Global conservation translocation perspectives: 2021

Case studies from around the globe

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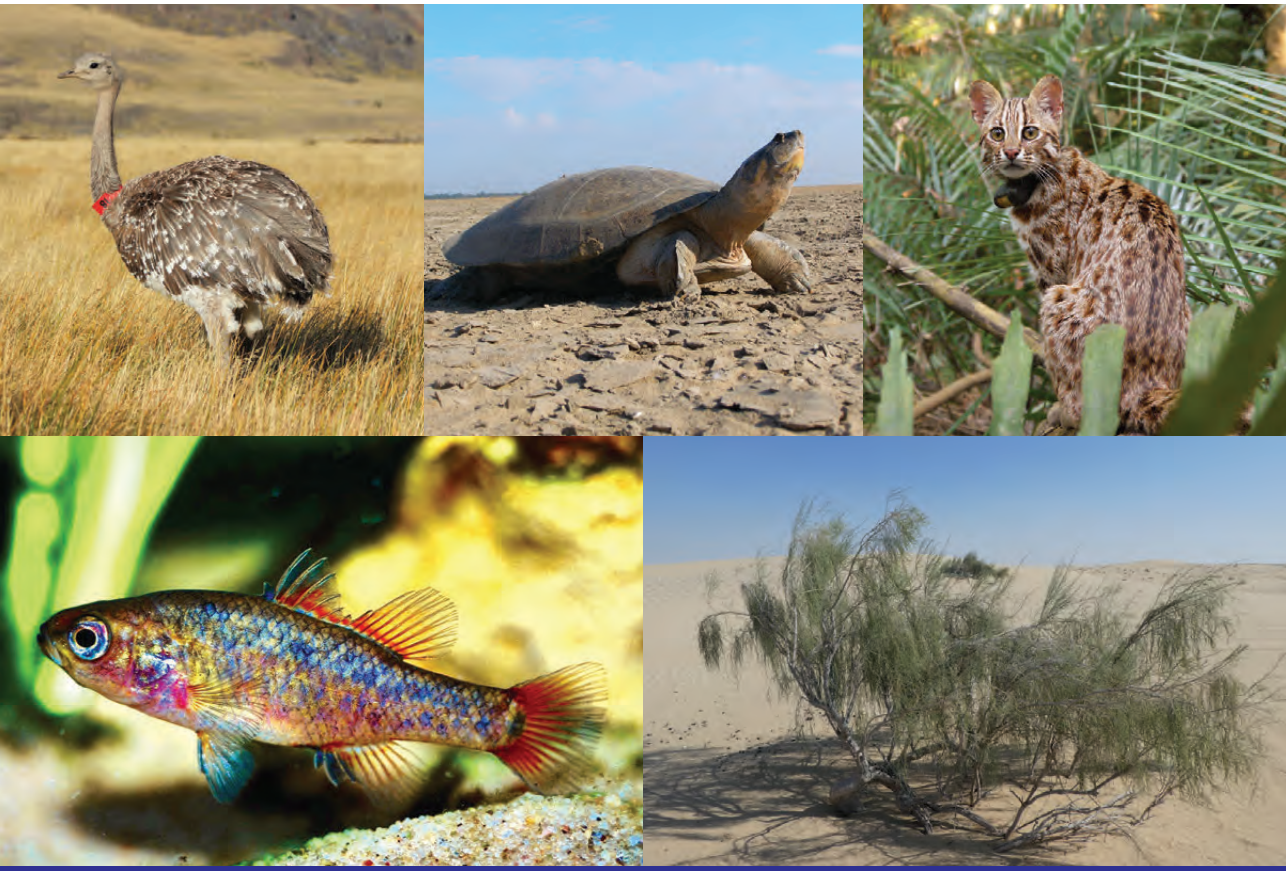

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Leaping from extinction: Rewilding the relict leopard frog in Las Vegas, Nevada, USA

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Introduction

The Springs Preserve (Preserve) is a 73 ha urban park known as the birthplace of Las Vegas, Nevada, USA. Historically, the Preserve contained three springs that flowed into riparian meadows. These spring systems were once inhabited by the Vegas Valley leopard frog (*Rana fisheri*), which was once presumed extinct but has persisted in central Arizona, USA. Today, the Preserve is privately-owned by the Las Vegas Valley Water District (LVVWD), the local municipal water purveyor. As part of ongoing restoration efforts, ponds were constructed at the Preserve to rewild the state-protected Relict leopard frog (*Rana onca*), a species considered Endangered by the IUCN. This frog species was once presumed extinct, but populations persisted along drainages of the Virgin and Colorado rivers in Arizona and Nevada, USA (Jaeger *et al.*, 2001).

Since then, eight natural populations have been documented and 13 refugia sites established. In spring 2018, surveys at all known sites documented a total of 1,125 frogs; although, the actual number was likely several times larger. The establishment of a population at the Preserve further protects the species from stochastic events that can lead to extinction.

Relict leopard frog © Aaron Ambos

Relict leopard frog tadpole © Aaron Ambos

Goals

- Obtain regulatory and legal agreements, permissions, and permits necessary for private land owners to conduct actions that may contribute to the recovery of species listed as endangered or threatened under the U.S. Endangered Species Act.
- Design and construct a pond mesocosm suitable for Relict leopard frogs.
- Establish a self-sustaining population of Relict leopard frogs.
- Increase geographic distribution and total population count to increase species resilience to stochastic events.
- Educate public about the plight of the Relict leopard frog and foster community support.

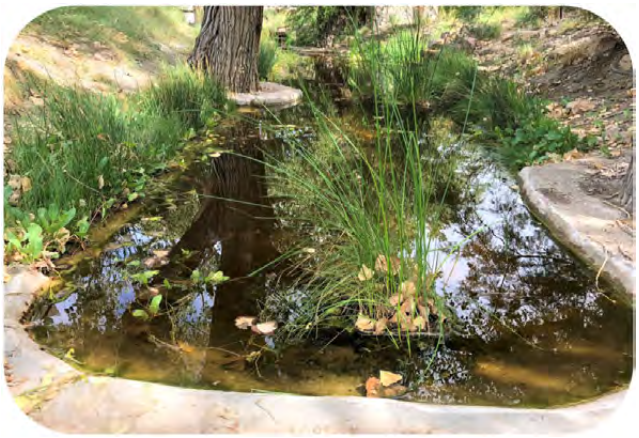
Success Indicators

- Ratification of Landowner Cooperative Agreement with Nevada Department of Wildlife (NDOW).
- Establishment of pond mesocosm at designated site.
- Obtain and translocate Relict leopard frogs.
- Relict leopard frog population becomes self-sustaining.
- Implement public education programing on conservation efforts.

Project Summary

Feasibility: To assist with conservation of the Relict leopard frog, additional public education and refugia populations are required. The Preserve was identified as a potential translocation site because: 1) it is a secure property that will reduce the likelihood of illegal introductions of non-native species, 2) it hosts two museums that promote conservation and public education, and 3) it was historically inhabited by the extirpated Vegas Valley leopard frog.

The Preserve, however, encompasses a 44 ha operational groundwater well-field that provides water to meet Las Vegas' peak municipal demands. In order to maintain operations of the active well-field, while ensuring the safety of a Relict leopard frog population, a 15-year Landowner Cooperative Agreement was ratified in 2017 by LVVWD and NDOW under a programmatic Candidate



Pond mesocosm in pond © Raymond A. Saumure

Conservation Agreement with Assurances between the U.S. Fish and Wildlife Service (USFWS) and NDOW. The legally-binding document spelled out the rights, responsibilities, and obligations of the parties (LVVWD & USFWS, 2017).

Implementation: The design and construction of a pond mesocosm suitable for Relict leopard frogs was potentially the most challenging part of the project. Two previously-built ponds at the Preserve had been negatively affected by decomposing leaves from overhead Cottonwood trees (*Populus fremontii*). Supplemental aeration and filtration was necessary in order to rectify water quality issues. Once funding and approvals were secured, a new low-maintenance pond mesocosm was designed in August 2016. This design included two interconnected concrete ponds with shared aeration systems (i.e., bubblers, waterfalls), and both natural filtration (i.e., emergent macrophytes) and mechanical filtration (i.e. high-capacity skimmer baskets, settling basin). The intricacies of the unique aeration and filtration systems were detailed in Wallace (2018).

Relict leopard frog eggs were collected in spring 2018 and 2019 from natural populations in Lake Mead National Recreation Area, Clark County, Nevada. Tadpoles were reared in a laboratory setting by biologists from the University of Nevada, Las Vegas. Once the ponds were working as designed in May 2018, 100 newly metamorphosed Relict leopard frogs were released into the ponds. An additional 101 tadpoles and 111 newly metamorphosed frogs were translocated from March to May 2019.

Post-release monitoring: Since the ponds can be visited regularly by staff, post-release monitoring has occurred almost daily. Upon the release of the initial 100 young frogs in May 2018, a female Mallard duck (*Anas platyrhynchos*) was observed consuming several frogs as they floated on the surface of one of the ponds. These laboratory-raised frogs appeared to have not developed effective flight response, which was compounded by a lack of dense cover in the newly-planted riparian areas. Few frogs were observed during subsequent diurnal visits.

A nocturnal visual encounter survey (VES) in July 2018 noted the presence of only six Relict leopard frogs. By October 2018, four (one male and three females) large adult-sized frogs were captured and PIT tagged during a nocturnal survey.

Although little is known about the overwintering habits of this species, dataloggers revealed that water temperatures in the two ponds decreased to 0.5°C and 1.5°C, respectively, over the winter of 2018 - 2019. All extant natural populations of Relict leopard frogs inhabit geothermally influenced systems, where water temperatures can reach 30 - 55ºC at sources (Bradford *et al.*, 2005). Nonetheless, refugia populations have been established at sites with colder water (Conservation Team, 2016).

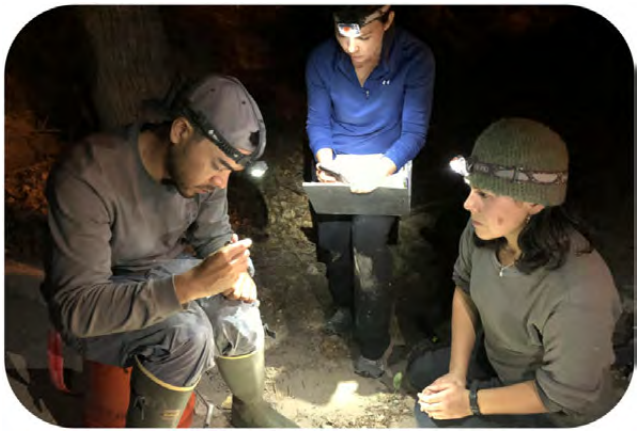
In March 2019, a nocturnal survey revealed the presence of two adult Relict leopard frogs. A male was captured at that time and its identity confirmed via PIT tag. This male, released as a newly metamorphosed frog in May 2018, was calling prior to capture, and thus already sexually mature.

In April 2019, *in situ* reproduction was confirmed when hundreds of small tadpoles were observed in the ponds. Although no egg mass was observed, Relict leopard frog egg masses can contain up to 1,100 eggs (Conservation Team, 2016). Thereafter, tadpoles were observed regularly on sunny days resting on algae and vegetation, but were noticeably absent on overcast days. These tadpoles began to undergo metamorphosis in July 2019, and by August 2019, a VES documented 195 frogs and one tadpole in the ponds. Six of the observed frogs were of adult size.

In October - November 2019, 214 Relict leopard frogs were captured and marked in the ponds. Twelve of these frogs were of adult size, including a very large PIT tagged female from the 2018 cohort. A subsequent recapture revealed that an estimated 424 frogs inhabiting the ponds (with a 95% Confidence Interval=308 - 540). Although the vast majority of the frogs were young and had not yet overwintered, the presence of so many frogs is promising in terms of their potential contribution to the overall status of this species.

Major difficulties faced

- Prior to the addition of aeration and filtration systems, there was an unanticipated decline in water quality because of large quantities of decomposing leaves in the fall and winter. The 2012 International Swimming Pool and Spa code recently adopted by the City of Las Vegas requires any body of water built deeper than 46 cm to be surrounded by child-proof, unclimbable, security fences. After consultation with the City of Las Vegas, it was determined that the ponds met the code requirements of a man-made lake used for recreational, scenic, or landscape purposes; therefore, no pool fencing was required.
- In spring 2018, the density of native plants in the riparian zone did not provide the translocated frogs with sufficient cover from previously undocumented avian predators. Riparian plant growth by 2019 appeared sufficient to resolve this issue.
- In 2018, most of the lab-raised young Relict leopard frogs did not appear to exhibit a sufficient flight response upon release to avoid avian predation. The contrast in wariness was especially evident in 2019, as the young frogs that developed *in situ*, or from tadpoles released at the site, had



PIT tagging frogs © Raymond A. Saumure

pronounced flight responses.

- The mechanical aeration system (i.e., bubblers) had to be adjusted so that the bubbles did not prevent falling leaves from reaching two large skimmer baskets. Given the closed nature of the system, large quantities of decomposing leaves could still potentially lead to water quality issues.

Major lessons learned

- Small pond mesocosms require supplemental aeration and filtration.
- In 2019, modifications to the translocation protocol were implemented in an attempt to reduce the impact of diurnal avian predators: 1) all translocations were scheduled at dusk to allow animals to acclimate prior to experiencing potential diurnal avian predation, and 2) large tadpoles were released in addition to the newly metamorphosed frogs.
- Although plant cover was substantial by 2019, cover was further enhanced in 2019 by placing several partially-submerged large sandstone slabs in the riparian zone. These slabs were heavy enough that ducks could not dislodge them, with access only under the edges. Subsequent monitoring has documented numerous metamorphs and young frogs sheltered under these slabs.
- Survivorship of young frogs that developed from the eggs deposited *in situ* was probably higher than the translocated lab-reared young frogs.
- The rewilding of the Springs Preserve generated a surprising amount of positive local media coverage. This media coverage was leveraged to educate the public about the plight of imperiled amphibian species in the Mojave Desert.

Success of project

Highly Successful	Successful	Partially Successful	Failure

Reason(s) for success:

- The initial buy-in and subsequent commitment from partner agencies to see the project through, despite temporary setbacks, was critical to the success of the project.

- The pond was redesigned to be a low-maintenance mesocosm that provided redundant natural and mechanical aeration and filtration systems.
- Enhanced riparian habitat with additional cover to mitigate for previously undocumented avian predation by ducks.
- The probability of success was increased by adjusting translocation protocols for the species.
- Public education followed a multifaceted approach, including interpretive panels, site tours, and public television. These activities resulted in additional reporting in local print and social media, generating even more public interest.

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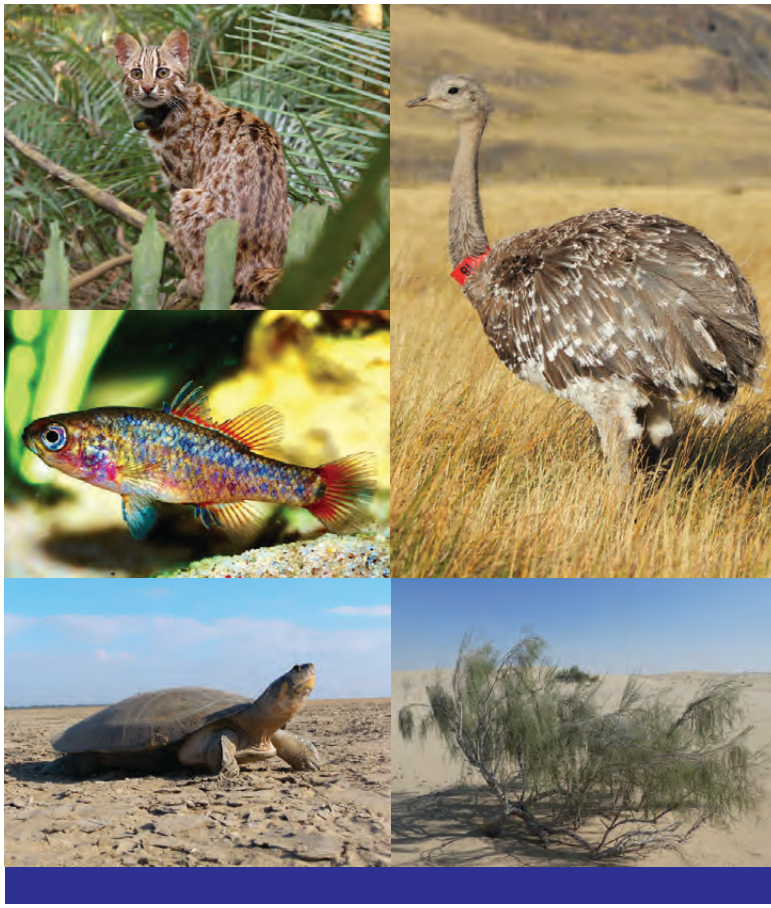

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