GLOBAL RE-INTRODUCTION PERSPECTIVES

Re-introduction case-studies from around the globe

Edited by
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Published by: IUCN/SSC Re-introduction Specialist Group

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Cover photo: Clockwise starting from top-left:
- Formosan salmon stream, Taiwan
- Students in Madagascar with tree seedlings
- Virgin Islands boa

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Re-introduction of Puerto Rican crested toads to historic range in Puerto Rico

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Introduction
The Puerto Rican crested toad (Peltophryne lemur) is listed as threatened by the
United States Fish and Wildlife Service and critically endangered by the IUCN.
Two genetically distinct northern and southern populations once existed in Puerto
Rico. The northern populations are extirpated in the wild. The only known wild
population is found in Guanica National Forest and over 25 years the population
has fluctuated between 500 and 2,000 adults. A stable breeding population of
northern and southern toads is held in captivity. Addressing threats is important
given the small population, single breeding pond and potential for a catastrophic
event to cause extinction. The American Zoo Association Species Survival Plan
(SSP) for the crested toad was approved in 1984. A USFWS Service Recovery
plan was written in 1991. The SSP has merged management goals with those of
the recovery plan. Recovery partners: 21 zoos and aquariums (US, Canada, UK
and Puerto Rico), USFWS, Puerto Rico Department of Natural and Ecological
Resources, University of Puerto Rico, Puerto Rican National Park Company at
Juan Rivero Zoo, Iniciativa Herpetologica, Inc. and Citizens of the Karst.
Recovery priorities for this species are coordinated through the FWS Puerto
Rican Crested Toad Recovery Plan and Population and Habitat Viability Analysis
Working Group.

Goals
- **Goal 1**: Creation of new ponds to support six self-sustaining meta-
  populations (three in the north and three in the south).
- **Goal 2**: Expansion of ecological research.
- **Goal 3**: Protection and restoration of existing habitat.
- **Goal 4**: Island-wide education and outreach.
- **Goal 5**: Re-introduction of tadpoles from captive genetically and demographically managed
  population.
- **Goal 6**: In-country training and
capacity building.

**Success Indicators**

- **Indicator 1**: To meet demographic and genetic goals of captive management, expansion of captive population to over 400, supplemented by tadpoles collected from wild.
- **Indicator 2**: Post-release survival to maturity in wild of captive bred tadpoles.
- **Indicator 3**: Breeding of adult toads released as tadpoles within 10 years; ongoing until six meta-populations breeding for 10 years.
- **Indicator 4**: No net loss of breeding habitat.
- **Indicator 5**: Increased profile and awareness of threats to toads.
- **Indicator 6**: Increase in number of constructed breeding sites (to support meta-population persistence) on protected lands.
- **Indicator 7**: In-country training and establishment of captive breeding and release in Puerto Rico.

**Project Summary**

**Feasibility**: Focus would remain on protection, hydrological research, and addressing threats to the single remaining natural breeding wetland in Guanica forest. Only tadpoles (to maintain a potential founder group of 20) from separate tadpole schools or pond sections would be collected to establish captive populations. Several research projects were initiated on the captive populations (genetic, growth, health screening, and nutritional). Lack of awareness of the existence of the toad and the threats to its survival were identified and stakeholder groups identified. Forging working partnerships with shared goals was initiated through working meetings with USFWS, DNER and AZA SSP with invited stakeholders. Working groups expanded to include all stakeholders and formalized in a PHVA Masterplan. A GIS based survey of potential release sites was subjected to further on site analysis to select best sites to establish satellite populations.

**Implementation**: Recovery efforts are directed through a Memorandum of Understanding between the USFWS, Department of Natural and Ecological Resources (DNER), Puerto Rican National Park Company and the AZA. Permit requirements are met through annual issue of blanket permit listing participating institutions to facilitate and expedite (within six days of hatching) movement of tadpoles back to Puerto Rico. All tadpoles are released at the earliest age possible to ponds outside the existing migratory range of the single extant Tamarindo breeding site.
population and within ground truthed habitat profiles in the historic range of the toad. All tadpoles are subject to health screening prior to release; random testing for disease; and no tadpoles are released from groups with parents with illness or death and tadpole groups with unexplained deaths prior to release.

**Post-release monitoring:** Marking techniques for tadpoles and technology to efficiently track toads through a labyrinth of subterranean limestone caverns has yet to be developed. Subsequently, post metamorphic survival and movements have been the subject of graduate projects. All natural and constructed breeding ponds are monitored for breeding activity under guidelines establishing windows for searches. Monitoring of historic and release sites has begun using automated frog call loggers. Health assessment studies of sympatric species and crested toads is ongoing. This also includes chytrid fungus screening.

**Major difficulties faced**
- Difficulty of monitoring either adults or juvenile toads in natural habitat.
- Lack of protected release sites in the north.
- Loss of protected wild habitat.
- No formal biological research program to understand natural history and severity of identified threats paralleling efforts to maintain assurance populations.
- Funding for inter-disciplinary research.

**Major lessons learned**
- Large number of early age metamorphs required to mimic natural life stage mortality tables (i.e. ramp up partners to meet numbers before releases attempted).
- Importance of establishing in-country partnerships and agreement on shared goals at earliest stages.
- Need to establish assurance populations early even while protection of natural habitat and addressing threats is being undertaken.
- Need for and value of social marketing skills and trained professionals to deliver these skills.
- Need for leadership to win small short-term victories in the face of overwhelming odds and to show success while formal long-term programming is under development.
- It may take up to 10 years before establishment of a re-introduced population;
highly variable dependant upon number of offspring released.

Success of project

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<th>Highly Successful</th>
<th>Successful</th>
<th>Partially Successful</th>
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Reasons for success/failure:
1. Juvenile recruitment has been confirmed at one southern location (the other two release sites are less than two years old); ongoing construction of ponds for increasing protected breeding habitat is underway.
2. Breeding of adult toads themselves released as tadpoles into ponds constructed for release has been confirmed over two breeding seasons.
3. Increased awareness of threats and partnerships for conservation action.
4. We are seeing recruitment at the main release site and the Puerto Ricans are finally taking ownership of this project. This program has also been used as a model for many other release programs). Long-term population persistence has not been documented, so partially successful in that regard.