Supplementary online material:

We used a simple predator-prey model, where one predator (golden eagle = E) has the choice between two prey (fox = F, and piglet = P).

\[
\begin{align*}
\frac{dF}{dt} &= r_i F \left(1 - \frac{F}{K_i}\right) - \mu_i \frac{\phi F}{\phi F + P} EF \\
\frac{dP}{dt} &= r_p P \left(1 - \frac{P}{K_p}\right) - \mu_p \frac{P}{\phi F + P} EP - \omega P \\
\frac{dE}{dt} &= \mu_f \lambda_f \phi F^2 + \mu_p \lambda_p P^2 \frac{\phi F + P}{E - \nu E - \delta E}
\end{align*}
\]

Each prey population \(i\) is characterized by its intrinsic growth rate \(r_i\), its carrying capacity \(K_i\), a predation rate by eagles \(\mu_i\), and a term of eagle preference for foxes \(\phi\) relative to piglets. Eagle mortality rate is \(\nu\) and the rate at which prey \(i\) are turned into new predators is given by \(\lambda_i\). The control of pigs and eagles are given by \(\omega\) and \(\delta\), respectively. Parameter estimates are the same as in (S1). Simulations are based on varying the intensity of \(\omega\) and \(\delta\) (from zero to 100%) for six years, the projected time to complete pig eradication (S2, S3), or for 100 years.

The model assumes a simple response from the eagle: after their primary prey is reduced or eradicated, eagles feed more heavily on foxes. This simple, linear response likely has more complex dynamics, especially if other species are considered. Alternative prey might be expected to lessen the eagle’s impact on the fox, but our previous work suggests that foxes and piglets were the eagles’ principle prey (S1). Alternative prey also might increase eagle survival and persistence, thereby leading to higher, long-term eagle
predation on the fox. Other factors not considered in this model, including stochastic variation in vital rates, environmental perturbation, Allee effects, disease introduction and the presence of pig carcasses left over from the eradication all are expected to further increase the probability of fox extinction. Models accounting for the presence of pig carcasses or of an Allee effect in foxes (not shown) showed increased extinction risks.

Moreover, comparative estimates of the persistence of fox populations of different size suggest that the risk of extinction increases with declining population size and disease severity (S4). At a population size of $\geq 200$ foxes extinction risk is only 1% in 50 years. When population size declines to 50 individuals extinction risk increases to 20% and at 20 animals it increases to nearly 60%. Population declines due to catastrophic events have actually occurred. Between 1998 and 1999, the Santa Catalina Island fox population was reduced by approximately 90% owing to a canine distemper virus epizootic (S5). Any deterministic decline of an island fox population would therefore raise the probability of stochastic extinction to unacceptable levels.


