

Using past archives to better constrain the future of *Alligator sinensis*

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Abstract: Species distribution modelling is a widely applied tool for forecasting future distributions of species under different climatic scenarios, informing conservation strategies and rewilding programmes. However, forecasting is typically based on very recent species' records (last ~50 years). This is problematic, given that these records are strongly affected by human interactions, and we do not know whether current distributions reflect the full suite of environmental parameters a species can inhabit. If we only model data from current distributions in future projections, we are thus likely to get misleading predictions that might misdirect conservation planning. The Critically Endangered Chinese alligator is currently restricted to a single Chinese province. Historical, zooarchaeological, and fossil records demonstrate a greater range across mainland China, extending its past distribution even further, to Taiwan and Japan. Species distribution models (SDMs) based only on the present-day distribution of the Chinese alligator are poorly constrained, whereas incorporation of past archives improves model fit and changes projected suitable habitat. By combining past and present data, we can provide a closer approximation of the full ecological niche of a species. For endangered species with restricted present-day ranges, additional occurrence data from past archives is critical for constraining SDMs, with potentially major misinterpretations of suitable habitats for conservation and rewilding. This research is the principal case study for an IUCN Green status of species/Conservation Paleontology Network working group; forming the framework for the inclusion of past archives in the development of species recovery baselines and it is planned that Crocodylia will have the first order-wide assessment.

Keywords: Species distribution model, IUCN Green status, Past archives

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