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Editorial

A long-term view of rare plant reintroduction

Drawing on a literature review and survey questionnaires, Godefroid et al. (2011) explore how demographic, genetic, and ecological factors influence success rates in plant reintroductions and present valuable recommendations to improve plant reintroduction success. But we are concerned that the generally dismal picture they paint may erroneously be viewed by conservation practitioners, land managers, and policy makers as being broadly representative of reintroduction in general, causing hesitation or even dismissing reintroduction as a beneficial conservation tool.

Acknowledging time constraints inherent in their analyses, they characterize a 52% survival rate of outplanted individuals over four years as being quite low and assert that short-term trends in vital rates strengthen their conclusion that "reintroduction is generally unlikely to be a successful conservation strategy as currently conducted." We question the predictive value of such short-term trends for evaluating long-term success. Based on empirical data and simulation modeling, initial short-term population decline is the expectation (Guerrant and Fiedler, 2004). This demographic cost of reintroduction can be substantial, even in populations projected to grow rapidly once the survivors reach reproductive maturity. Reintroduced population persistence greatly depends upon life history, type and size of propagule planted (Albrecht and Maschinski, in press). Without additional information on the taxa and life histories represented in their figures, conclusions about project trajectories are premature.

The outcome of any review will depend upon the species, timescales, nature of studies and specific data considered. To archive and synthesize data on plant reintroductions, the Center for Plant Conservation (CPC) established the *CPC International Reintroduction Registry* (CPCIRR, http://www.centerforplantconservation.org/reintroduction/MN_ReintroductionEntrance.asp) recently reviewed in Maschinski and Haskins (in press). Surprisingly, CPCIRR data are largely independent of Godefroid et al. (2011); only 4% of the combined species ($n = 336$) were common to both datasets. Of the 49 reintroductions in the CPCIRR with known status as of 2009, 92% survived, 76% had reached reproductive maturity, 33% had produced a next generation, and in 16% the next generation had reproductive individuals (Guerrant, in press). Fates of the remaining reintroduced populations could not be determined due to lack of monitoring information. Thus, we, too, encourage sustained, long-term monitoring and reporting of reintroduced populations.

The CPCIRR data show that reintroduced populations can have long-term persistence (24 + years), and documenting population sustainability requires more than four years, especially for long-lived perennials (Maschinski and Haskins, in press). In our rapidly changing world, reintroduced populations can increase a species' distribution and abundance, improve gene flow enhancing metapopulation dynamics, and yield insight into the species biology, thereby reducing extinction risk.

Although there are undoubtedly biases in reporting successes over failed projects, as Godefroid et al. (2011) correctly highlight, some reintroductions have been monitored for >10 years, and have successfully contributed to species recovery (e.g. *Potentilla robbinsiana* http://www.ecos.fws.gov/docs/federal_register/fr3937.pdf). We encourage conservation practitioners to consult published guidelines (see Maschinski and Haskins (in press) to improve the chance of reintroduction success and to report failed and successful projects. Conducting reintroductions as experiments is an effective and efficient way to identify specific techniques and management treatments that enhance population persistence. Godefroid et al. (2011) report a number of factors associated with greater success. Of 89 CPCIRR reintroduction projects with adequate information, 70% were designed to test specific hypotheses on factors influencing reintroduction success. These help diagnose the cause(s) of failed reintroductions and improve future attempts, which is problematic in the absence of an experimental framework (Godefroid et al., 2011).

Reintroduction science is making demonstrable progress, but it is still a young science. The ability of reintroduction to contribute to endangered species recovery is significant, and enhanced when it is part of larger, integrated strategies that encompass in situ and ex situ practices.

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