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## Caracaras: Exploring the Natural History and Conservation of an Understudied Raptor Group

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**KEY WORDS:** *caracara*; Daptrius; Ibycter; Milvago; Phalcoboenus; scavenger.

Raptors are often the focus of conservation efforts because of their global exposure to a variety of threats many of which are linked to anthropogenic activities. These include acute threats like persecution, electrocution, and collisions with vehicles and other human structures (Hager 2009, Péron et al. 2017, Madden et al. 2019, Slater et al. 2020), chronic threats like exposure to lead and rodenticide (Garvin et al. 2020, Gomez et al. 2022), and existential threats like habitat loss and climate change (Panopio et al. 2021, Martínez-Ruiz et al. 2023).

Caracaras are an understudied group of Neotropical raptors in the family Falconidae comprising nine extant species (Winkler et al. 2020). All are endemic to the New World, and all but one occur only in Central and South America, with one species extending north through Mexico to the southern United States. The geographic distribution and even much of the natural history are not well known for most caracaras, yet many are affected by factors likely to lead to population declines, particularly as agriculture and urban development expand throughout these regions. Along with the above-mentioned threats, caracaras may also incur negative perceptions associated with scavengers because of their scavenging habits and frequent associations with vultures, possibly limiting interest in the group.

Knowledge of the caracaras varies widely across species. Some are broadly distributed and in some regions are expanding into urban areas, where they may encounter many anthropogenic threats. Other

caracaras are elusive and scarcely distributed, and occupy remote habitats that are difficult to access, so their exposure to threats is unknown. The two forest-dwelling caracaras, the Black Caracara (*Daptrius ater*) and the Red-throated Caracara (*Ibycter americanus*), are essentially unstudied as are the three species in the genus *Phalcoboenus* that inhabit high elevation habitats in the Andes. In contrast, the Crested Caracara (*Caracara plancus*) is represented in numerous studies from throughout its large geographic range, including the USA (Florida [e.g., Morrison 1999, Smith et al. 2017, Dwyer et al. 2018] and Texas [Atkinson et al. 2007]), Mexico (Rodríguez-Estrella and Rivera-Rodríguez 1992), Brazil (Sazima 2007), and Argentina (Saggese et al. 2022). The behavioral ecology of the Chimango Caracara (*Milvago chimango*), perhaps the most common raptor in southern south America, has been well studied in Argentina (e.g., Biondi et al. 2013, Guido et al. 2017); other aspects of this species' natural history are little known.

The conservation status of most extant caracaras is least concern; only the Striated Caracara (*Phalcoboenus australis*) is listed as near threatened (International Union for the Conservation of Nature [IUCN] 2024), yet this likely is due more to lack of knowledge of their life histories and population trajectories throughout their respective ranges than to actual insulation from threats. Developing appropriate conservation and management strategies for caracaras requires reliable information on each species' ecology, habitat requirements, distribution, and demography. In the absence of sufficient research to understand the needs of and threats to each caracara species in each part of its range, there

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is the risk that species may slip from least concern to higher threat levels.

Recognizing the need for expanded understanding of the life history and threats to all caracaras, the Raptor Research Foundation hosted a caracara symposium during its 2022 annual meeting in Fort Lauderdale, Florida, USA. The symposium gathered researchers from North, Central, and South America and provided a venue for researchers to share information on the behavior, breeding biology, genomics, nesting habitat, and threats faced by caracaras. That symposium led to this special issue of the *Journal of Raptor Research* focused on caracaras. This issue begins with an article in which the authors compiled and summarized the existing literature on caracaras to help identify knowledge gaps and provide recommendations for future research (Morrison and Saggese 2024). The subsequent 20 articles then describe original research on most of the caracaras, with topics ranging from predation behavior (Formoso et al. 2024) to movements (Morrison and Poli 2024), nest site selection (Rivas-Fuenzalida et al. 2024), and disease (Michels et al. 2024, Paterlini et al. 2024). Many papers describe specific threats, some offer conservation strategies. Unfortunately, this special issue includes no new research on the Black Caracara, the Carunculated Caracara (*Phalcoboenus carunculatus*), and the Yellow-headed Caracara (*Mitovago chimachima*), demonstrating the ongoing paucity of knowledge of these species.

Citizen science is increasingly making important contributions to applied ecological research and conservation planning (Pocock et al. 2017). Large citizen science datasets can add insights into natural history and aid in identifying anthropogenic risks for raptors (Demeter et al. 2018, Hanmer et al. 2021). Multiple papers in this issue follow that trend by using citizen science data to investigate topics including diet of two of the least known caracaras (Pantoja-Maggi et al. 2024), the spatial distribution and overlap of two allopatric species (Balza et al. 2024), and range expansion of the Crested Caracara in the southern USA (Smith and Dwyer 2024). Grande et al. (2024b) used citizen science data to model a species' distribution in Chile and Argentina. We are pleased to see the expansion of citizen science to support caracara conservation and management and look forward to seeing additional research leverage novel and creative mechanisms of collecting and using citizen science data.

There are no Corvidae (crows, ravens, jays, and allies) in South America. Caracaras are curious and intelligent, likely filling many of the corvid niches in the southern hemisphere (Harrington et al. 2024). Articles in this issue describe aspects of behavior and

social ecology of the Chimango Caracara in South America (Gallego-García et al. 2024, Solaro 2024) and exploration of anthropogenic objects by the Striated Caracara on Islas Malvinas/Falkland Islands (Harrington and Lambert 2024). We encourage further research into the cognitive capabilities of all caracaras, as understanding their intelligence and behavioral plasticity is crucial to understanding their ecology and conservation needs (Dwyer et al. 2018, Biondi et al. 2022).

The caracaras' generalist and opportunistic nature is highlighted in several articles describing caracara adaptations to and threats encountered in anthropogenic landscapes, including use of human-made structures as nest sites in urban areas (Galmes et al. 2024, Liébana et al. 2024a, 2024b, Martínez-Miranzo et al. 2024), consumption of novel prey (Honig et al. 2024, Quispe et al. 2024), and causes of mortality (Grande et al. 2024a, Orozco-Valor et al. 2024). Findings from these studies highlight the need for future research on caracaras to include a focus on human-caracara interactions.

The articles included here begin to address some of the knowledge gaps and research needs limiting conservation and management of caracaras, yet much remains a mystery, particularly for species with limited distributions, in areas that face challenges to both financial and political support for conservation, and in areas with limited access for researchers. More work is needed, and we hope that readers of this issue will discover a new appreciation for, and perhaps a new interest in studying, caracaras. We hope this expanded interest will lead to additional understanding and focus on conservation of these unique raptors.

In organizing and editing this special issue, we found caracara researchers throughout the Americas to be incredibly welcoming and inclusive. We hope these papers will also introduce you to caracara researchers you may not have known and that new connections will lead to expanded collaborations among caracara researchers both within and across countries. Further, we hope this work will lead to collaborations among researchers studying other avian scavengers, many of which are subject to the same threats as the caracaras.

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Chief, C. R. Dykstra, for supporting this special issue, the first focused on caracaras. We also thank the authors of the papers presented in the symposium and published here, and the institutions that supported them, for their dedication to expanding the scientific understanding of the natural history and conservation needs of this unique and understudied group of raptors. Finally, we recognize and express our gratitude to the reviewers, translators, and editors for their dedicated and professional work to bring this issue to fruition.

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