

2 Ecology and Life History of the Saker Falcon

2.1 Geographic distribution and habitat preferences

The Saker Falcon (*Falco cherrug*) has a broad Palearctic distribution, spanning from Central and Eastern Europe through Central Asia to western China and Mongolia (Karyakin et al., 2022; Karyakin et al., 2023). Populations are found in diverse habitats, including arid steppes, grasslands, semi-deserts, and mountainous regions. In areas such as the Karatau Mountains (Kazakhstan), suitable breeding habitats have been mapped to over 4,200 km², with total habitats exceeding 9,000 km² (Karyakin et al., 2022). In the Sanjiangyuan National Park (China), habitat suitability is strongly influenced by elevation and temperature, with Saker Falcons favoring open landscapes and showing sensitivity to extreme temperatures (Zhang et al., 2019). Human disturbance is less significant in remote regions, but habitat changes due to land use and prey availability can drive shifts in nesting sites, as observed in Slovakia where populations moved from highlands to lowlands in response to forest management and prey decline (Chavko et al., 2019).

2.2 Breeding biology and reproductive strategies

Saker Falcons typically breed from April to July, with clutch sizes ranging from three to five eggs (average 4.0) (Yi-Qun et al., 2007). They often utilize nests built by other large birds, such as buzzards, eagles, or ravens, and increasingly nest on artificial structures like power poles and nest boxes (Chavko et al., 2019; Zhatkanbaev et al., 2023). Breeding success is closely linked to prey abundance and climatic conditions. In Mongolia, artificial nest provision has supported large managed populations, with breeding density and fledging success positively correlated with small mammal prey and favorable weather (Zhang et al., 2024). In Xinjiang, China, food availability is a key determinant of clutch size and fecundity, and nest success rates can exceed 80% under optimal conditions (Yi-Qun et al., 2007). Instances of cannibalism (sibling aggression) and nest abandonment have been documented, often associated with food scarcity or disturbance (Zhatkanbaev et al., 2023; Bold et al., 2024).

2.3 Diet composition and hunting behavior

The Saker Falcon is an opportunistic predator, with diet composition varying by region and prey availability. In Central Asia and Kazakhstan, small mammals such as the Great Gerbil (*Rhombomys opimus*) and other rodents are primary prey, but birds (e.g., pigeons, starlings, crows) become more important when rodent populations decline (Chavko et al., 2019; Karyakin et al., 2022; Zhatkanbaev et al., 2023). In Slovakia, long-term studies show a shift from mammals to birds in the diet, with domestic pigeons comprising up to 62% of prey in some areas, and mammals like voles and ground squirrels declining due to habitat changes (Chavko et al., 2014; Chavko et al., 2019). Saker Falcons also hunt reptiles, fish, and occasionally feed on carrion, demonstrating flexible foraging strategies (Zhatkanbaev et al., 2023). Prey availability directly influences home range size and breeding success, particularly for males during the breeding season (Bold et al., 2024; Zhang et al., 2024).

2.4 Migration patterns and seasonal movements

Saker Falcons exhibit a range of movement strategies, from resident to migratory, depending on geographic location and resource availability. Satellite tracking in Mongolia reveals strong territoriality during breeding, with minimal overlap between neighboring pairs (Bold et al., 2024). Males adjust their home range size in response to prey density, occupying smaller territories in areas with abundant rodents (Bold et al., 2024). Seasonal movements are influenced by prey fluctuations, with some populations displaying nomadism or long-distance migration to wintering grounds in southern Asia or the Middle East (Zhang et al., 2019; Karyakin et al., 2022). In China's Sanjiangyuan National Park, Saker Falcons' wintering home ranges are shaped by environmental variables such as elevation and temperature, and overlap with other raptor species is limited by dietary and spatial preferences (Zhang et al., 2019).

3 Population Dynamics Analysis Based on Field Observations

3.1 Long-term monitoring methodologies

Long-term field studies are essential for understanding population dynamics, as they capture the heterogeneity and temporal variability that drive population processes (Reinke et al., 2019). Common methodologies include satellite tracking, which provides detailed data on individual movements and spatial use; banding (ringing), which