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A pilot release of captive-bred red-billed choughs into Cornwall, UK

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Introduction

The red-billed chough (*Pyrrhocorax pyrrhocorax*) has been in decline for decades, disappearing from significant parts of its European range over the past 100 years. In the UK, coastal populations exist in Ireland, Wales and Scotland, last breeding in England (Cornwall) in 1952 until a naturally dispersing group recolonized Cornwall during 2001. A pair subsequently bred in 2002 and by 2010 there were five breeding pairs. Their decline is believed to result from changing farming practices, exacerbated by human persecution. In the UK efforts to provide suitable habitat through subsidies paid to farmers has taken place since the 1990s and the threat of persecution has largely vanished due to changes in public attitudes and legislation. However their sedentary ecology makes re-establishment slow. A long held aim of a Cornwall based captive breeding center, Paradise Park, has been to re-establish red-billed choughs to Cornwall. Over 30 years Paradise Park has developed husbandry and captive breeding techniques and has a captive population (24 individuals with four breeding pairs in 2010) suitable for a re-introduction program. The release of intelligent and social birds is potentially complex, largely restricted to parrots to date, and is an area of re-introduction biology requiring further applied research.

Goals

- Goal 1: A pilot release to develop protocols for the re-introduction of a social crow.
- Goal 2: Successfully release red-billed choughs with the aim that these would become an establishing cohort, with the intention of subsequently releasing additional birds and establishing a resident breeding group.



Two of the released red-billed choughs with a radio transmitter © Ray & Alison Hales

- Goal 3: Monitor the survival, behavior and habitat use of released birds.
- Goal 4: To add more genetic diversity to the very small naturally occurring founding population.

Success Indicators

- Indicator 1: Success in the release methodology, resulting in individuals feeding and roosting in the immediate area as a social group and behaving naturally.
- Indicator 2: The continued presence and survival of released birds in the locality.
- Indicator 3: Formation of pairs and initiation of a breeding attempt.
- Indicator 4: Released birds and/or their progeny breeding with individuals from the recently naturally colonized population.

Project Summary

Feasibility: A captive breeding program was initiated with birds purchased from private breeders during the 1980s. Paradise Park funded a PhD investigating feeding ecology and the potential to re-establish red-billed choughs into Cornwall (Meyer, 1991 & Meyer *et al.*, 1994) supervised by a leading chough researcher at the University of Glasgow. The study identified sites suitable for re-establishment. Meetings with interested organizations were convened but a lack of consensus prevented progressing together, as we preferred. Considerable care was taken to follow IUCN guidelines however some organizations, although supporting a potential role for re-introduction (Carter *et al.*, 2008), were publically critical suggesting guidelines were ignored (Carter & Newbery, 2004). Specifically this concerned i) lack of suitable habitat, ii) lack of veterinary checks, iii) problems of introducing captive bred birds and iv) uncertain origins of captive birds. However these issues were all addressed. Habitat (and prey) availability was assessed by the PhD study with three areas identified suitable, validated when two were colonized naturally and subsequently supported breeding pairs. Good health had

been established by independent vets over several years. Appropriate checks including fecal screening for parasites and microbial pathogens, blood smear for blood parasites, blood sample for haematology and biochemistry tests and a visual examination for ecto-parasites occurred on all individuals prior to release.

To reduce problems of releasing species with long learning periods and



Typical chough habitat © Ray & Alison Hales

complex social behaviors birds were parent raised, while a hand-raised bird was raised with siblings. All birds were socialized with up to 16 conspecifics overwinter in one large aviary and live invertebrate food placed under turf so birds learnt natural foraging techniques. Genetic origin of captive birds was established. A genetic study (Bruford & Tomaskovic, 2001) using samples from museum specimens and wild individuals indicated that extirpated Cornish birds were from the UK sub-species of red-billed chough. The same authors repeated this work using samples from all 16 captive birds; all were also from this sub-species. As was legally required at the time, all founding birds were government licensed and registered, and were believed to originate from Wales.

Two critical organizations also carried out a study on re-introduction to Cornwall. Addressing IUCN guidelines they concluded re-introduction was a possibility but too costly, time consuming and unpredictable and that short-term efforts should focus on habitat management and assessing the progress and viability of the re-colonized population (Carter *et al.*, 2008). Three years prior to the release (May 2000) two red-billed choughs (both females aged five years) escaped from Paradise Park. Both were regularly re-sighted and identified by their color rings. Although separated, both found coastal habitat; one survived 28 days before found dead, the other was re-sighted six months following escape. This showed that even in undesirable circumstances one at least was capable sustaining itself.

Implementation: The PhD research identified three potential release areas containing suitable habitat, invertebrate abundance and nest-sites. Two had become breeding sites for naturally recolonizing birds so the remaining area was used as the release site, 35 km from the nearest wild nest-site. Here an aviary 21 m x 7 m x 3.5 m was constructed within a private cliff-top residence. Two males and four females were sourced from Paradise Park. An older pair was translocated to the aviaries in February 2003, subsequently fledging young in the aviary, with four others translocated in July. Despite the old age of the breeding pair they were selected because they were pre-bonded and experienced breeders. Individuals were also selected to represent different blood lines within the captive population. All were released on 1st August 2003.

Post-release monitoring: Behavior, dispersal and survival of released birds was monitored by radio telemetry and direct observation. Radio transmitters were tail-mounted and birds located daily. Supplementary live food (wax and mealworms) was provided daily to aid monitoring, with birds learning to respond to an audible cue reinforced with a food reward. Within one week of release they formed two distinct groups, a male and female and a group consisting of the pre-bonded pair and two females. Initially the group remained within a small area, the other two over a larger area. Birds roosted in cavities at two coastal sites within contact range of each other. They flew strongly and took many exploratory flights, later dispersing more widely. Individuals showed natural behaviors, foraging in the same way as wild birds. In winter they frequently fed on invertebrates found in or under cattle dung in recently grazed fields, spending more time at coastal sites in the summer. They recognized predators, regularly mobbing raptors. Fecal

samples collected showed evidence of fly and beetle larvae, ants, spiders, adult beetles and vegetable matter.

Three died within four months of release. One female was found dead after nine days drowned in a cattle watering trough. A second female was found dead after 21 days predated by a peregrine. A third female was shot dead by a farm worker after four months. Two disappeared during the second month so by the fourth month only a male survived, last sighted six months after release. None have been re-sighted since, despite an extensive network of co-ordinated birdwatchers who re-sight color ringed individuals fledged from wild pairs.

Table 1. Details and fate of the six released red-billed choughs

Identity	Sex	Age at release	Rearing	Fate
S750	Male	11 years	Parent	Last seen September 2003
S751	Female	8 years	Parent	Last seen September 2003
S752	Female	8 years	Parent	Taken by predatory bird
S841	Female	7 years	Parent	Drowned in water trough
S866	Male	6 years	Hand	Last seen December 2003
S996	Female	4 years	Parent	Shot November 2003

Major difficulties faced

- Poor survival of released birds.
- The level of monitoring necessary was underestimated and more should have been invested in this, particularly during the post-release phase which affected assessing habitat use, social behavior and feeding ecology.
- Difficulty of radio tracking birds due to the terrain and poor weather (sea mist and fog). During a prolonged period of fog an airplane was used to locate individuals.
- Unusually hot and dry weather occurred shortly after release. This made the ground hard for three weeks, which was likely to have affected foraging efficiency and the availability of water. In response to a death in a watering trough, exit ladders and alternative water sources were provided.
- Lack of support from other conservation organizations, which resulted in negative publicity and the publication of misleading information which undermined the project.

Major lessons learned

- Ideally it should have included some younger individuals. The release of adult birds may not be a problem since the release of other social birds, for example the mariana crow (*Corvus kubaryi*), griffon vulture (*Gyps fulvus*) and California condor (*Gymnogyps californianus*) has shown that birds a year old or older may fare better than juveniles. However, the potential number of breeding attempts from older birds is reduced.

- Re-introduction likely to establish a viable population would require the release of a much larger number of individuals, over several years. Had this pilot re-introduction been given support by other organizations we would have continued this work applying lessons from this trial. This trial was intended as a basis for future releases, and could have led to further cohorts being released after consideration of the results.



Release aviary © Ray & Alison Hales

- There was a suggestion of naivety affecting survival, for example drowning in a cattle trough (although not an uncommon cause of mortality in wild birds). However survival of wild fledged young in Cornwall has also been very low (of nine fledged in 2010 five had died within two months and all by the end of the year).
- Release could have waited to see how the recolonized population developed to avoid the resulting ideological conflict with other conservation organizations. These organizations were particularly critical of releasing birds at this time since they felt birds may have had socialization problems and disrupt wild breeding pairs. We feel this was unlikely since the released birds were all socialized together in captivity and none showed abnormal behaviors. The released birds did not interact with the recolonized population, although had they become established that would have occurred in time.
- Failure to publically and clearly make clear how IUCN guidelines were followed which resulted in poor public relations and worsened relations between Paradise Park and other organizations.

Success of project

Highly Successful	Successful	Partially Successful	Failure
		√	

Reason(s) for success/failure:

- Release methods were successful with individuals roosting in the vicinity and responding to an audible cue to facilitate monitoring and assessing health.
- Individuals remained in social groups and a pair remained together and settled in one locality until the female was shot.
- Individuals did not show any abnormal behavior.

- All released birds had died or had disappeared within six months. One of these had been shot by a farm worker, one had drowned in a cattle water trough and one was taken by a predatory bird.
- Poor relationships with other conservation organizations caused lasting damage to future work. Poor public relations also resulted in confused interpretation by the conservation media, as well as the wider media. These both remain very significant issues eight years later, and are hampering restoration efforts by all organizations despite widespread public support.

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