

SCIENTIFIC REPORTS

OPEN

Unravelling the drastic range retraction of an emblematic songbird of North Africa: potential threats to Afro-Palearctic migratory birds

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Understanding how culture may influence biodiversity is fundamental to ensure effective conservation, especially when the practice is local but the implications are global. Despite that, little effort has been devoted to documenting cases of culturally-related biodiversity loss. Here, we investigate the cultural domestication of the European goldfinch (*Carduelis carduelis*) in western Maghreb (Morocco, Algeria and Tunisia) and the effects of long-term poaching of wild populations (1990–2016) on range distribution, socio-economic value, international trading and potential collateral damage on Afro-Palearctic migratory birds. On average, we found that the European goldfinch lost 56.7% of its distribution range in the region which led to the increase of its economic value and establishment of international trading network in western Maghreb. One goldfinch is currently worth nearly a third of the average monthly income in the region. There has been a major change in poaching method around 2010, where poachers started to use mist nets to capture the species. Nearly a third of the 16 bird species captured as by-catch of the European goldfinch poaching are migratory, of which one became regularly sold as cage-bird. These results suggest that Afro-Palearctic migratory birds could be under serious by-catch threat.

Species overexploitation for wildlife trade is a major global threat to biodiversity, particularly birds^{1,2}. Many species of birds are targets of poaching due to their high economic and cultural value³, threatening wild populations and ecosystem functioning^{4,5}. Nearly half of the extant and extinct bird species have been utilized by humans for various purposes, especially for domestication as pets¹. These species are often not exploited sustainably⁶, and many are threatened by extinction⁷. Although poaching is sometimes species-specific and tends to have local consequences on target species^{8–10}, it can also be non-selective with substantial consequences on a large number of local and migratory species¹¹.

The Mediterranean has recently been identified as a danger zone for migratory birds where 11–36 million individuals per year may be killed or taken illegally, and one of the most important reasons is for use as cage-birds¹¹. This is an alarming issue for global avian diversity since one of the world's major flyways, the Palearctic-African flyway¹², crosses the Mediterranean where an estimated number of 2.1 billion Afro-Palearctic birds migrate every year back and forth from breeding to wintering grounds¹³. Moreover, migratory birds do not only fly through the Mediterranean region but also spend several days in stop-overs to rest and eat^{14,15} which increases their vulnerability to poaching. In North Africa, and particularly western Maghreb (Morocco, Algeria, and Tunisia), stop-over

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