Chapter 8

Reintroductions

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8.1 Introduction

Reintroduction of animals to the wild has frequently been promoted as the primary reason for breeding animals in captivity. However, captive breeding may contribute to conservation through actions that do not involve reintroduction (e.g., education, research) and reintroductions do not necessarily involve a captive component. Indeed, for many amphibian species, reintroductions may be achieved more efficiently, more safely and more cost effectively if they do not involve a captive breeding component. Simple translocation of spawn or tadpoles, for example, can be an effective tool in species recovery. Where high levels of spawn or tadpole mortality are prevalent, head-starting tadpoles by raising them beyond the stages at which they are vulnerable to competitors, predators or other threats may also be preferable to captive breeding. Nevertheless, there are many issues that need to be carefully considered and addressed when a reintroduction is planned or carried out. The IUCN (1998) guidelines for reintroductions provide a framework for the protocols to be followed for amphibians, but may need modifying in view of species-specific requirements or linkages to other themes within ACAP.

Many species are likely to recover on their own following mitigation of the threats coupled with habitat management, restoration or creation. Indeed, natural recolonization is likely to be more effective in terms of establishing viable populations, as well as logistics and costs. If natural recolonization is not possible because the restored habitat is isolated, consideration needs to be given to whether the area can support a viable population (or metapopulation) even if a reintroduction takes place. Reintroduction should therefore only be considered as an option where these mechanisms are deemed insufficient for ensuring species recovery on their own. Whether or not they involve captive breeding, reintroduction programs for amphibians are at an early stage of development, and it will be many years before we can make unqualified judgements concerning their effectiveness as a tool for conservation. Certainly more science is needed, but given the current biodiversity crisis, we cannot wait for all the necessary hypotheses to be rigorously tested before acting. Adaptive management—which relies on continuous review and refinement of program protocols based on prior experience—will therefore always be an integral part of amphibian reintroduction programs, and of conservation programs in general.

8.2 Selecting Species for Reintroduction

Although a large number of species are recommended for reintroduction within the Global Amphibian Assessment (GAA), the selection of these species appears to be rather arbitrary and not based on objective criteria. There appears to be variation between regions in the tendency to recommend species for reintroduction, and this may reflect regional variation in expertise and personal interests rather than real needs for reintroduction. It is therefore essential that species are carefully appraised for their suitability for reintroduction.

The following criteria provide guidance for evaluating whether a species is suitable for reintroduction.

8.2.1 Status and distribution of the species

Without this information, it is difficult to make any objective recommendations for conservation or assess whether reintroduction is appropriate. Priorities for reintroduction should focus on globally threatened species, although locally threatened species may also be considered when they are of local political or cultural importance.

8.2.2 Reversibility of threats

The most successful animal reintroductions have usually involved those species that have threats that are easily neutralized (Griffith et al. 1989; Caughley 1994; Wilson and Stanley-Price 1994). Threats that are more likely to be reversible are often those associated with direct persecution, pollution and those that can be realistically addressed using legal, political or cultural processes that are enforceable. It is often easier to reverse threats in clearly delimited geographical areas, such as islands, than it is in habitats that grade into each other. One problem facing amphibians is that the threats that they face are complex, often synergistic, and not easily reversed (Beebee and Griffiths 2005). The reversibility of threats should therefore influence which species are considered for reintroduction programs. Reversing localized agents of decline, such as introductions of fish or other predators, is likely to be more feasible than reversing global threats such as climate change and increased UV-B.

8.2.3 Life history

Species in which certain life stages can be safely collected and translocated without detriment to the donor population will be most suitable for reintroductions. Such species will usually be those that have high fecundity and robust eggs, larvae or metamorphs that can be transported easily. Donor populations of species that display clear density dependence in larval development and survival are less likely to be impacted by the extraction of animals for translocation than populations that display other forms of population regulation.

8.2.4 Geographical priorities

Geographical priorities may be associated with priority areas for conservation, or areas where the political or logistic support is likely to increase the chances of success of a reintroduction. Most reintroductions carried out to date have been in temperate areas, rather than in those areas that support high levels of amphibian diversity. Careful consideration therefore needs to be given to balancing priorities between those geographical regions that are low in biodiversity but rich in expertise and infrastructure, and those areas poor in expertise and infrastructure but rich in biodiversity.

8.2.5 Taxonomic priorities

Monotypic genera or families, members of ancient lineages or taxa that are otherwise poorly represented in conservation programs may be considered a priority in some circumstances. Where expertise and knowledge has been previously gained on a widespread or non-declining species, it may be cost-effective to consider closely related, threatened species for reintroduction as these may benefit from the existing knowledge base.

8.2.6 Wider biodiversity considerations

When a species is part of an ecological community or natural system that is of wider biodiversity interest, it may be considered a priority. Such species may play an important role in maintaining community structure and thereby influence other aspects of biodiversity.

8.3 Actions to Execute a Reintroduction

8.3.1 Publicity, public relations and information

These will be achieved by timely press releases, information leaflets, website information, T-shirts, post cards etc. In some cases it may be possible to develop nature tourism and possibly other economic incentives based on the species concerned. These actions should mobilize public support and consolidate political—and possibly financial—backing for the project.

8.3.2 Pre-release assessment of the wild populations

The status and distribution of the species will be assessed by a combination of interrogation of existing sources of information (e.g., GAA, local atlases etc.) and field survey. Refinement of existing survey methodologies may be required as an adjunct research activity to allow this. Priority species will be those that have undergone clear contractions in historical range, and which would be unable to re-establish functional populations (or metapopulations) within that range without reintroduction. Introductions to areas outside the historical range will usually be discouraged, although climate change data may suggest that unsuitable areas outside the natural range may become suitable sometime in the future. Equally, restocking (or supplementing) existing populations carries disease and genetic risks (see below) and should not be considered unless numbers have fallen below those required for a minimum viable population and the associated risks have been assessed.

8.3.3 Applied ecological research on life history and habitat requirements

Basic population demographic data on the species will be gathered if these parameters are not already known, as these will be required for population viability analysis and for informing decisions about which stages of the life cycle should be used for the reintroductions. Similarly, habitat requirements will be determined so that habitat management, restoration and creation can be carried out in a way that will maximize the chances of the reintroduction succeeding (see below).

8.3.4 Threat mitigation, habitat management, restoration and creation

The threats leading to the decline or extinction of the species will be evaluated and neutralized following the protocol described by Caughley (1994). It is unlikely that some important threats to amphibians (e.g., climate change, UV-B, etc.) can be neutralized, at least in the short to medium term. In such cases, reintroduction is unlikely to be a sensible option.

Following the assessment of habitat requirements, potential reintroduction sites will be evaluated for management requirements. The program of habitat management will involve maintaining or enhancing existing areas, restoring areas that still exist but have become unsuitable and creation of new habitat where appropriate (or a combination thereof).

8.3.5 Population viability analysis, release protocols, and strategic recovery plan development

Population and Habitat Viability Analysis (PHVA) may assist in determining targets for minimum viable populations, habitat requirements, and the time frames required to establish such populations (Akcakaya et al. 2004). These targets should then be embraced within a staged planning process, with interim milestones if necessary to monitor progress as the project develops. Knowledge of the life history of the species should be used to determine appropriate targets and time frames for success. EU legislation requires member states to maintain—or restore to—‘favorable conservation status’ those species of community interest, and this is being used as a generic target in many species recovery programs (although explicit definitions of this term may vary from species to species, and region to region).

The reintroductions will involve the release of eggs, larvae and/or metamorphs, as previous reintroduction programs have shown that using these stages is most likely to lead to success. However, further research is needed on release protocols, (e.g., the relative proportions of the different stages, 'soft' vs. 'hard' releases, trade-offs of captive vs. wild stock, applicability of head-starting technologies). The reintroductions will therefore serve as ecological experiments for testing hypotheses concerning these issues, and protocols will be refined accordingly.

An appropriate organizational infrastructure needs to be established to ensure the success of the program. This will invariably require the cooperation of a wide spectrum of stakeholders ranging from local communities to government officials. There may be legal obstacles associated with the release of organisms into the wild that need to be overcome. Effective lines of communication need to be established, language barriers overcome and transparent mechanisms for resolving differences of opinions established.

8.3.6 Risk analysis

The movement of living organisms from one place to another carries various risks. These risks may be genetic, ecological or socio-economic. Genetic risks are associated with the release of maladapted animals into an area. Donor populations will be screened for any potential problems associated will possible maladaptations or inbreeding. This will be combined with a landscape level analysis of the release site to ensure that the released population will not suffer from any genetic problems as a result of habitat isolation in the future. There may also be concern over the release of animals whose taxonomic relationships are unresolved. Linkage with the ACAP Systematics Working Group will be maintained to resolve any issues in this area.

Ecological risks embrace issues associated with the inadvertent transmission of disease or other organisms. Apparently benign organisms may have unforeseen impacts on food chains when transmitted to new environments. Protocols will therefore be in place to minimize the risk of transmission of propagules of potentially invasive species. Comprehensive health screening will be carried out on 1) animals from the donor population (captive or wild); 2) all amphibian species present at the release site. The protocols will follow those established by the ACAP Disease Working Group (See Chapter 4). Socio-economic risks are associated with impacts on the livelihoods of local people. If the reintroduction results in the exclusion of people from traditional areas or ecological impacts that impact on agriculture or other income-generating activities, there may be ramifications for its likely success. Surveys of attitudes towards the reintroduction within local communities will therefore be carried out and any conflicts of interest resolved.

8.3.7 Post-release monitoring

Many amphibian species have cryptic life styles that render them extremely difficult to monitor. Consequently, research on the refinement of monitoring protocols will inform the design of post-release monitoring. Equally, the longer the generation time of the species the longer the timeframe needed for establishing ‘success’. In order to demonstrate whether the reintroduction has resulted in the founding of self-sustaining populations, each reintroduced species will be monitored for multiple generations. Population and habitat viability analysis will be used to develop the timeframes over which ‘success’ can be realistically assessed using demographic and habitat data.

8.4 Budget

There are many difficulties in deriving a generic budget for funding amphibian reintroductions. Because of the long-term nature of most reintroduction strategies it is probably unrealistic to persuade a single donor to commit funding for the entire duration of a project. However, a fund-raising strategy should be in place that should be consistent with the staged planning process mentioned above, so that breaks in the continuity of the project are avoided.

Recovery programs are often funded through short-term grants which often make maintaining continuity of expertise problematical. The coordinating body for a reintroduction program will usually be the local or national governmental conservation agency, and it will be the responsibility of this agency to ensure that the roles of different partners are clearly identified so that all parties are aware of their commitments. Personnel changes in either the lead agency or project partners can jeopardize reintroduction projects and the organization of the reintroduction program needs to account for this.

The logistics and costs of carrying out the activities required for a reintroduction program will vary by an order of magnitude between taxa and regions, and there are very few estimates of costs for any amphibian conservation programs. In England, the costs of carrying out development mitigation for great crested newt conservation—which embraces some but not all of the activities required for reintroduction—varied between UK£ 1350 and > UK£ 100,000 per project (Edgar Et al. 2005). This variation was largely due to differences in the scale of the projects undertaken—some lasted a few days while others extended to several years. The costs in Table 8.1 are based on reintroduction programs of four species of threatened amphibian in Europe (Bufo calamita and Rana lessonae in England; Rana dalmatina in Jersey;

Alytes muletensis in Mallorca). The budget assumes that a thorough preliminary evaluation of the suitability of the species for reintroduction has already been performed by interrogation of the GAA, consultation with experts and literature survey. Some of the proposed activities may be short-term, and perhaps achieved within the timeframe of one year, while others will require a long-term commitment, but it is envisaged that no projects could be realistically completed in less than five years. However, the costs reflect the fact that certain activities (e.g. habitat management/threat mitigation) may require large initial outlays followed by rather lower annual maintenance budgets. Not all of the activities listed may be applicable to all projects and some projects may require specialist activities that are not listed. Economic circumstances may mean that projects carried out in tropical countries are proportionately cheaper, but this may be offset by higher travel costs and more difficult logistics. In most cases, reintroduction is likely to be a relatively expensive conservation option, particularly if it is combined with captive breeding. When a species can be conserved via habitat management/protection and/or threat mitigation the costs are likely to be considerably lower. Given current available expertise and methodologies, we propose that the ACAP reintroduction program should initially focus on a priority list of 20 species that will be compiled following the species selection process.

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Table 8.1. Suggested budget for carrying out an amphibian reintroduction program in Europe or North America. Costs shown are proposed costs (US $) per species for projects of up to 10 years duration (some projects may require > 10 years). Costs are based on travel, accommodation, equipment, consumables and overheads, but exclude staff salaries and/or student stipends.

	Duration of project		
Activity	1 year	5 years	10 years
Publicity, public relations and information	2000	4000	8000
Pre-release assessment of the wild population	8000	40,000	/
Applied ecological research on life history and habitat requirements	10,000	50,000	/
Habitat management, restoration and creation and threat mitigation	15,000	35,000	450,000
Population viability analysis and strategic recovery plan development	6000	/	/
Health monitoring and disease assessment	10,000	18,000	22,000
Genetic assessment	20,000	25,000	30,000
Local communities assessment	4000	/	/
Post-release monitoring	4000	20,000	40,000
Total	79,000	192,000	550,000