



GPS-based insights into movement behaviour and space use of the Rock Partridge in Apennine mountain grasslands



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Background

Apennine mountain grasslands are undergoing rapid structural changes driven by climate change and the decline of extensive grazing. These processes promote shrub encroachment and may alter habitat availability for open-habitat specialists [1].

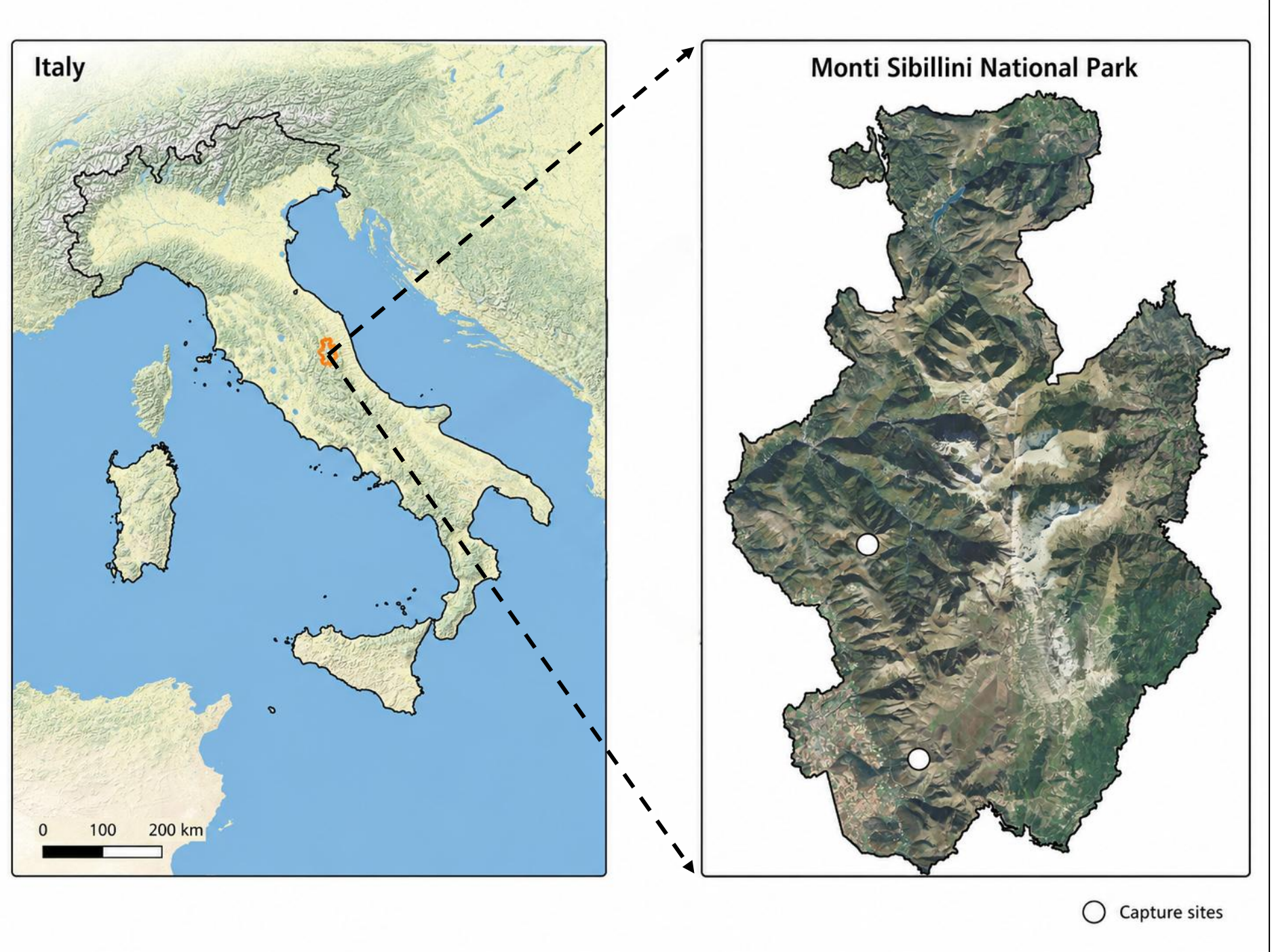
The Rock Partridge (*Alectoris graeca* Meisner, 1804) is a Near Threatened galliform associated with high-altitude grasslands and heterogeneous mountain landscapes [2]. Although traditionally considered sedentary [3], quantitative GPS-based evidence on its movement behaviour and space use remains limited. Previous telemetry in the Monti Sibillini reported movements up to 3.5 km [3].

Aim

To quantify seasonal movement behaviour and space use of male Rock Partridges in Apennine mountain grasslands using GPS telemetry.

Study area

The study was conducted in the Monti Sibillini National Park, central Italy, within a mountain landscape dominated by high-altitude grasslands, shrublands and woodland patches.



Methods

- Capture & GPS tagging**
4 male Rock Partridges fitted with solar-powered GPS transmitters (<3% body mass)
- Field monitoring**
Individuals tracked from spring 2025 to mid-winter
- Data filtering**
9,501 GPS locations retained after filtering, HDOP ≤ 6
- Movement analysis**
Resident and exploratory phases identified using Net Squared Displacement
- Space-use estimation**
Home ranges estimated using MCP95 and k-LoCoH

9,501

GPS fixes

14.5 km

Max adult

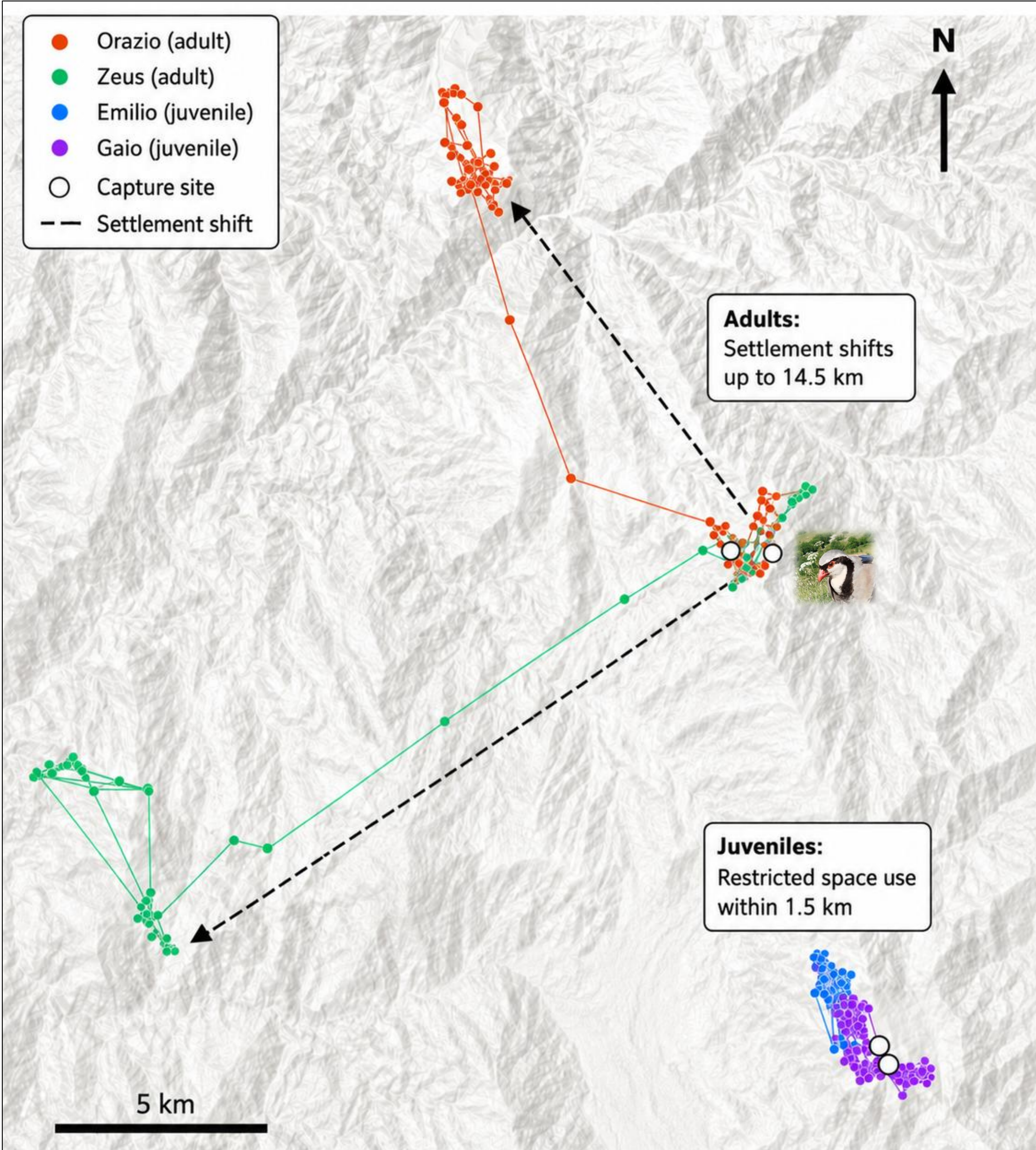
displacement

291.1 + 27.6 ha

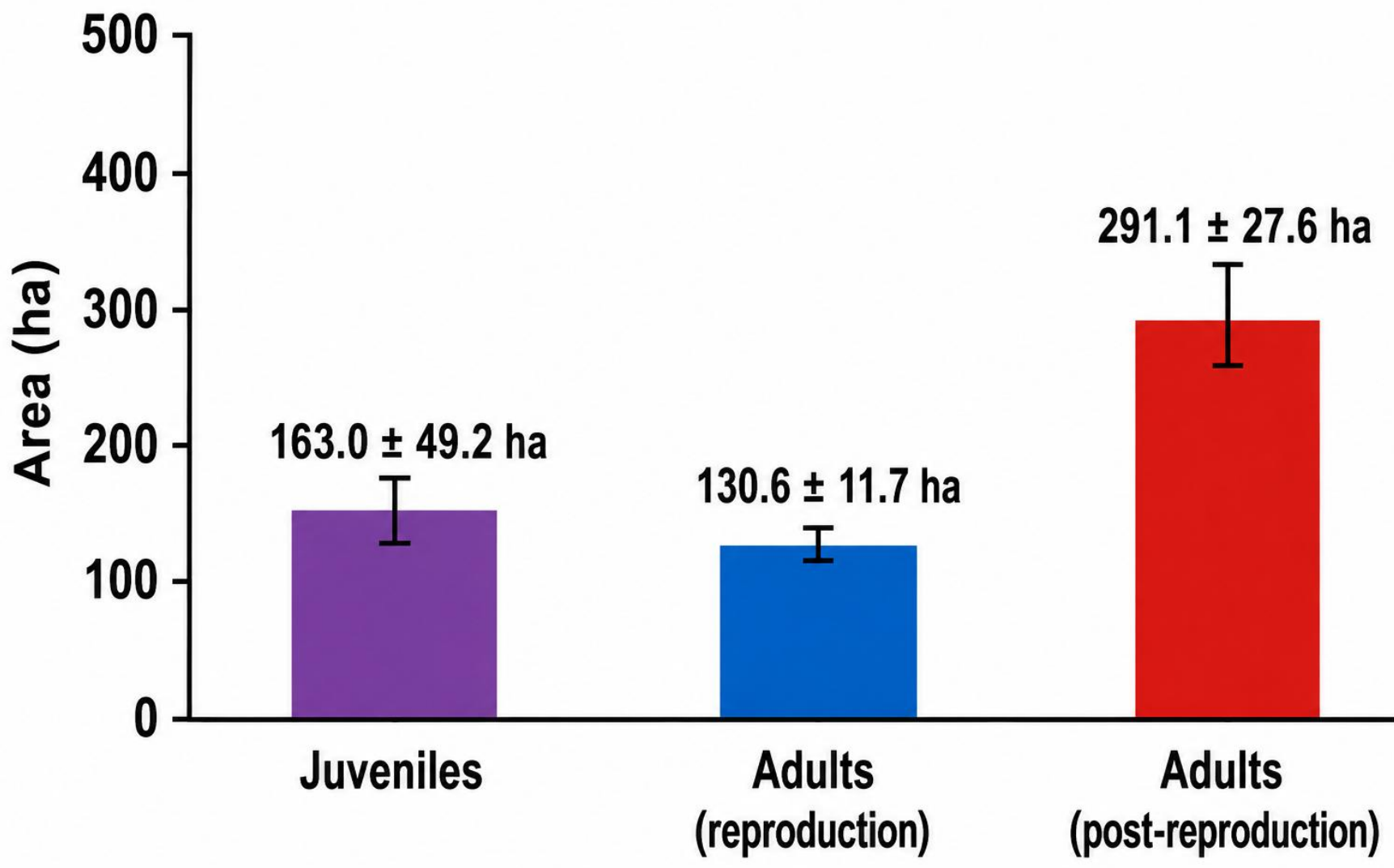
Adul post-reproductive

MCP95

Seasonal movement patterns

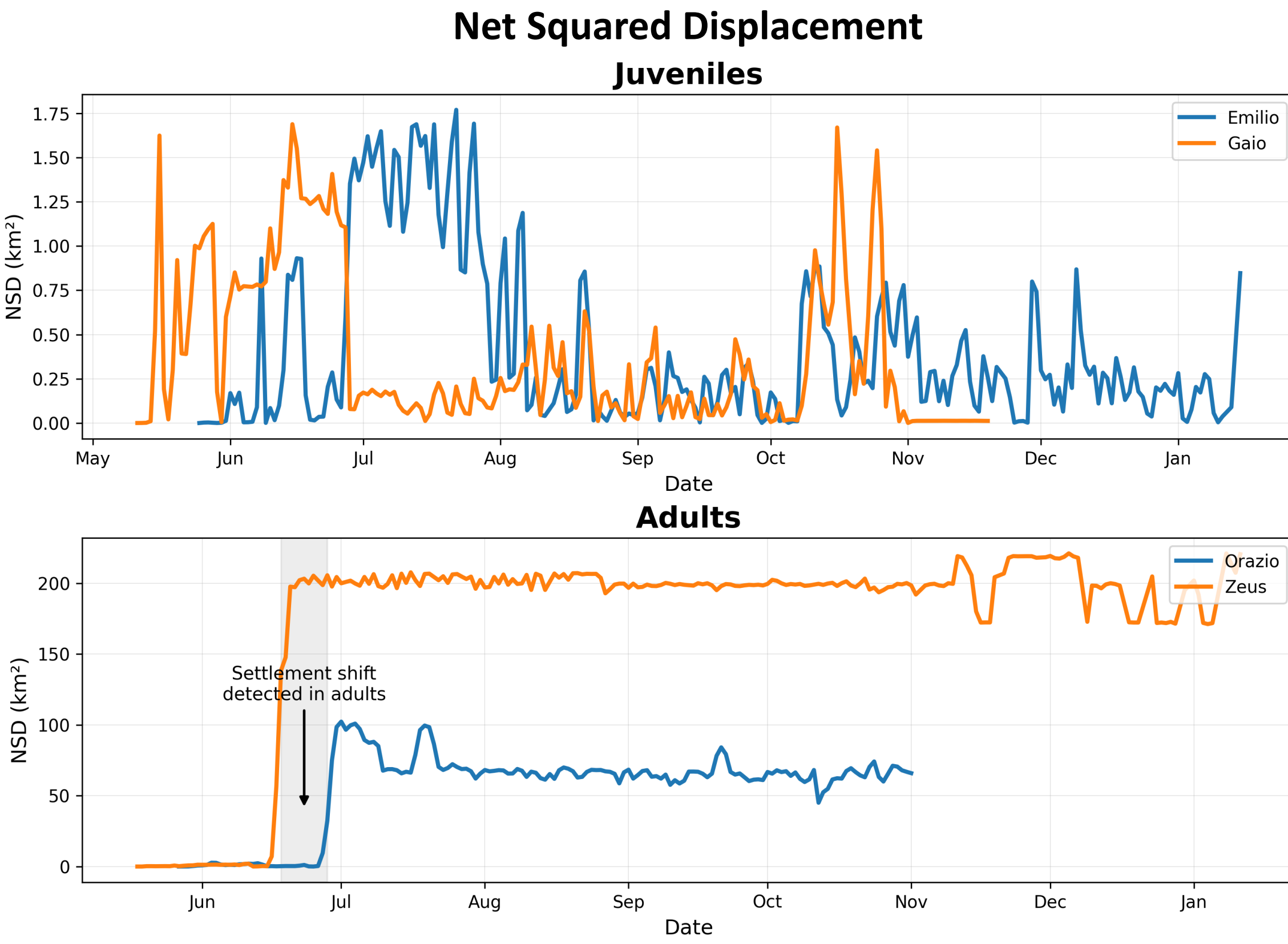


Home range size (MCP95)



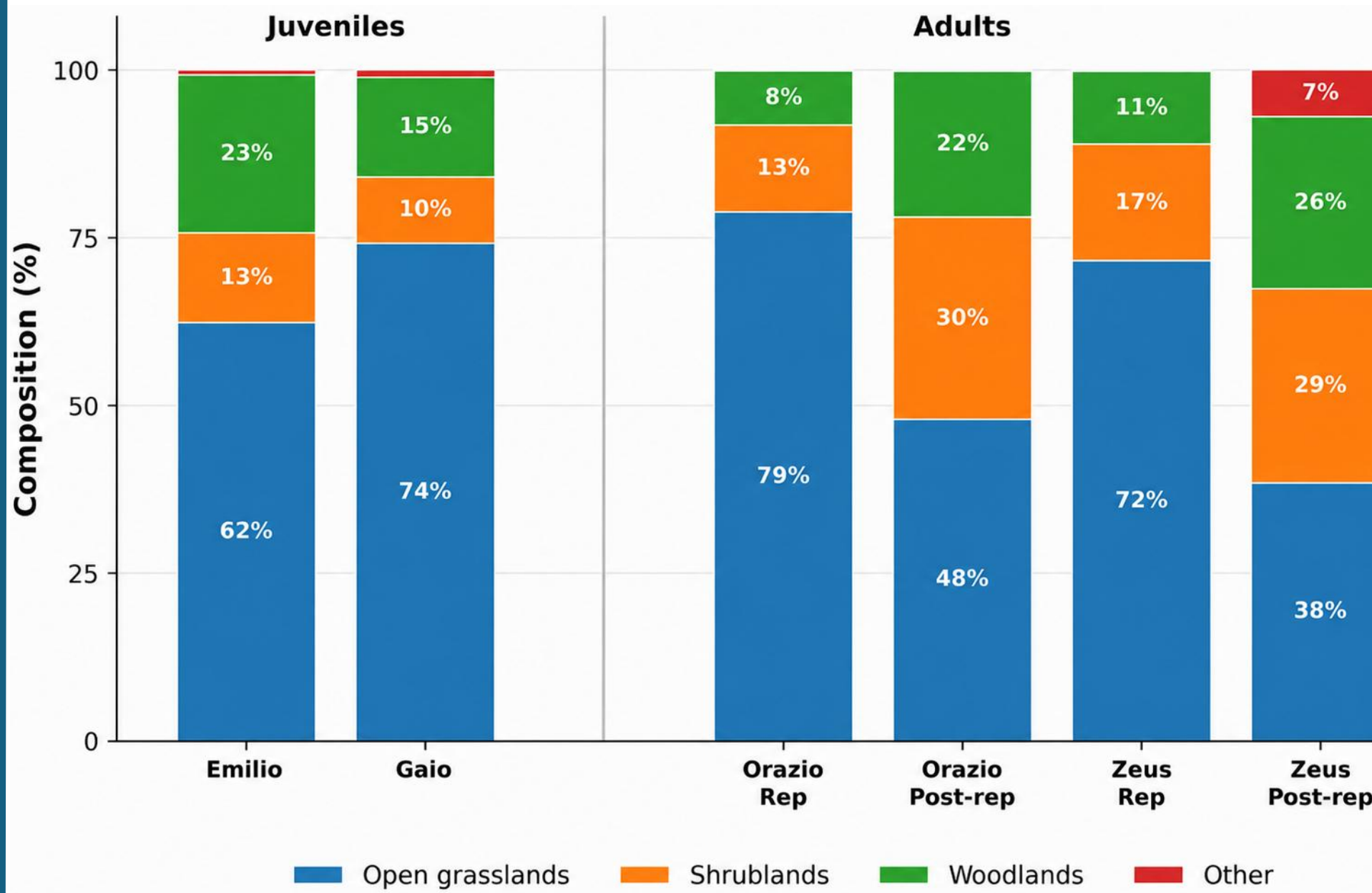
Adults showed distinct reproductive and post-reproductive settlements, whereas juveniles showed a single settlement area. Adult males expanded their space use after reproduction, while juveniles remained spatially restricted.

Movement phase



In adults, NSD increases between late June and early July indicated settlement shifts from reproductive to post-reproductive areas

Landscape context



Settlement areas were dominated by open grasslands, but shrub and woodland patches were consistently present, highlighting the importance of heterogeneous mountain mosaics.

Interpretation

- Adult males showed seasonal settlement shifts of up to 14.5 km, exceeding previous telemetry evidence from the Monti Sibillini and approaching winter movement distances reported in Alpine contexts [4].
- Juveniles remained spatially restricted, showing strong site fidelity.
- Resident phases occurred in heterogeneous grassland–shrub–woodland mosaics.
- Conservation planning should consider landscape-scale habitat continuity.

Conservation implications

- Maintain connectivity** among suitable mountain grasslands.
- Preserve habitat mosaics** with grassland, shrub and woodland patches.
- Support extensive grazing** to limit shrub encroachment and maintain open habitats.
- Include seasonal movements** in conservation and pastoral management planning.

Limitation and next steps

- Limited sample size:** four male individuals.
- Females were not tracked:** sex-specific movement patterns remain unknown.
- Further GPS monitoring:** more individuals and multi-year data are needed.
- Next step:** fine-scale habitat-selection analyses within home ranges.

Take-home message

Given the large seasonal movements observed, Rock Partridge conservation should prioritise connected, heterogeneous mountain grasslands maintained by extensive pastoral systems.

Reference

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