Introductory remarks

A demographic frame for reintroductions

Reintroduction is a popular but much debated conservation tool. It is often seen as costly, too species-focused, and risky. Part of these programs concern locally-extinct species that are not globally threatened (Seddon *et al.,* 2005). Although no clear definition of success criteria is available (*e.g.,* Seddon, 1999; Osterman *et al.,* 2001), probably less than half of reintroduction programs can be considered successful. However, numerous examples contradict this pessimistic viewpoint and reintroduction is often the last chance to restore locally-extinct populations within management time horizons. Although the link between ecological theory and reintroduction pratice has already been advocated to increase efficiency (May, 1991) and challenge ecological theory (Sarrazin & Barbault, 1996), extensive evidence-based approaches are still needed to provide robust management guidelines (Pullin & Stewart, 2006). Recently, Seddon *et al*. (2007) proposed a whole range of research practices to define a “science of reintroduction biology”. They showed that among 454 papers published on reintroduction from 1990 to 2005, only 21% dealt with population dynamics issues and only 15% included modeling to project growth and/or viability of reintroduced populations. This lack of population approaches in reintroduction remains surprising. Whatever the local or global conservation target, the aim of reintroduction should be to move a population along a “Red list gradient” from “extinct” to “least concern” categories *i.e.*, to make it viable (IUCN, 1998). Thus, population biology provides a unique framework for planning and evaluating reintroductions since all factors (genes, environment, behavior, management, etc.) affect the success of reintroduction through survival, reproduction or dispersal of released individuals and their progeny. Estimating demographic rates without integrating these various factors is useless, but discussing the relative impact of these factors without seeing them through this demographic frame is equally pointless. Dobshansky (1973) stated that “nothing in biology makes sense except in the light of evolution”. At a far lower scale, it seems that “nothing in reintroduction makes sense except in the light of population biology”.

Numerous modeling tools - from matrix models of structured populations, to individual-based, spatially-explicit, demo-genetic and even economic models (*e.g.,* Tenhumberg *et al*., 2005) - are now available and all may contribute to our understanding of the dynamics of reintroductions. However, defining spatial and temporal scales to assess the viability of reintroduced populations is challenging. Similar to the stability and resilience of restored ecosystems, reintroduced populations should persist once they face abiotic control, reach carrying capacity, and suffer intra- and inter-specific interactions and human activities. We can thus define three obvious phases of reintroduced population’s dynamics: releases, growth, and regulation. Their duration, overlap and efficiency may strongly vary according to life cycles, habitat qualities and reintroduction strategies.

In this issue, we present a set of papers dealing with various aspects of reintroduction science. Some of these papers have roots in a French meeting on reintroduced and invasive populations that occurred in 1999 in Niederbronn les Bains (eastern France). Deterministic and stochastic processes —for which I accept a large part of the responsibility— almost brought this publication to a quasi extinction threshold several times. However, this delay allowed us to solicit additional papers and thus include up-to-date studies and reviews in this issue. These papers connect to demography, population dynamics and viability analyses and some of them go far beyond the reintroduction area. Ewen and Armstrong identify key issues that need to be considered when monitoring reintroduced populations and their habitats. Experimental approaches a too rare in reintroductions (see Armstrong *et al*., 1995). Bottin *et al*. present examples of experimental reintroduction of plants, and Letty *et al*. review experiments assessing short term effects on released animals. Henry and Pradel propose new estimators for population growth that may apply to declining as well as reintroduced populations. Deredec and Courchamp focus on the Allee effects in newly released populations, whereas Veran and Lebreton account for the dependence among individuals in population viability. Robert *et al*. explore various effects of demo-genetic interactions on reintroduced population viability. Finally, Lebreton *et al.* provide a new framework to define and assess extinction dynamics that may apply to reintroduced as well as native populations. We do not aim at being exhaustive here but we hope that these papers will contribute to the development of the science of reintroduction biology and encourage positive interactions between scientists and reintroduction managers.

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