



## Title: “The Pelican Brief”: Using environmental archives to establish ecological baselines for UK wetland biodiversity restoration

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The UK is among the world’s most nature-depleted countries ([De Palma et al. 2021](#)), and species reintroductions and rewilding are increasingly seen as a means of restoring natural landscapes. Freshwater wetlands represent a priority for UK biodiversity restoration. These ecosystems play key roles in climate change mitigation and provide essential ecosystem services, but have long histories of human impact, and have experienced severe modification and degradation throughout recent millennia. However, to be planned and implemented effectively, species reintroductions require an assessment of long-term environmental archives to establish key baselines. For example, how did past ecosystems differ from those today, what were the ecological and environmental requirements of lost species, and when, how and why did biodiversity change occur?

This project will explore the conservation information-content of a range of different environmental archives (e.g., fossil and zooarchaeological bones; museum specimens from the 18<sup>th</sup>–20<sup>th</sup> centuries; and palaeoecological samples) and how these can be used to reconstruct changes in biodiversity and ecosystem processes across UK freshwater systems. In particular, the project will focus on the past status and ecology of regionally extinct native British wetland species that have recently been proposed as candidates for reintroduction, including wetland birds such as the Dalmatian pelican (*Pelecanus crispus*) and extirpated fish such as the European and Atlantic sturgeons (*Acipenser sturio* and *A. oxyrinchus*) ([Alif et al. 2023](#); [Crees et al. 2023](#)). The project will use a series of isotopic (light, heavy and compound-specific) and elemental analyses to determine key aspects of the former ecology and environmental requirements of these lost species, including their past landscape use, trophic ecology, breeding and migration ([Altenritter et al. 2023](#); [Crees et al. 2023](#)). These data will also be correlated with past environmental and climatic data to generate predictive models of future priority habitat areas for target species, and to establish new ecological baselines for modern-day landscape management in extirpated species reintroduction.

**Wider Scope and Relevance:** The project will establish a new understanding of past ecological baselines that are needed to guide broad-scale modern UK wetland restoration targets (e.g., which wetland systems were needed by now-lost species in the past, and what extent of wetland restoration needs to take place at a landscape scale to support viable levels of biodiversity based upon past species’ requirements). Project findings will also be used to establish predictive insights about likely UK wetland responses to future climate change scenarios, across multiple scales (from components of biodiversity to landscape-level system change). This will provide a crucial new evidence-base to guide restoration of the UK’s critically depleted wetlands and their biodiversity, and will serve as best-practice integration of historical baselines within a “conservation palaeontology” framework.

### **Training opportunities:**

The student will be trained in isotopic and elemental analyses by the University of Reading supervisory team. The student will also have direct engagement with zooarchaeological and palaeoenvironmental research being conducted in UK wetlands, and will have outstanding fieldwork opportunities through collaboration with existing international conservation projects (e.g., Eastern Mediterranean and/or Kazakhstan to understand pelican ecology; France and/or the Baltic for sturgeon restoration projects). The student will have training for the modelling element of the PhD and will take advantage of courses at the University of Reading and the Zoological Society of London (ZSL) to enhance their statistical and analytical skills.

This project is CASE supported by ZSL's Conservation & Policy department, which is a partner organisation in the UK Sturgeon Alliance, a conservation network dedicated to evaluating the feasibility and practical steps needed to restore sturgeons to UK freshwater systems. This conservation initiative will be directly informed by the data generated by this PhD project. The project placement will provide an exciting opportunity for the student to participate in real-world conservation decision-making, and to understand the processes by which conservation evidence is integrated into practical environmental planning.

### **Funding particulars:**

The project has CASE funding from ZSL.

### **References**

Alif Z et al. 2023. Understanding local knowledge and attitudes toward potential reintroduction of a former British wetland bird. *People and Nature* 5: 1220-1233.

Altenritter ME et al. 2015. Assessing dorsal scute microchemistry for reconstruction of shortnose sturgeon life histories. *Environmental Biology of Fishes* 98: 2321-2335.

Crees JJ et al. 2023. Challenges for incorporating long-term baselines into biodiversity restoration: a case study of the Dalmatian pelican (*Pelecanus crispus*) in Britain. *Ibis* 165: 365-387.

De Palma A et al. 2021. Annual changes in the Biodiversity Intactness Index in tropical and subtropical forest biomes, 2001–2012. *Scientific Reports* 11: 20249.