MSc Project: potential future distribution of Egyptian Vultures in Switzerland

Background

The Egyptian Vulture is the only long-distance migrant among the four vulture species breeding in Europe (Phipps *et al.* 2019). Partly due to hazards along the flyway, many Egyptian Vulture populations in Europe have decreased in the past and are now dependent on conservation management (Oppel *et al.* 2024). One successful avenue to support decimated populations is reinforcement, where Egyptian Vultures are bred in captivity and released as immatures into established wild populations. Currently there are insufficient institutions within Europe to provide captive-bred Egyptian Vultures for reinforcement programs across Europe.

Several zoos in Switzerland could contribute to the captive breeding program of Egyptian Vultures, but because the Egyptian Vulture is not a native breeding bird of Switzerland, there is limited justification to invest in a captive breeding program of Egyptian Vultures in Switzerland. Given rapid climatic changes in southern Europe, and the expansion of an Egyptian Vulture population in southern France (Lieury *et al.* 2015), it is plausible that Egyptian Vultures may become native breeding birds in Switzerland in the near future.

Objective

The goal of this MSc thesis would be to estimate whether Switzerland may have suitable breeding habitat for Egyptian Vultures in the next 30 years using species distribution models (Panthi *et al.* 2021) and climatic projections. These predicted probabilities could then inform a decision whether to invest in a captive breeding program in Swiss institutions.

Approach

Obtain breeding locations of Egyptian Vultures from Spain (Mateo-Tomás & Olea 2015; Tauler-Ametller *et al.* 2017; Carrete *et al.* 2007), France (Lieury *et al.* 2015), and eastern Europe (Oppel *et al.* 2017). Identify 10-20 plausible environmental variables (climatic, landscape, land use) that can predict the potential breeding habitat suitability (Panthi *et al.* 2021) for Egyptian Vultures in Europe and obtain those data across the range of breeding locations. Fit a habitat suitability model and predict the habitat suitability for Switzerland in the year 2050 using plausible climate projections.

Supervision

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References

Carrete, M., Grande, J.M., Tella, J.L., Sánchez-Zapata, J.A., Donázar, J.A. & Díaz-Delgado, R. *et al.* (2007). Habitat, human pressure, and social behavior: Partialling out factors affecting large-scale territory extinction in an endangered vulture. *Biol. Conserv.*, 136, 143–154.

Lieury, N., Gallardo, M., Ponchon, C., Besnard, A. & Millon, A. (2015). Relative contribution of local demography and immigration in the recovery of a geographically-isolated population of the endangered Egyptian vulture. *Biol. Conserv.*, 191, 349–356.

Mateo-Tomás, P. & Olea, P.P. (2015). Livestock-driven land use change to model species distributions: Egyptian vulture as a case study. *Ecological Indicators*, 57, 331–340.
Oppel, S., Dobrev, V., Arkumarev, V., Saravia, V., Bounas, A. & Manolopoulos, A. *et al*. (2017). Landscape factors affecting territory occupancy and breeding success of Egyptian Vultures on the Balkan Peninsula. *J Ornithol*, 158, 443–457.
Oppel, S., Dobrev, V., Arkumarev, V., Saravia-Mullin, V., Bashmili, K. & Bino, T. *et al*. (2024). Long-term conservation efforts at flyway scale can halt the population decline in a globally endangered migratory raptor. *Animal Conservation*, 27, 374–385.
Panthi, S., Pariyar, S. & Low, M. (2021). Factors influencing the global distribution of the endangered Egyptian vulture. *Scientific Reports*, 11, 21901.
Phipps, W.L., López-López, P., Buechley, E.R., Oppel, S., Álvarez, E. & Arkumarev, V. *et al*. (2019). Spatial and temporal variability in migration of a soaring raptor across three continents. *Frontiers in Ecology and Evolution*, 7, 323.
Tauler-Ametller, H., Hernández-Matías, A., Pretus, J.L.L. & Real, J. (2017). Landfills determine the distribution of an expanding breeding population of the endangered Egyptian Vulture Neophron percnopterus. *Ibis*, 159, 757–768.