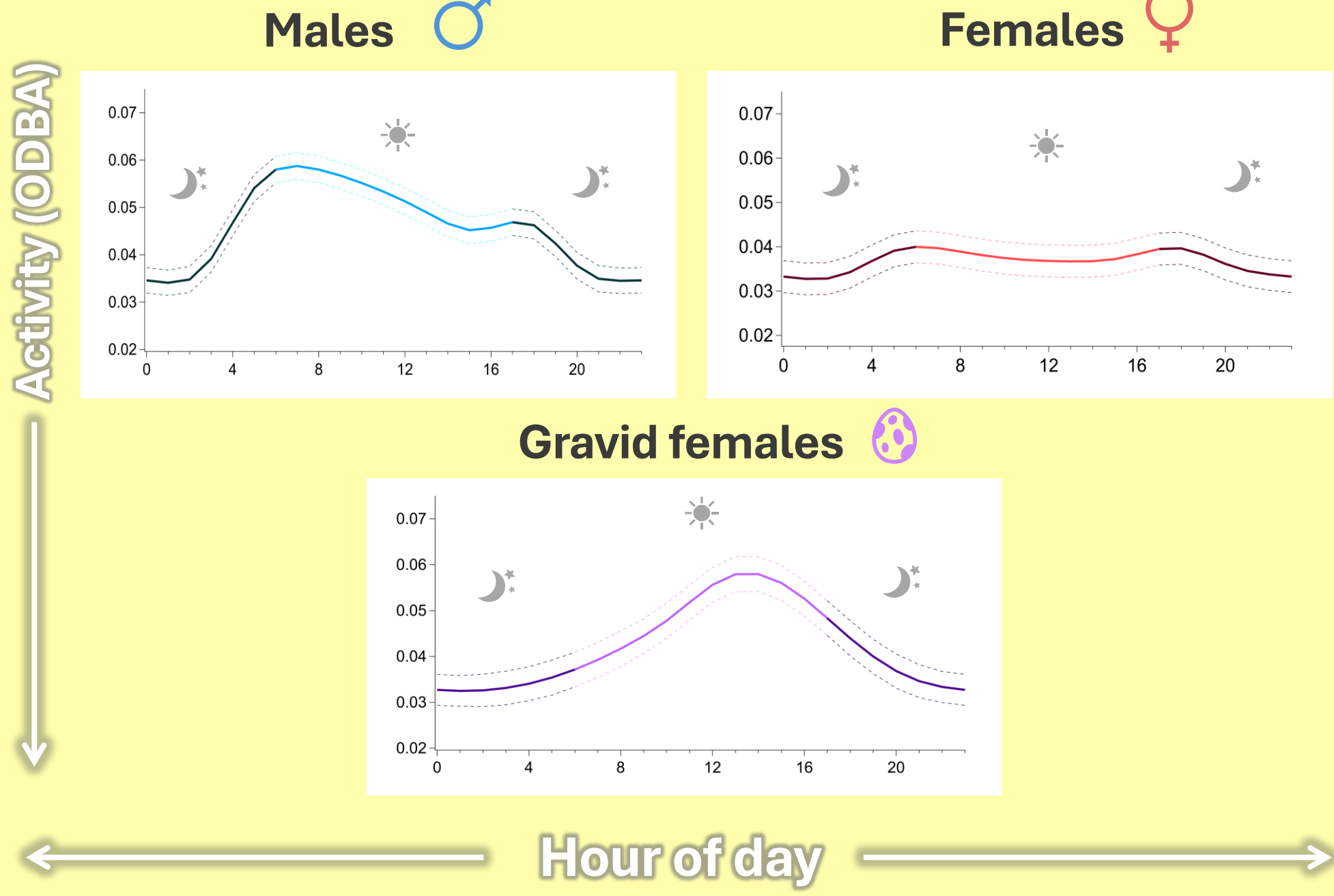
- Highest activity season** for males and females, despite low environmental temperatures.
- Likely due to males **searching for mates** and females feeding more frequently as they **develop follicles and eggs**.
- Patterns starting to shift but still mostly **diurnal**.

Djilba
August to September
Beginning of spring, egg development, nesting



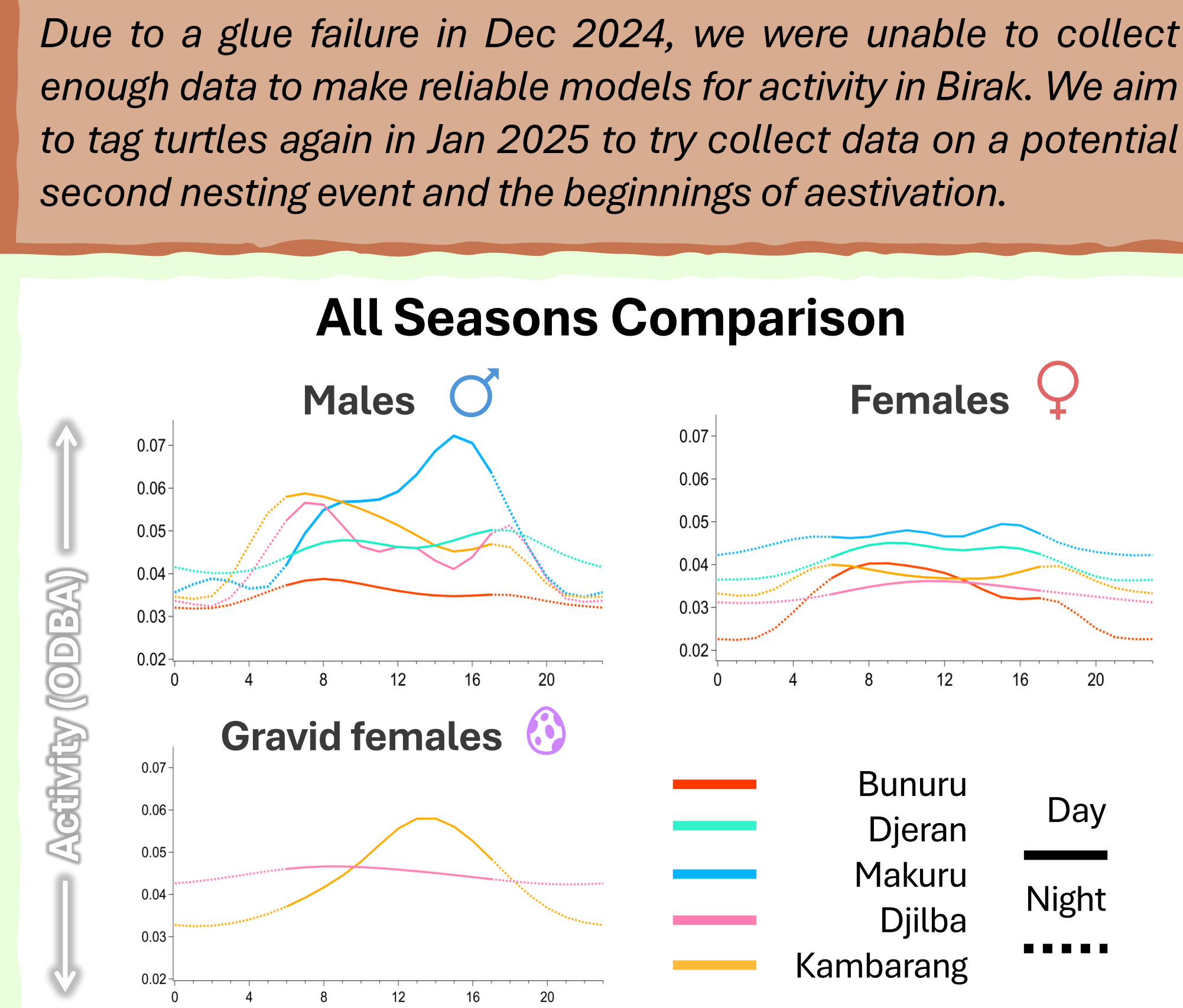
- Females** show a **significant drop** in their activity. **Males** showing a shift to **crepuscular** pattern.
- Gravid females show very little pattern in their activity, indicating a lack of clear preference to feed/move/rest at any time of day.

Kambarang
October to November
Nesting



- Males' activity still high, females relatively low. **Females** also showing a slight **crepuscular** pattern.
- Gravid females show slight diurnal pattern, likely related to **day-time nesting** events.

Birak
December to January
Due to a glue failure in Dec 2024, we were unable to collect enough data to make reliable models for activity in Birak. We aim to tag turtles again in Jan 2025 to try collect data on a potential second nesting event and the beginnings of aestivation.



Significance

- This study shows this species' activity is highly variable, showing a decent level of plasticity.
- We now have a baseline of this species seasonal activity patterns to compare to as the effects brought on by anthropogenic climate change begin to severely impact freshwater ecosystems.
- We found unexpected variability in the turtle's activity patterns, especially in regard to Makuru being the highest activity season and sexes swapping between patterns like diurnal and crepuscular between seasons.

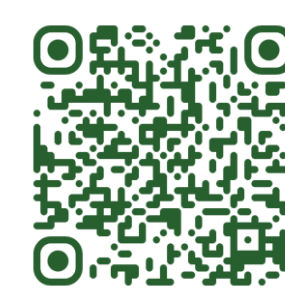
- Conservation efforts can be focused during critical times for turtles. For example, turtles nesting (Djilba/Kambarang), travelling (Makuru), and aestivating (Bunuru).
- We have shown that using the Noongar six-season calendar for species native to Western Australia's southwest is appropriate and may show more detail and nuance than the European 4-season calendar.
- We can use this data on turtles' seasonal activity shifts to then study the species' metabolic demands within the wild.



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